FULTON COUNTY BOARD OF COMMISSIONERS
SECOND REGULAR MEETING
February 18, 2026
10:00 AM

Fulton County Government Center
Assembly Hall
141 Pryor Street SW
Atlanta, Georgia 30303

A G E N D A

CALL TO ORDER: Chairman Robert L. Pitts

ROLL CALL: Tonya R. Grier, Clerk to the Commission

Robert L. Pitts, Chairman (At-Large)
Bridget Thorne, Commissioner (District 1)
Bob Ellis, Commissioner (District 2)
Dana Barrett, Commissioner (District 3)
Mo Ivory, Commissioner (District 4)
Marvin S. Arrington, Jr., Commissioner (District 5)
Khadijah Abdur-Rahman, Vice Chair (District 6)

INVOCATION: Reverend Clifton Dawkins, Jr., County Chaplain

PLEDGE OF ALLEGIANCE: Recite in unison

ANNOUNCEMENTS

PLEASE SWITCH ALL ELECTRONIC DEVICES (CELL PHONES, PAGERS, PDAs, ETC.) TO THE SILENT POSITION DURING THIS MEETING TO AVOID INTERRUPTIONS.

IF YOU NEED REASONABLE MODIFICATIONS DUE TO A DISABILITY, INCLUDING COMMUNICATIONS IN AN ALTERNATE FORMAT PLEASE CONTACT THE OFFICE OF THE CLERK TO THE COMMISSION. FOR TDD/TTY OR GEORGIA RELAY SERVICE ACCESS DIAL 711.

CONSENT AGENDA

26-0070 **Board of Commissioners**
Adoption of the Consent Agenda - All matters listed on the Consent Agenda are considered routine by the County Commission and will be enacted by one motion. No separate discussion will take place on these items. If discussion of any Consent Agenda item is desired, the item will be moved to the Second Regular Meeting Agenda for separate consideration.

26-0071 **Board of Commissioners**
Proclamations for Spreading on the Minutes.

Proclamation recognizing "Deborah Sengbloh Murphy Remembrance Day." **(Abdur-Rahman)**
February 5, 2026

Proclamation recognizing "Buckhead Art and Company Appreciation Day." **(Arrington)**
February 5, 2026

Proclamation recognizing "First Icononium Baptist Church Appreciation Day." **(Arrington)**
February 8, 2026

Proclamation recognizing "Kenan Thompson Appreciation Day." **(Arrington)**
February 12, 2026

Proclamation recognizing "Nathan Smith Remembrance Day." **(Arrington/Ellis)**
February 13, 2026

Proclamation recognizing "Marc H. Morial Appreciation Day." **(Ivory)**
February 15, 2026

Commissioners' District Board Appointments

26-0072 **Board of Commissioners**
FULTON COUNTY REPARATIONS TASK FORCE

The Reparations Task Force shall have the following members: Each Commissioner shall appoint two (2) members, for a total of 14 members. Each member shall be a resident of Fulton County at the time of the appointment. A member shall serve for a two year term and subject to removal by the appointing Commissioner for cause. No member's term shall exceed that of the appointing Commissioner, but shall remain as a voting member until replaced or reappointed by the successive Commissioner.

Term = 2 years. The Reparations Task Force shall sunset on December 31, 2025 unless continued by action of the Board of Commissioners. At the November 19th, 2025 Second Regular Meeting (Item #25-0890) the Fulton County Board of Commissioners adopted a resolution that extends the term of the Fulton County Reparations Taskforce for a period of twelve (12) months after the December 21, 2025 end date.

Term below expired: 12/31/2025
Rodney J. Littles **(Abdur-Rahman)**

Vice Chair Abdur-Rahman nominated Rodney J. Littles for a District reappointment to a term ending December 31, 2026.

26-0073 **Board of Commissioners**
FULTON COUNTY REPARATIONS TASK FORCE

Term below expired: 12/31/2023
Michael Simanga **(Abdur-Rahman)**

Vice Chair Abdur-Rahman nominated Michael Simanga for a District reappointment to a term ending December 31, 2026.

26-0074 **Board of Commissioners**
FULTON COUNTY REPARATIONS TASK FORCE

Term below expired: 12/31/2025
Karcheik Sims-Alvarado **(Hall)**

Commissioner Ivory has nominated Karcheik Sims-Alvarado for a District reappointment to a term ending December 31, 2026.

26-0075 **Board of Commissioners**
FULTON COUNTY REPARATIONS TASK FORCE
Term below expired: 12/31/2025
Ann Hill-Bond **(Ivory)**

Commissioner Ivory has nominated Ann Hill-Bond for a District reappointment to a term ending December 31, 2026.

26-0076 **Board of Commissioners**
FULTON COUNTY ARTS COUNCIL

The Arts Council shall be composed of fifteen (15) residents of the county. Initially, each member of the Board of Commissioners shall appoint two persons to serve on the council, one person to serve for a one-year term and one person to serve a two-year term. No term of any member shall extend beyond the term of the District Commissioner who appointed the member to serve on the Arts Council Board; thereafter, each year, each member of the Board of Commissioners shall appoint one member for a two-year term. Each member may continue to serve beyond his/her term until replaced. The Chairman of the Arts Council shall be appointed to a two-year term by a majority vote of the Board of Commissioners. The Council shall elect a Vice-Chairman and a secretary from its membership.

Term = 2 years

Term below expired: 12/31/2024
Brandon Tonge **(Abdur-Rahman)**

Vice Chair Abdur-Rahman has nominated Brandon Tonge for a District reappointment to a term ending December 31, 2026.

26-0077 **Board of Commissioners**
FULTON COUNTY COMMUNITY ZONING BOARD

The Fulton County Board of Commissioners shall appoint seven (7) members to a Community Zoning Board for unincorporated Fulton County. Each member of the Fulton County Board of Commissioners shall nominate, for full Board approval, a member to the Community Zoning Board. From the membership of the Community Zoning Board, the Board of Commissioners shall appoint a Chair and Vice-Chair to serve no more than two (2) years. Members of the Community Zoning Board serve at the pleasure of the Board of Commissioners and may be removed upon motion of the nominating Commissioner and affirmative vote of a majority of the Board of Commissioners.

Term = The members shall serve a term consistent with that of the member of the Board of Commissioners making the nomination. Members shall serve no more than two (2) terms, either consecutive or non-consecutive.

Term below expired: 12/31/2024
Frederick Caldwell **(Abdur-Rahman)**

Vice Chair Abdur-Rahman nominated Frederick Caldwell for a District reappointment to a term ending December 31, 2028.

26-0078 **Board of Commissioners**
FULTON COUNTY HOMELESS CONTINUUM OF CARE (CoC)

One (1) representative will be nominated by each of the Commission Districts for a total of seven (7) members; this includes one representative from District 1, 2, 3, 4, 5, 6, 7. Each representative will serve a two-year term and could be re-appointed to serve additional terms. Notwithstanding the foregoing, no term of any member nominated by a District Commissioner shall extend beyond the term of the District Commissioner who nominates that member.

Term = 2 Years

Term below expired: 12/31/2024
Kareemah Hanifa **(Abdur-Rahman)**

Vice Chair Abdur-Rahman has nominated Kareemah Hanifa for a District reappointment to a term ending December 31, 2026.

26-0079 **Board of Commissioners**
COMMISSION ON DISABILITY AFFAIRS

The Commission on Disability Affairs shall consist of a total of sixteen (16) members to serve staggered two (2) year terms and appointed as follows:

Each member of the Board of Commissioners shall appoint two (2) members; one of them said appointees shall have an initial term, of one (1) year; No term of any member shall extend beyond the term of the District Commissioner who appointed the member to serve on the Commission for Disability Affairs; The Commission on Disability Affairs shall appoint two (2) members, who receive the consent of the majority of the members of the Commission on Disability Affairs and one (1) of the appointees shall have an initial term of one (1) year.

The Commission on Disability Affairs appointees shall be made for the purpose of maintaining diversity.

Term = Staggered two (2) year terms

Term below expired: 12/31/2025
Michael Hopkins **(Ivory)**

Commissioner Ivory has nominated Michael Hopkins for a District reappointment to a term ending December 31, 2027.

26-0080 **Board of Commissioners**
COMMISSION ON DISABILITY AFFAIRS
Term = Staggered two (2) year terms

Term below expired: 12/31/2025
Anne Currie **(Pitts)**

Chairman Pitts has nominated Latonia Jones for a District appointment to a term ending December 31, 2027.

Development Authority of Fulton County TEFRA (Tax Equity Fiscal Responsibility Act)

26-0081 **Board of Commissioners**
Execution by Chairman Robert L. Pitts of a TEFRA (Tax Equity Fiscal Responsibility Act) for documentation pertaining to the proposed issuance of its Development Authority of Fulton County Revenue Bonds (Robert W. Woodruff Arts Center, Inc.). Series 2026 in an amount not to exceed $90,000,000.00 (the "Bonds").

Open & Responsible Government

26-0082 **Finance**
No action is requested. This reporting is being provided to meet the quarterly reporting requirement for monetary transfers amount budget funds per Board Resolution #09-1262.

26-0083 **Finance**
Ratification of January 2026 Grants Activity Report.

26-0084 **Human Resources Management**
Request approval to amend the 2026 COLA Resolution, as adopted in the FY2026 Budget (#26-0032), to include Superior Court and State Court chamber staff as eligible COLA recipients.

26-0085 **Real Estate and Asset Management**
Request approval of a Water Easement Dedication of 11,674.08 square feet to Fulton County, a political subdivision of the State of Georgia, from Arkan Bethany, LLC, for the purpose of constructing the Elara at Bethany Project at 3475-95 Bethany Bend, Milton, Georgia 30004.

26-0086 **Real Estate and Asset Management**
Request approval of a Sewer Easement Dedication of 14,026 square feet to Fulton County, a political subdivision of the State of Georgia, from Arkan Bethany, LLC, for the purpose of constructing the Elara at Bethany Project at 3475-95 Bethany Bend, Milton, Georgia 30004

26-0087 **Real Estate and Asset Management**
Request approval of Sanitary Sewer System Ownership, Operation, Maintenance, and Repair Agreement between Fulton County, a political subdivision of the State of Georgia, and Toll Southeast LP Company, Inc., for the purpose of granting Fulton County legal access to extend and maintain the sanitary sewer system at 1000 Lexington Farm Drive, Alpharetta, Georgia 30004.

26-0088 **Real Estate and Asset Management**

Request approval of a Resolution approving a Fourth Amendment to the Governmental Agreement between the City of Atlanta, Fulton County, Georgia, and the City of Atlanta and Fulton County Recreation Authority regarding the Atlanta Zoo for the purpose of releasing the Abana Courtyard from the Leased Premises; authorizing the Chairman to execute the Fourth Amendment and any related documents; authorizing the County Attorney to approve the Fourth Amendment and any related documents as to form and make necessary modifications thereto prior to execution; and for other purposes.

26-0089 **Real Estate and Asset Management**

Request approval of a Resolution authorizing the acceptance by Fulton County, Georgia of certain leasehold interests held by the Building Authority of Fulton County; of title in fee simple of certain real property owned by the Building Authority of Fulton County; of title in fee simple to all real or personal property, equipment, and assets of any kind, including assets later discovered, from the Building Authority of Fulton County; authorizing the Chairman to execute all documents necessary to effectuate the acceptance of leasehold interests, real property, and any other assets from the Building Authority of Fulton County; authorizing the transfer of a leasehold interest to the City of South Fulton; authorizing the Chairman to execute all documents necessary to effectuate the transfer of a leasehold interest to the City of South Fulton; authorizing the County Attorney to prepare and approve as to form all documents necessary and appropriate to accomplish these transactions; and for other purposes.

26-0090 **Real Estate and Asset Management**

Request approval to close out a contract - Department of Real Estate and Asset Management, 22ITB134833C-MH, Fire Extinguisher Testing and Maintenance Services**,** in the amount not to exceed $10,582.20 with (B) Summit Fire & Security (Loganville, GA), to cover the final payment to close out the contract for services rendered. This contract provided on-site fire extinguisher testing and maintenance services for Fulton County facilities for FY2025. Effective upon BOC approval.

SECOND REGULAR MEETING AGENDA

26-0091 **Board of Commissioners**

Adoption of the Second Regular Meeting Agenda.

26-0092 **Clerk to the Commission**

Ratification of Minutes.

Second Regular Meeting Minutes, January 21, 2026
First Regular Meeting Post Agenda Minutes, February 4, 2026

26-0093 **Board of Commissioners**
Presentation of Proclamations and Certificates.

Proclamation recognizing “Government Communicators Appreciation Day.” **(Pitts/BOC)**

PUBLIC HEARINGS

26-0094 **Board of Commissioners**
Public Comment - Citizens are allowed to voice County related opinions, concerns, requests, etc. during the Public Comment portion of the Commission meeting. **Priority for public comment will be given to Fulton County citizens and those individuals representing businesses or organizations located within Fulton County, including their employees, whether such persons are commenting in-person, via Zoom or other electronic media (i.e., phone call). Non-Fulton County citizens will only be heard after all in-person Fulton County citizens, representatives of business and organizations located within Fulton County, including their employees, have been heard and the time allotted for public comment has not expired, except as otherwise provided in this code section. County staff shall verify the residency of each public speaker prior to such person being heard by the board. Speakers will be granted up to two minutes each. Members of the public will not be allowed to yield or donate time to other speakers. The Public Comment portion of the meeting will not exceed sixty (60) minutes at the First Regular Meeting, nor will this portion exceed sixty (60) minutes at the Second Regular Meeting**. In the event the 60-minute time limit is reached prior to public comments being completed, public comment will be suspended and the business portion of the BOC meeting will commence. Public comment will resume at the end of the meeting. For more information or to arrange a speaking date, contact the Clerk’s Office.

COUNTY MANAGER'S ITEMS

Open & Responsible Government

26-0095 **County Manager**
Presentation of the Fulton County Operational Report.

Health and Human Services

26-0096 **Community Development**

Request approval to renew an existing contract - Department of Community Development, 25RFP1347583B-EC, Housing Rehabilitation Program in the amount not to exceed $1,002,791.54 with Meals on Wheels Atlanta Inc. (Atlanta, GA), to provide housing rehabilitation services including general program administration. The action exercises the first of two renewal options. One renewal option remains. Effective dates: April 1, 2026, through December 31, 2026.

26-0097 **Public Works**

Request approval and adoption of revisions and updates to the Fulton County Standard Details, Specifications, and Pump Station Manual with regards to water and wastewater infrastructure. The proposed updates establish the new standard details, specifications, and guidelines that the development community will be required to follow. Effective upon BOC approval.

26-0098 **Senior Services**

Request approval of a recommended proposal - Senior Services, 25RFP1421145A-KM, Food Services Management in the amount not to exceed $669,600.00 with Nourish Food Services (Grayson, GA) to provide food service management services for the five senior multipurpose facilities and three training centers. Effective March 2, 2026, through December 31, 2026, with two renewal options.

COMMISSIONERS' ACTION ITEMS

26-0063 **Board of Commissioners**

Request approval of a Resolution affirming the protection of Constitutional Rights at Fulton County facilities and limiting ICE enforcement activities. **(Arrington) (HELD ON 2/4/26)**

26-0099 **Board of Commissioners**

Request approval of a Resolution to reallocate at least two percent of the fiscal year 2026 budget towards affordable housing, homelessness prevention programs, and wrap-around services; to direct the County Manager or his designee to propose a similar budget allocation in subsequent fiscal years; and for other purposes. **(Ivory)**

26-0100 **Board of Commissioners**

Request approval of a Resolution increasing the amount of the stipend paid to each member of the Fulton County Board of Equalization from $100.00 per day to $150.00 per day and for other purposes. **(Pitts)**

26-0101 **Board of Commissioners**
Request approval of a Resolution to support affordable housing in partnership with Cosmopolitan AME Church, Good Place, and Collaborative Housing Solutions by approving a grant from funds previously set aside to aid in the construction of a 70-unit new construction multifamily development in Vine City that includes 63 affordable units and 7 market rate units, and for other purposes. **(Barrett)**

Commissioners' Full Board Appointments

26-0102 **Board of Commissioners**
FULTON COUNTY ARTS COUNCIL

The Arts Council shall be composed of fifteen (15) residents of the county. Initially, each member of the Board of Commissioners shall appoint two persons to serve on the council, one person to serve for a one-year term and one person to serve a two-year term. No term of any member shall extend beyond the term of the District Commissioner who appointed the member to serve on the Arts Council Board; thereafter, each year, each member of the Board of Commissioners shall appoint one member for a two-year term. Each member may continue to serve beyond his/her term until replaced. The Chairman of the Arts Council shall be appointed to a two-year term by a majority vote of the Board of Commissioners. The Council shall elect a Vice-Chairman and a secretary from its membership.

Term = 2 years

Term below expires: 12/31/2026
Vacant **(BOC - Chairperson)**

Chairman Pitts has nominated Melissa Adams for a Full Board appointment to serve as Chairperson to an unexpired term ending December 31, 2026.

COUNTY MANAGER'S PRESENTATION AND DISCUSSION ITEMS

Open & Responsible Government

26-0103 **External Affairs**
Presentation: 2026 State Legislative Session Update.

Infrastructure and Economic Development

26-0104 **Select Fulton**

Presentation: Annual Development Authority of Fulton County Governmental Accounting Standards Board, GASB 77.

EXECUTIVE SESSION

26-0105 **Board of Commissioners**

Executive **(CLOSED**) Sessions regarding litigation **(County Attorney)**, real estate **(County Manager)**, and personnel **(Pitts)**.

ADJOURNMENT

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0071 **Meeting Date:** 2/18/2026

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Proclamations for Spreading on the Minutes.

Proclamation recognizing “Deborah Sengbloh Murphy Remembrance Day.” **(Abdur-Rahman)**
February 5, 2026

Proclamation recognizing “Buckhead Art and Company Appreciation Day.” **(Arrington)**
February 5, 2026

Proclamation recognizing “First Icononium Baptist Church Appreciation Day.” **(Arrington)**
February 8, 2026

Proclamation recognizing “Kenan Thompson Appreciation Day.” **(Arrington)**
February 12, 2026

Proclamation recognizing “Nathan Smith Remembrance Day.” **(Arrington/Ellis)**
February 13, 2026

Proclamation recognizing “Marc H. Morial Appreciation Day.” **(Ivory)**
February 15, 2026

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0081 **Meeting Date:** 2/18/2026

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*

Execution by Chairman Robert L. Pitts of a TEFRA (Tax Equity Fiscal Responsibility Act) for documentation pertaining to the proposed issuance of its Development Authority of Fulton County Revenue Bonds (Robert W. Woodruff Arts Center, Inc.). Series 2026 in an amount not to exceed $90,000,000.00 (the “Bonds”).

Arnall Golden Gregory LLP

Atlanta Office
171 17th Street NW, Suite 2100
Atlanta, GA 30363-1031
Direct phone: 404.873.8124
Direct fax: 404.873.8125

February 11, 2026

Via Hand Delivery

Ms. Tonya Grier
Clerk to the Commission
Fulton County Board of Commissioners
141 Pryor Street, S.W.
Atlanta, Georgia 30303

Re: Development Authority of Fulton County Revenue Bonds (Robert W. Woodruff Arts Center, Inc.), Series 2026

Dear Ms. Grier:

As attorney for the Development Authority of Fulton County (the "Issuer"), I am enclosing herewith for the signature of Chairman Pitts four copies of the TEFRA certificate, with attached standard supporting documentation, pertaining to the proposed issuance of its Development Authority of Fulton County Revenue Bonds (Robert W. Woodruff Arts Center, Inc.), Series 2026, in an amount not to exceed $90,000,000 (the "Bonds"). The Bonds will be issued for the benefit of Robert W. Woodruff Arts Center, Inc., a Georgia nonprofit corporation ("Woodruff Arts Center"), for the purpose of (a) refunding all or a portion of certain obligations previously issued by the Issuer for the benefit of Woodruff Arts Center, including but not limited to, the (i) Development Authority of Fulton County Refunding Revenue Bonds (Robert W. Woodruff Arts Center, Inc. Project) Series 2009A (the "Series 2009A Bonds"); and (ii) Development Authority of Fulton County Revenue Bonds (Robert W. Woodruff Arts Center, Inc. Project), Series 2015A Bonds (the "Series 2015A Bonds" and, together with the Series 2009A Bonds, the "Refunded Bonds"), which such Refunded Bonds financed or refinanced, in whole or in part, the cost of the acquisition, construction, installation and equipping of certain arts/educational facilities, equipment and improvements owned or operated by Woodruff Arts Center or one of its affiliates located in Fulton County, Georgia (the "Facilities"); and (b) paying all or a portion of the costs of issuing the Bonds (collectively, the "Project"). The Facilities consist of land, buildings, equipment and improvements used or to be used by Woodruff Arts Center or one of its affiliates in connection with the charitable and educational operations of Woodruff Arts Center located on the main campus of the Robert W. Woodruff Arts Center at 1280 Peachtree Street, N.E., Atlanta, Georgia between 15th and 16th streets, Fulton County, Georgia or other sites proximate to the main campus, as well as on other sites that are operated by Woodruff Arts Center or one of its affiliates, as part of their integrated charitable and educational operations. The initial legal owner or principal user of the Facilities financed or refinanced by the Bonds is Woodruff Arts Center.

Please note that Woodruff Arts Center commits to comply with the Issuer's Minority and Female Business Enterprises Policy, which was revised April 22, 2008, in accordance with the Fulton County Board of Commissioners Resolution adopted April 2, 2008, however, since this is a refinancing of existing debt, no new construction is anticipated for the Project.

If you or Chairman Pitts have any questions, please call me. Otherwise, please ask Chairman Pitts to execute the enclosed certificates at his earliest opportunity, and please then return at least three executed certificates with supporting documentation to me at your earliest opportunity for further processing.

Thank you for your cooperation in this matter.

Sincerely,

Sandra Z. Zayac

SZZ
Enclosures
cc: Mr. Richard Anderson (w/o encl.)
County Manager
cc: Ms. Y. Soo Jo
County Attorney

CERTIFICATE OF CHAIRMAN OF FULTON COUNTY BOARD OF COMMISSIONERS REGARDING PUBLIC APPROVAL FOR DEVELOPMENT AUTHORITY OF FULTON COUNTY PROPOSED REVENUE BONDS FOR ROBERT W. WOODRUFF ARTS CENTER, INC.

The undersigned is the Chairman of the Fulton County Board of Commissioners, and as such is the designated chief elected executive official of Fulton County. Robert W. Woodruff Arts Center, Inc., a Georgia nonprofit corporation ("Woodruff Arts Center"), proposes to (a) refund all or a portion of certain obligations previously issued for the benefit of Woodruff Arts Center, including but not limited to, the (i) Development Authority of Fulton County Refunding Revenue Bonds (Robert W. Woodruff Arts Center, Inc. Project) Series 2009A (the "Series 2009A Bonds"); and (ii) Development Authority of Fulton County Revenue Bonds (Robert W. Woodruff Arts Center, Inc. Project), Series 2015A Bonds (the "Series 2015A Bonds" and, together with the Series 2009A Bonds, the "Refunded Bonds"), which such Refunded Bonds financed or refinanced, in whole or in part, the cost of the acquisition, construction, installation and equipping of certain arts/educational facilities, equipment and improvements owned or operated by Woodruff Arts Center or one of its affiliates located in Fulton County, Georgia (the "Facilities"); and (b) pay all or a portion of the costs of issuing the Bonds defined below (collectively, the "Project").

The Project is to be financed from the proceeds of revenue bonds to be issued by the Development Authority of Fulton County (the "Issuer") in the aggregate principal amount of not to exceed $90,000,000 (the "Bonds"). The initial legal owner or principal user of the Facilities financed or refinanced by the Bonds will be Woodruff Arts Center. The Facilities consist of land, buildings, equipment and improvements used or to be used by Woodruff Arts Center or one of its affiliates in connection with the charitable and arts/educational operations of Woodruff Arts Center located on the main campus of the Robert W. Woodruff Arts Center at 1280 Peachtree Street, N.E., Atlanta, Georgia between 15th and 16th streets, Fulton County, Georgia or other sites proximate to the main campus, as well as on other sites that are operated by Woodruff Arts Center or one of its affiliates, as part of their integrated charitable and arts/educational operations.

On January 26, 2026, notice of the public hearing (the "Notice") was published on the website of the Issuer. The Notice was designed to apprise residents of Fulton County of the proposed issuance of the Bonds by the Issuer and was published not less than 7 days before the scheduled date of the public hearing referred to in the Notice. A copy of the Publisher's Affidavit including a copy of the Notice is attached as Exhibit "A" to the Certification of Hearing Officer (the "Certification") dated February 11, 2026, which is attached hereto.

On February 9, 2026, a public hearing (the "Hearing") with regard to the issuance of the Bonds was held at 11:00 a.m. via teleconference in accordance with Revenue Procedure 2022-20. The Hearing was accessible to the residents of the approving governmental unit by calling a toll-free telephone number. The public was invited to join by dialing 888-573-8199 (Participant Access: 860151145). The Hearing was conducted in a manner that provided a reasonable opportunity for persons with differing views on both the issuance of the Bonds and the location and nature of the Project to be heard, as evidenced by the Certification, which is attached hereto.

The proceedings have been reviewed and determination made that the issuance of the Bonds is legally proper and an investment letter and a Minority and Female Business Enterprise Policy ("MFBE") Utilization Report has been received, as evidenced by the Exhibits "C", "D" and "E", respectively, to the Certification, which is attached hereto.

Based on the foregoing, the undersigned duly approves the issuance of the Bonds as contemplated by the Notice for the purpose of financing the Project for Woodruff Arts Center. This approval is solely intended to comply with the provisions of Section 147(f) of the Internal Revenue Code of 1986, as amended, and shall not result in or impose any pecuniary liability upon or constitute a lien upon the property or a claim against Fulton County, the State of Georgia, or a political subdivision thereof.

This _____ day of _____, 2026.

Robert L. Pitts
Chairman, Board of Commissioners of
Fulton County, Georgia

Approved as to form:

Attorney

CERTIFICATION
RELATIVE TO THE ISSUANCE OF
DEVELOPMENT AUTHORITY OF FULTON COUNTY
PROPOSED REVENUE BONDS
(ROBERT W. WOODRUFF ARTS CENTER, INC.)

WHEREAS, the DEVELOPMENT AUTHORITY OF FULTON COUNTY (the "Issuer") is considering adoption of or has adopted a Resolution (the "Resolution") providing for the issuance of Development Authority of Fulton County Revenue Bonds related to the Project, in an amount not to exceed $90,000,000 (the "Bonds"); and

WHEREAS, prior to the adoption of the Resolution, notice of public hearing (the "Notice") was published on January 26, 2026, on the website of the Issuer, as evidenced by the copy of Publisher's Affidavit including a copy of the Notice attached hereto as Exhibit "A". The Notice was designed to apprise residents of Fulton County of the proposed issuance of the Bonds by the Issuer and was published not less than 7 days before the scheduled date of the public hearing referred to in the Notice; and

WHEREAS, on February 9, 2026, a public hearing (the "Hearing") with regard to the issuance of the Bonds was held at 11:00 a.m. via teleconference in accordance with Revenue Procedure 2022-20. The Hearing was accessible to the residents of the approving governmental unit by calling a toll-free telephone number. The public was invited to join by dialing 888-573-8199 (Participant Access: 860151145). The Hearing was conducted by the undersigned as authorized hearing officer for the Issuer in a manner that provided a reasonable opportunity to be heard for persons with differing views on both the issuance of the Bonds and the location and nature of the Project; and

WHEREAS, the names and addresses of all parties attending the Hearing, together with a summary of matters discussed at the Hearing, are set forth on the Hearing Report attached hereto as Exhibit "B"; and

WHEREAS, the documents involved in the proposed issuance of the Bonds have been approved by the attorney for the Issuer, as evidenced by an opinion letter attached hereto as Exhibit "C"; and

WHEREAS, an investment letter relating to the contemplated underwriting and sale of the Bonds, a copy of which is attached hereto as Exhibit "D," has been furnished to the Issuer, as required by procedures adopted by the Board of Commissioners of Fulton County;

WHEREAS, a Minority and Female Business Enterprise Policy ("MFBE") Utilization Report, a copy of which is attached hereto as Exhibit "E," has been furnished to the Issuer, as required by procedures adopted by the Board of Commissioners of Fulton County;

WHEREAS, a copy of the Issuer's Minority and Female Business Enterprise Policy is attached hereto as Exhibit "F," as required by procedures adopted by the Board of Commissioners of Fulton County;

NOW, THEREFORE, the undersigned does hereby certify the above facts are true and correct and does request the Board of Commissioners of Fulton County approve the issuance of the Development Authority of Fulton County Revenue Bonds (Robert W. Woodruff Arts Center, Inc.), Series 2026, for the purpose of complying with Section 147(f) of the Internal Revenue Code of 1986.

Given under my hand and seal of the Issuer, this 11th day of February, 2026.

ANSLY P. MOYER
Hearing Officer, Development
Authority of Fulton County

EXHIBIT "A"

(PUBLISHER'S AFFIDAVIT)

AFFIDAVIT OF PUBLICATION

Personally appeared before the undersigned authorized to administer oaths, Lauren W. Daniels, who upon being duly sworn deposes and says as follows:

I am counsel to the *Development Authority of Fulton County*, a public body corporate and politic, duly created by the Development Authorities Law, O.C.G.A. § 36-62-1, *et seq.* and activated by resolution, as amended, of the governing body of Fulton County. Pursuant to Section 147(f) of the Internal Revenue Code of 1986, as amended (26 C.F.R. § 1.147(f)-1 (2018)), public notice has been given by electronic posting on the public website of the *Development Authority of Fulton County*, the on-behalf-of issuer, as an alternative to the public website of the approving governmental unit. Attached hereto is a true and correct copy of the publication of the TEFRA Notice concerning Robert W. Woodruff Arts Center, Inc., which was published on the *Development Authority of Fulton County* website (https://www.developfultoncounty.com/tefra-notices) in an area of the website used to inform its residents about events affecting the residents on the following date: January 26, 2026.

Print Name: Lauren W. Daniels

Sworn to and subscribed before me
this 11th day of February, 2026.

Notary Public, State of Georgia

My commission expires: _____ [NOTARY SEAL]

ANSLY MOYER NOTARY PUBLIC FULTON COUNTY GEORGIA EXPIRES August 21, 2027

4932-6665-9214.v1

NOTICE OF PUBLIC HEARING ON
PROPOSED PLAN OF FINANCING BY
DEVELOPMENT AUTHORITY OF FULTON COUNTY
FOR THE BENEFIT OF
ROBERT W. WOODRUFF ARTS CENTER, INC.

YOU ARE HEREBY NOTIFIED that, pursuant to the provisions of Section 147(f) of the Internal Revenue Code of 1986, as amended (the "*Code*"), a hearing officer of the Development Authority of Fulton County (the "*Authority*") will hold a public hearing (the "*Hearing*") on the 9th day of February, 2026, at 11:00 a.m., via teleconference in accordance with Revenue Procedure 2022-20 (Dial In: 888-573-8199 and Participant Access: 860151145), regarding a plan of finance (the "*Plan of Finance*") proposed by Robert W. Woodruff Arts Center, Inc., a Georgia nonprofit corporation (the "*Woodruff Arts Center*") or an entity affiliated with, related to, or controlled by it, involving the issuance by the Authority of its qualified 501(c)(3) bonds as defined in Section 145 of the Code, for charitable and arts/educational facilities (the "*Bonds*") for the benefit of the Woodruff Arts Center to (a) refund all or a portion of certain obligations previously issued by the Authority for the benefit of Woodruff Arts Center, including but not limited to, the (i) Development Authority of Fulton County Refunding Revenue Bonds (Robert W. Woodruff Arts Center, Inc. Project) Series 2009A (the "*Series 2009A Bonds*"); and (ii) Development Authority of Fulton County Revenue Bonds (Robert W. Woodruff Arts Center, Inc. Project), Series 2015A Bonds (the "*Series 2015A Bonds*" and, together with the Series 2009A Bonds, the "*Refunded Bonds*"), which such Refunded Bonds financed or refinanced, in whole or in part, the cost of the acquisition, construction, installation and equipping of certain arts/educational facilities, equipment and improvements owned or operated by Woodruff Arts Center or one of its affiliates located in Fulton County, Georgia (the "*Facilities*"); and (b) pay certain costs of issuance relating to the Bonds.

The Facilities consist of land, buildings, equipment and improvements used or to be used by Woodruff Arts Center or one of its affiliates in connection with the charitable and arts/educational operations of Woodruff Arts Center located on the main campus of the Robert W. Woodruff Arts Center at 1280 Peachtree Street, N.E., Atlanta, Georgia between 15th and 16th streets, Fulton County, Georgia or other sites proximate to the main campus, as well as on other sites that are operated by Woodruff Arts Center or one of its affiliates, as part of their integrated charitable and arts/educational operations. The maximum stated principal amount of the Bonds to be issued to finance or refinance such Facilities at these locations is $90,000,000.

The initial legal owner or principal user of the Facilities financed or refinanced with the Bonds will be Woodruff Arts Center. The proposed Bonds will not be a general obligation of the State of Georgia, Fulton County or the City of Atlanta, but will be limited obligations of the Authority payable from payments received pursuant to a loan agreement from Woodruff Arts Center.

The Bonds may be issued by the Authority pursuant to the Plan of Finance from time to time and in one or more series in an aggregate principal amount of up to $90,000,000 during the expected three-year period commencing on the date of approval of the Plan of Finance. It is the intention of Woodruff Arts Center and the Authority that the first series of Bonds will be issued not later than one year from the date of approval of the Plan of Finance.

Any person interested in the proposed issuance of the Bonds pursuant to the Plan of Finance or the location or the nature of the Facilities proposed to be financed or refinanced from the proceeds of the sale of the Bonds may appear and be heard.

THE AUTHORITY WILL NOT CONDUCT ANY PERFORMANCE AUDIT OR PERFORMANCE REVIEW WITH RESPECT TO EACH SERIES OF THE BONDS AS SUCH TERMS ARE DESCRIBED IN SECTION 36-82-100, OFFICIAL CODE OF GEORGIA ANNOTATED.

DEVELOPMENT AUTHORITY OF
FULTON COUNTY

EXHIBIT "B"

(HEARING REPORT)

1. The names and addresses of all parties present for the Hearing are as follows:

   No parties were in attendance.

2. The matters discussed at the Hearing are summarized as follows:

   Because no parties were present at the Hearing, no matters were discussed.

EXHIBIT "C"

(LETTER OF ISSUER ATTORNEY)

Arnall
Golden
Gregory LLP

Atlanta Office
171 17th Street NW, Suite 2100
Atlanta, GA 30363-1031
Direct phone: 404.873.8124
Direct fax: 404.873.8125

February 11, 2026

The Board of Commissioners
of Fulton County
Atlanta, Georgia

Development Authority of
Fulton County
Atlanta, Georgia

Dear Sir or Madam:

We are delivering this opinion in compliance with the requirements of the Chairman of the Fulton County Commission relative to approval of financing.

This opinion is to accompany the approval of the Issuer and Financing described as follows:

Issuer:	Development Authority of Fulton County
Financing:	Revenue Bonds in the aggregate principal amount not to exceed $90,000,000 (the "Bonds")
Borrower:	Robert W. Woodruff Arts Center, Inc.
Project:	To (a) refund all or a portion of certain obligations previously issued for the benefit of Woodruff Arts Center, including but not limited to, the (i) Development Authority of Fulton County Refunding Revenue Bonds (Robert W. Woodruff Arts Center, Inc. Project) Series 2009A (the "Series 2009A Bonds"); and (ii) Development Authority of Fulton County Revenue Bonds (Robert W. Woodruff Arts Center, Inc. Project), Series 2015A Bonds (the "Series 2015A Bonds" and, together with the Series 2009A Bonds, the "Refunded Bonds"), which such Refunded Bonds financed or refinanced, in whole or in part, the cost of the acquisition, construction, installation and equipping of certain arts/educational facilities, equipment and improvements owned or operated by Woodruff Arts Center or one of its affiliates located in Fulton County, Georgia (the "Facilities"); and (b) pay all or a portion of the costs of issuing the Bonds.

The Facilities financed or refinanced by the Bonds are located on the main campus of the Robert W. Woodruff Arts Center at 1280 Peachtree Street, N.E., Atlanta, Georgia between 15th and 16th streets, Fulton County, Georgia or other sites proximate to the main campus, as well as on other sites that are operated by Woodruff Arts Center or one of its affiliates, as part of their integrated charitable and educational operations.

A public hearing was held before the Development Authority of Fulton County on February 9, 2026, pursuant to an advertisement appearing on the website of the Development Authority of Fulton County on January 26, 2026.

In rendering this opinion, with your permission, we have relied conclusively on representations of representatives of the Issuer, the Borrower, or both as to the correctness of the information set forth above.

Based on the foregoing, we are of the opinion that the Issuer is authorized under the laws of the State of Georgia to issue financing for projects of the type and nature described hereinabove pursuant to Article IX, Section VI, Paragraph III, of the Constitution of Georgia of 1983, as amended, the Development Authorities Law (O.C.G.A. 36-62-1 et seq.) and the Revenue Bond Law (O.C.G.A. 36-82-60 et seq.).

This opinion relates solely to the application relating to the Financing identified above as submitted by or on behalf of the Borrower to the Issuer, and is rendered solely to the parties to whom it is addressed. This opinion is not to be used for any other purpose, quoted in whole or in part, relied upon by or delivered to any other person or party.

Sincerely,

Sandra Z. Zayac

SZZ
Enclosures

EXHIBIT "D"

(Investment Letter)

TRUIST

[illegible]
Truist Securities, Inc.

February 11, 2026

Development Authority of Fulton County c/o Sandy Zayac
Arnall Golden Gregory, LLP
Atlanta, Georgia

Dear Sir or Madam:

In connection with the public hearing, pursuant to Section 147(f) of the Internal Revenue Code of 1986, as amended, relating to the proposed revenue bonds (the "Bonds") to be issued by the Development Authority of Fulton County (the "Issuer") for the benefit of Robert W. Woodruff Arts Center, Inc. (the "Borrower"), Truist Securities, Inc. ("Truist") has been engaged to underwrite the sale of the Bonds. As of the date hereof and based on current market conditions, Truist expects that it will be able to underwrite and sell the Bonds in a principal amount up to $90,000,000.

This expectation is based on Truist's understanding of the transaction as it is presently structured, including Truist's current knowledge of the operations, tax status, financial results, conditions and prospects of the Borrower and general economic and industry conditions. In addition, Truist's expectation is based upon the limited information provided by the Issuer and the Borrower to date regarding the transaction and, as Truist has not had the opportunity to conduct due diligence, Truist understands that it will be provided the opportunity to conduct thorough due diligence prior to any financing or commitment.

This letter does not represent and should not be construed as a commitment by Truist or any of its affiliates to underwrite or arrange any financing for the Issuer or the Borrower and does not constitute an undertaking or contractual commitment to purchase on a principal or agency basis any debt securities of the Issuer or the Borrower. Any commitment to underwrite the Bonds will be conditioned on the execution of a mutually acceptable definitive bond purchase agreement and will be subject to the following conditions: (i) internal approval from the applicable Truist approval committees; (ii) satisfactory completion of the financing documents; (iii) satisfactory completion of an offering document for the financing; (iv) satisfactory completion of legal, accounting, financial and other due diligence customary in similar capital markets transactions; (v) satisfactory results from the rating agencies with a credit rating of at least A2 from Moody's, and (vi) the absence of any material adverse change in the condition, business, results, operations or prospects of the Issuer or the Borrower.

Furthermore, Truist's underwriting of the Bonds will be subject to certain events having not occurred, including but not limited to: (a) any general suspension of, or limitation on prices for, trading in securities in the New York Stock Exchange; (b) any suspension of trading in any securities of the Issuer or the Borrower; (c) any material adverse change in financial market conditions; (d) any declaration of a banking moratorium or any suspension of payments in respect of banks generally in the States of New York or Georgia; or (e) any outbreak or escalation of hostilities or any other calamity or crisis that, in Truist's judgment, is material and adverse.

Nothing expressed or implied in this letter is intended to create legal relations among Truist, the Issuer and the Borrower or to constitute representations or warranties on which the Issuer or the Borrower may rely.

This letter has been delivered to you for your informational purposes only, at your request, and is not to be distributed or disclosed to, or otherwise relied upon by, any other person without Truist's prior written consent, except as required by law.

If you have any questions with respect to this letter, do not hesitate to call the undersigned.

Very truly yours,



Justin Baumgardner
Director
Truist Securities, Inc.

EXHIBIT "E"

(Minority and Female Business Enterprise Policy Utilization Report of Robert W. Woodruff Arts Center, Inc.)

BORROWER'S MFBE UTILIZATION REPORT

This report must be submitted at the earlier of the date of TEFRA approval or final bond resolution, and thereafter, updated reports must be submitted on a quarterly basis, beginning with the first full quarter following the date of final bond resolution, to be received by the tenth day following the last day of the relevant quarter. The report should be mailed/emailed to: Development Authority of Fulton County, 141 Pryor Street, S.W., Suite 1031 (first floor), Atlanta, Georgia 30303 (sandra.zayac@agg.com). Upon the first submission of this report, please attach a copy of the Borrower's policy on hiring of minorities and females or the Prime Contractor's policy on the utilization of minority and female-owned businesses, as applicable. Please complete the report with "N/A - not applicable for refunding transactions" or mark "Not yet engaged" if contractors or subcontractors have not yet been retained.

REPORTING PERIOD		**PROJECT NAME:**	Refunding of all or portion of the (i) Development Authority of Fulton County Refunding Revenue Bonds (Robert W. Woodruff Arts Center, Inc. Project) Series 2009A and (ii) Development Authority of Fulton County Refunding Revenue Bonds (Robert W. Woodruff Arts Center, Inc. Project) Series 2015A
FROM:		**BOND CAPTION:**	Development Authority of Fulton County Revenue Bonds (Robert W. Woodruff Arts Center, Inc. Project) Series 2026
TO:		**PROJECT ADDRESS:**	N/A - not applicable for refunding transactions

PRIME CONTRACTOR (Identify if MFBE)		**Contract Award Date**	**Contract Award Amount**	**Change Order Amount**	**Contract Period**	**% Complete to Date**
Name:	N/A - not applicable for refunding transactions					
Address:						
Telephone #:						

AMOUNT OF REQUISITION THIS PERIOD: $_____

TOTAL AMOUNT REQUISITION TO DATE: $_____

SUBCONTRACTOR or VENDOR UTILIZATION (for equipping of Project or acquisition of personal property) Continue on additional page if necessary

Name of Sub-Contractor or Vendor (Identify if MFBE)	**Description of Work or Goods Purchased**	**Contract Amount**	**Amount Paid To Date**	**Amount Requisition This Period**	**Contract Period Starting Date**	**Ending Date**
N/A - not applicable for refunding transactions						
TOTALS						

Borrower's Representative: Brian Walley *(Print Name)*

Executed By: *(Signature)*

Title: Chief Financial Officer

Date: January 15, 2026

Address: 1280 Peachtree Street, NE, Atlanta, Georgia 30309

Phone: 404-733-4214

Email: brian.walley@woodruffcenter.org

EXHIBIT "F"

(Copy of Authority's Minority and Female Business Enterprise Policy Revisions Adopted April 22, 2008)

It is the policy of the Development Authority of Fulton County that discrimination against businesses by reason of the race, color, gender or national origin of the ownership of any such business is prohibited. The Company shall utilize contractors, subcontractors, suppliers and vendors that do not discriminate against employees or employment applicants because of race, color, gender or national origin, in connection with the development of the Project. The Company shall also make a good faith effort to utilize, to the extent feasible and reasonable under the circumstances, minority or female owned enterprises in connection with the development of the Project. In furtherance of this effort, the Company shall furnish to the Authority, at or before the earlier of the date of submission of TEFRA approval documentation, if applicable, or of the final bond resolution, a written report (i) projecting its utilization of minority and female owned business enterprises in connection with the construction and/or equipping of the proposed Project, (ii) identifying all significant contractors, subcontractors, suppliers, or vendors engaged or utilized to date in connection with the development of the Project, and (iii) specifically identifying all minority or female owned contractors, subcontractors, suppliers or vendors engaged or utilized to date. The report shall also identify a Company representative who will be responsible for future contact and information regarding minority and female owned business enterprise utilization in connection with Project construction and/or acquisition of personal property in conjunction with the Project. In addition to the aforementioned initial written report, the Company shall file updated reports with the Authority on a quarterly basis, beginning with the first full quarter following the date of final bond resolution and continuing through the date of completion of the Project. The Company shall also consent to on-site monitoring visits by the Authority to evaluate compliance with the Policy.

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0082 **Meeting Date:** 2/18/2026

Department
Finance

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
No action is requested. This reporting is being provided to meet the quarterly reporting requirement for monetary transfers amount budget funds per Board Resolution #09-1262.

Requirement for Board Action *(Cite specific Board policy, statute or code requirement)*
Board Resolution #09-1262

Strategic Priority Area related to this item *(If yes, note strategic priority area below)*
Choose an item.

Commission Districts Affected
All Districts ☒
District 1 ☐
District 2 ☐
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?
No

Summary & Background
This reporting is being provided to meet the quarterly reporting requirement for monetary transfers among budget funds per Board Resolution #09-1262. The General Fund had no Intra Fund Borrowings outstanding from any other County Fund as of December 31, 2025. An Intra Fund borrowing occurs when the general fund balance goes negative utilizing a positive excess cash position from another fund at the County to cover operating cash flow needs.

See attached reporting of all funds that had negative cash position as of 12-31-2025 and had a borrowing position from the County's general fund.

Scope of Work: NA

Agenda Item No.: 26-0082 **Meeting Date:** 2/18/2026

Community Impact: NA

Department Recommendation: NA

Project Implications: NA

Community Issues/Concerns: NA

Department Issues/Concerns: NA

INTEROFFICE MEMORANDUM

FULTON COUNTY

TO: Board of Commissioners

THROUGH: Dick Anderson, County Manager
Sharon Whitmore, CFO

FROM: Ray Turner, Interim Finance Director

DATE: January 7, 2026

SUBJECT: Intra Fund Borrowings

The General Fund had no Intra Fund Borrowings outstanding with any other County Fund as of December 31, 2025. An Intra Fund Borrowing occurs when the General Fund balance goes negative, utilizing a positive excess cash position from another fund, at the County to cover operating cash flow needs.

The below represents all funds that had negative cash positions as of 12/31/2025 and had a borrowing position from the County's General Fund.

12-31-2025 Negative Cash Positions	
Contractual Services Animal Control #312*	(918,104.37)
Atl/Fulton Water Resource Comm #431*	(1,360,564.13)
Facilities Service Fund #700*	(413,375.82)
Total intra-fund borrowings from General Fund & other funds	(2,692,044.32)

Ray Turner
Interim Finance Director

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0083 **Meeting Date:** 2/18/2026

Department
Finance

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Ratification of January 2026 Grants Activity Report.

Requirement for Board Action *(Cite specific Board policy, statute or code requirement)*
Grants Policy A(10): All grant applications and awards must be presented via the Grants Activity Report on the Consent Agenda during the Board of Commissioners' First and Second meetings. The Board of Commissioners shall utilize the Grants Activity Report to ratify the submission of all grant applications and acceptance of all grant funding.

Strategic Priority Area related to this item *(If yes, note strategic priority area below)*
Open and Responsible Government

Commission Districts Affected
All Districts ☒
District 1 ☐
District 2 ☐
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?
No

Summary & Background *(First sentence includes Agency recommendation. Provide an executive summary of the action that gives an overview of the relevant details for the item.)*

The Fulton County January 2026 Grants Activity Report (GAR) Exhibit 1: BOARD GRANTS RATIFICATION SUMMARY summarizes grants submitted/pending and awarded for the period January 1, 2026 - December 31, 2026.

Fulton County departments report the following grants activity:

- Applications Submitted/Pending: _1_ ($88,821.00 + $0.00 Cash Match)

- Applications Awarded: __3__ ($1,866,023.29 + $219,362.00 Cash Match)

The following Strategic Priority Areas are Impacted by January 2026 grant applications:

- Justice and Safety
- Health and Human Services

The Fulton County January 2026 Grants Activity Report (GAR)-Exhibit 2: ALL GRANTS ACTIVITY summarizes cumulative grants activity through January 31, 2026. Fulton County departments report the following grants activity:

- Total Applications Submitted/Pending: _14_ ($46,129,151.11 + $0.00 Cash Match)
- Total Applications Awarded: 3_ ($1,866,023.29+ $219,362.00 Cash Match)
- Total Grant Applications Denied: _0__ ($0.00 + No Cash Match)

Department Recommendation: Department recommends ratification of the January 2026 Grants Activity Report (GAR).

EXHIBIT 1: BOARD GRANTS RATIFICATION SUMMARY

Fulton County FY2026 January 2026 Grants Activity Report

Exhibit 1 lists by Strategic Goal grant applications that require BOC ratification. Per the Fulton County Grants Policy approved 3/2/2016, Section A(10), "all grant applications and awards must be presented via the Grants Activity Report on the Consent Agenda during the Board of Commissioners second meetings of the month. The Board of Commissioners shall utilize the Grants Activity Report to ratify the submission of all grant applications and acceptance of all grant funding."

Grant Applications Submitted and/or Awarded January 1, 2026 Through January 31, 2026 Requiring BOC Ratification

Dept.	Grantor	Grant Title	Grant Description	Funds Requested	County Match	Status	Previous Award from Grantor
JUSTICE AND SAFETY							
Juvenile Court	Criminal Justice Coordinating Council	Fulton County Juvenile Accountability Court	Request approval to apply and accept a repeat grant from Criminal Justice Coordinating Council in the amount of $88,821.00. Funding will support Fulton County Juvenile Accoutability Court that serves the residents of Fulton County by handling cases involving allegations of dependency, children in need of services, and delinquency for children under 18.. There is an in-kind match of $15,674.00 that will be covered through staff salary and benefits. The grant period is from July 1, 2026 through June 30, 2027. No County Cash Match	$ 88,821.00	$ -	Pending	$ 66,450.00
Marshal	United States Marshal Service	Joint Law Enforcement Operations Task Force	Request approval to accept a repeat grant from the United States Marshal Service in the amount $21,000.00 to cover overtime compensation and benefits for staff participating on the Joint Law Enforcement Operations Task Force. The grant period is from October 1, 2025 through September 30, 2026. No County Cash Match	$ 21,000.00	$ -	Awarded	$ 21,000.00
			Subtotal:	**$ 109,821.00**	**$ -**		
HEALTH AND HUMAN SERVICES							
ARTS AND LIBRARIES							
INFRASTRUCTURE AND ECONOMIC DEVELOPMENT							
Community Development	U.S. Department of Housing and Urban Development (HUD)	Community Development Block Grant (CDBG)	Request approval to accept a repeat grant from the U.S. Department of Housing and Urban Development (HUD) in the amount $1,254,161.00 to fund projects and services that support the needs of Fulton County citizens that qualify as low and moderate income residents. The grant period is from October 1, 2024 through September 30, 2034. No County Cash Match	$ 1,254,161.00	$ -	Awarded	$ 1,254,257.00
Community Development	U.S. Department of Housing and Urban Development (HUD)	HOME Investment Partnership Program.	Request approval to accept a repeat grant from the U.S. Department of Housing and Urban Development (HUD) in the amount $590,862.29 to fund projects and services that support the needs of Fulton County citizens that qualify as low and moderate income residents, and empowers people and communities to design and implement strategies tailored to their own needs and priorities. There is a required match of $219,362.00 that is within the Department's FY26 Budget. The grant period is from October 1, 2024 through September 30, 2033. County Cash Match: $219,362.00	$ 590,862.29	$ 219,362.00	Awarded	$ 594,879.99
			Subtotal:	**$ 1,845,023.29**	**$ 219,362.00**		
OPEN AND RESPONSIBLE GOVERNMENT							
REGIONAL LEADERSHIP							
			TOTAL:	**$ 1,954,844.29**	**$ 219,362.00**		

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0084 **Meeting Date:** 2/18/2026

Department
Human Resources Management

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Request approval to amend the 2026 COLA Resolution, as adopted in the FY2026 Budget (#26-0032), to include Superior Court and State Court chamber staff as eligible COLA recipients.

Requirement for Board Action *(Cite specific Board policy, statute or code requirement)*
Click or tap here to enter text.

Strategic Priority Area related to this item *(If yes, note strategic priority area below)*
Open and Responsible Government

Commission Districts Affected
All Districts ☒
District 1 ☐
District 2 ☐
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?
No

Summary & Background
The Department of Human Resources Management recommends approval to amend the 2026 COLA Resolution, as adopted in the FY2026 Budget (#26-0032), to include Superior Court and State Court chamber staff as eligible COLA recipients.

The personal staff of elected judges in the Superior and State Courts were excluded from the 2026 COLA due to their compensation being governed by the Superior and State Courts Chamber Staff Plan.

The County Manager has confirmed that funds for the 2026 COLA in the FY 2026 budget are sufficient to extend the 2026 COLA to the personal staff in the Superior and State Courts Chamber

Staff Plan.

This request once approved will also allow the County to work with both Courts on the future of their compensation structure

Scope of Work: Click or tap here to enter text.

Community Impact: There is no community impact.

Department Recommendation: The Department of Human Resources Management recommends approval.

Project Implications: There are no project implications.

Community Issues/Concerns: There are no community issues or concerns.

Department Issues/Concerns: There are no department issues or concerns,

Fiscal Impact / Funding Source

Funding Line 1:

N/A

Funding Line 2:

Click here to enter text.

Funding Line 3:

Click here to enter text.

Funding Line 4:

Click here to enter text.

Funding Line 5:

Click here to enter text.

A RESOLUTION OF THE FULTON COUNTY BOARD OF COMMISSIONERS REFINING THE SCOPE OF THOSE ELIGIBLE FOR THE 2026 COST OF LIVING ADJUSTMENT ADOPTED IN RESOLUTION 26-0032.

WHEREAS, on January 21, 2026 via Resolution 26-0032, the Board of Commissioners of Fulton County ("BOC") adopted the County's FY 2026 budget which included sufficient funding for a cost of living adjustment for employees in 2026 (the "2026 COLA"); and

WHEREAS, Resolution 26-0032 also outlined the effective date, amount, position categories and other conditions and exclusions applicable to the 2026 COLA; and

WHEREAS, the personal staff of elected judges in the Superior and State Courts were excluded from the 2026 COLA due to their compensation being governed by the Superior and State Courts Chamber Staff Plan which, pursuant to compensation rules for personal staff and subject to budget availability, allows their salaries to automatically increase within the applicable salary range at pre-determined intervals based on experience level, a process not applicable to other employees; and

WHEREAS, the Superior and State Courts have requested that their personal staff in the Superior and State Courts Chamber Staff Plan be included within the scope of those eligible for the 2026 COLA; and

WHEREAS, the BOC recognizes that a cost of living adjustment for the personal staff in the Superior and State Courts Chamber Staff Plan supports retention of those employees that support important court operations; and

WHEREAS, according to the County Manager, the funds for the 2026 COLA in the FY 2026 budget are sufficient to extend the 2026 COLA to the personal staff in the Superior and State Courts Chamber Staff Plan.

NOW, THEREFORE, BE IT RESOLVED, the Board of Commissioners of Fulton County hereby amends Resolution 26-0032 to refine the scope of those eligible for the 2026 COLA such that those employees compensated by the Superior and State Courts Chamber Staff Plan are eligible to the extent not otherwise excluded based on any other provision of Resolution 26-0032.

BE IT FURTHER RESOLVED, that all other conditions for the 2026 COLA as contained in Resolution 26-0032, including, but not limited to, the effective date, amount,

applicable position categories, and inapplicability to County supplements or individuals employed by and paid salaries by the State of Georgia, shall also apply to the employees compensated by the Superior and State Courts Chamber Staff Plan.

BE IT FURTHER RESOLVED, that this Resolution is only intended to refine the scope of those eligible for the 2026 COLA to remove the exclusion that was applied to employees compensated by the Superior and State Courts Chamber Staff Plan and not modify or change the application of any other provision of Resolution 26-0032.

BE IT FINALLY RESOLVED, that this Resolution will take effect upon its adoption, and that all resolutions and parts of resolutions in conflict with this Resolution are hereby repealed to the extent of such conflict.

PASSED AND ADOPTED, this ____ day of February, 2026.

FULTON COUNTY BOARD OF COMMISSIONERS

_____
Robert L. Pitts, Chairman

ATTEST:

_____
Tonya Grier,
Clerk to Commission

APPROVED AS TO FORM:

_____
Y. Soo Jo
County Attorney

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0085 **Meeting Date:** 2/18/2026

Department
Real Estate and Asset Management

Requested Action
Request approval of a Water Easement Dedication of 11,674.08 square feet to Fulton County, a political subdivision of the State of Georgia, from Arkan Bethany, LLC, for the purpose of constructing the Elara at Bethany Project at 3475-95 Bethany Bend, Milton, Georgia 30004.

Requirement for Board Action
Board action is required pursuant to Fulton County Code, Appendix B, Zoning Resolution, Article XXXIV. - Development Regulations, 34.4.1 -- Land disturbance permit prerequisites. In addition, Board Action is required pursuant to Fulton County Code Section 1-117, the Board of Commissioners has exclusive jurisdiction and control in directing and controlling all the property of the county, as they may deem expedient, according to and to exercise such other powers as are granted by law, or are indispensable to their jurisdiction over County matters.

Strategic Priority Area related to this item
Open and Responsible Government

Commission Districts Affected
All Districts ☐
District 1 ☐
District 2 ☒
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?
No

Summary & Background

Scope of Work: The proposed Elara at Bethany Project, a residential development, requires the installation of a water service line. Fulton County development regulations require that all new water line connections acknowledge Fulton County's ownership interests in the area(s) where a water

service line connection is being made before recording the Final Plat. The easement area to be conveyed consists of 11,674.08 square feet and is located in Land Lot 972 of the 2nd District, 1st Section of Fulton County, Georgia.

Community Impact: The community will benefit from the extension of the County's water system and the addition of a residential development.

Department Recommendation: The Department of Real Estate and Asset Management recommends acceptance of the easement dedication

Project Implications: Easement dedications by the owner of record to Fulton County are recorded in the public records and grant Fulton County access to perform construction, maintenance, and upgrades to the County's water system once the proposed improvements are installed.

Community Issues/Concerns: None

Department Issues/Concerns: None

Fiscal Impact / Funding Source

Acceptance of this easement dedication does not involve the expenditure or the receipt of funds.

[BLANK SPACE ABOVE THIS LINE IS FOR THE SOLE USE OF THE CLERK OF SUPERIOR COURT]

THIS DOCUMENT MAY BE RECORDED ONLY BY PERSONNEL OF THE FULTON COUNTY LAND DIVISION

Return Recorded Document to:
Fulton County Land Division
141 Pryor Street, S.W. – Suite 8021
Atlanta, Georgia 30303

Project Name : Elara at Bethany
Tax Parcel Identification No.: 21 547009720497, 21 547009720463, 21 547009720547
Land Disturbance Permit No.: WRN24-058
Zoning/Special Use Permit No.: R-5A
(if applicable)

For Fulton County Use Only

Approval Date: _____
Initials: _____

WATER LINE EASEMENT
(Corporate Form)

STATE OF GEORGIA,
COUNTY OF FULTON

This indenture entered into this 3rd day of October, 2025, between Arkan Bethany, LLC, a corporation duly organized under the laws of the State of Georgia, party of the first part (hereinafter referred to as Grantor) and **FULTON COUNTY**, a Political Subdivision of the State of Georgia, party of the second part and Grantee.

WITNESSETH, that for and in consideration of $1.00 in hand paid, at and before the sealing and delivery of these presents, the receipt whereof is hereby acknowledged and in consideration of the benefits which will accrue to the undersigned from the construction of a water line through subject property, and in consideration of the benefits which will accrue to the subject property from the construction of a water line through the subject property, said Grantor has granted, bargained, sold and conveyed and by these presents does grant, bargain, sell and convey to FULTON COUNTY and to successors and assigns the right, title, and privilege of easements through subject property located in Land Lot(s) 972, 1st Section (if applicable) of District 2, Fulton County, Georgia, and more particularly described as follows: To wit:

Elara at Bethany

Project Name

[See Exhibit "A" attached hereto and made a part hereof]

This right and easement herein granted being to occupy such portion of my property as would be sufficient for the construction, access, maintenance and upgrade of a water line through my property according to the location and size of said

water line as shown on the map and profile now on file in the office of the Public Works Department of Fulton County, and which size and location may be modified from time to time including in the future after the date of this document to accommodate said water line within the aforesaid boundaries of the above-described easement.

For the same consideration, Grantor hereby conveys and relinquishes to FULTON COUNTY a right of access over Grantor's remaining lands as necessary for FULTON COUNTY to perform maintenance and repairs on said water line on both a routine and emergency basis.

Said Grantor hereby warrants that it has the right to sell and convey said water line easement and right of access and binds itself, its successors and assigns forever to warrant and defend the right and title to the above described water line easement unto the said FULTON COUNTY, its successors and assigns against the claims of all persons whomever by virtue of these presents.

Said Grantor hereby waives for itself, its successors and assigns all rights to any further compensation or claim to damages on account of the construction, access, upgrade or maintenance of said water line for the use of the property as herein agreed.

IN WITNESS HEREOF said party of the first part has hereunto affixed his/her hand and seal on the day and year first above written.

Signed, sealed and delivered this 9th day of October, 20 25 in the presence of:

Witness

Notary Public

[NOTARIAL SEAL]

SUMA VALLURI NOTARY PUBLIC FULTON COUNTY, GA Exp. July 21, 2029

GRANTOR: Arkan Bethany, LLC
CORPORATE NAME

By:

Print Name: Ihssan Hashem

Title: CEO

By:

Print Name:

Title:

[CORPORATE SEAL]

Elara At Bethany, Water Easement

All that tract or parcel of land lying and being in the City of Milton in Land Lot 972 of the 2nd District, 1st Section of Fulton County, Georgia and more particularly described as follows.

Beginning 915.3 feet east of the intersection of the southern right of way line with the west side of Land Lot 952 and thence continue along said right of way along a curve to the right, said curve having an arc length of 121.49 feet with a radius of 780.68 feet, being subtended by a chord bearing of South 55 degrees 36 minutes 17 seconds East, a distance of 121.37 feet to a point; thence South 10 degrees 06 minutes 28 seconds West, a distance of 10.94 feet to a point; thence along a curve to the right, said curve having an arc length of 141.66 feet with a radius of 993.91 feet, being subtended by a chord bearing of South 47 degrees 33 minutes 16 seconds East, a distance of 141.54 feet to a point and the Point of Beginning, Thence from said Point of Beginning and continue thence along a curve to the right, said curve having an arc length of 9.92 feet with a radius of 993.91 feet, being subtended by a chord bearing of South 43 degrees 11 minutes 07 seconds East, a distance of 9.92 feet to a point; thence along a curve to the right, said curve having an arc length of 11.10 feet with a radius of 993.91 feet, being subtended by a chord bearing of South 42 degrees 34 minutes 45 seconds East, a distance of 11.10 feet to a point; thence leaving said right of way and run South 49 degrees 57 minutes 03 seconds West, a distance of 50.08 feet to a point; thence South 38 degrees 42 minutes 03 seconds West, a distance of 11.04 feet to a point; thence South 11 degrees 07 minutes 11 seconds West, a distance of 11.74 feet to a point; thence South 00 degrees 54 minutes 56 seconds West, a distance of 27.12 feet to a point; thence along a curve to the right, said curve having an arc length of 121.65 feet with a radius of 285.22 feet, being subtended by a chord bearing of South 13 degrees 11 minutes 28 seconds West, a distance of 120.73 feet to a point; thence South 38 degrees 08 minutes 07 seconds West, a distance of 100.56 feet to a point; thence South 43 degrees 40 minutes 08 seconds West, a distance of 90.20 feet to a point; thence North 46 degrees 17 minutes 29 seconds West, a distance of 30.19 feet to a point; thence North 43 degrees 05 minutes 13 seconds East, a distance of 12.54 feet to a point; thence North 89 degrees 45 minutes 07 seconds East, a distance of 12.93 feet to a point; thence North 43 degrees 40 minutes 08 seconds East, a distance of 69.68 feet to a point; thence North 38 degrees 13 minutes 48 seconds East, a distance of 93.64 feet to a point; thence along a curve to the left, said curve having an arc length of 81.04 feet with a radius of 264.22 feet, being subtended by a chord bearing of North 16 degrees 27 minutes 39 seconds East, a distance of 80.72 feet to a point; thence North 84 degrees 01 minutes 04 seconds West, a distance of 34.94 feet to a point; thence North 05 degrees 58 minutes 56 seconds East, a distance of 2.50 feet to a point; thence North 84 degrees 01 minutes 04 seconds West, a distance of 5.00 feet to a point; thence North 05 degrees 58 minutes 56 seconds East, a distance of 5.00 feet to a point; thence South 84 degrees 01 minutes 04 seconds East, a distance of 5.00 feet to a point; thence North 05 degrees 58 minutes 56 seconds East, a distance of 2.50 feet to a point; thence South 84 degrees 01 minutes 04 seconds East, a distance of 35.04 feet to a point; thence along a curve to the left, said curve having an arc length of 31.32 feet with a radius of 264.22 feet, being subtended by a chord bearing of North 02 degrees

06 minutes 33 seconds East, a distance of 31.30 feet to a point; thence North 89 degrees 04 minutes 38 seconds West, a distance of 35.69 feet to a point; thence North 00 degrees 55 minutes 22 seconds East, a distance of 2.48 feet to a point; thence North 88 degrees 52 minutes 57 seconds West, a distance of 4.99 feet to a point; thence North 00 degrees 55 minutes 22 seconds East, a distance of 5.00 feet to a point; thence South 88 degrees 52 minutes 57 seconds East, a distance of 5.00 feet to a point; thence North 00 degrees 55 minutes 22 seconds East, a distance of 2.52 feet to a point; thence South 89 degrees 04 minutes 38 seconds East, a distance of 34.34 feet to a point; thence North 11 degrees 07 minutes 11 seconds East, a distance of 27.46 feet to a point; thence North 38 degrees 42 minutes 03 seconds East, a distance of 8.87 feet to a point; thence North 89 degrees 05 minutes 57 seconds West, a distance of 43.89 feet to a point; thence North 00 degrees 54 minutes 03 seconds East, a distance of 2.50 feet to a point; thence North 89 degrees 05 minutes 57 seconds West, a distance of 5.00 feet to a point; thence North 00 degrees 54 minutes 03 seconds East, a distance of 5.00 feet to a point; thence South 89 degrees 05 minutes 57 seconds East, a distance of 5.00 feet to a point; thence North 00 degrees 54 minutes 03 seconds East, a distance of 2.50 feet to a point; thence South 89 degrees 05 minutes 57 seconds East, a distance of 52.61 feet to a point; thence North 49 degrees 57 minutes 03 seconds East, a distance of 10.18 feet to a point; thence North 69 degrees 57 minutes 45 seconds West, a distance of 58.04 feet to a point; thence North 20 degrees 02 minutes 15 seconds East, a distance of 2.50 feet to a point; thence North 69 degrees 57 minutes 45 seconds West, a distance of 5.00 feet to a point; thence North 20 degrees 02 minutes 15 seconds East, a distance of 5.00 feet to a point; thence South 69 degrees 57 minutes 45 seconds East, a distance of 5.00 feet to a point; thence North 20 degrees 02 minutes 15 seconds East, a distance of 2.50 feet to a point; thence South 69 degrees 57 minutes 45 seconds East, a distance of 58.03 feet to a point; thence North 43 degrees 14 minutes 34 seconds West, a distance of 64.21 feet to a point; thence North 46 degrees 45 minutes 26 seconds East, a distance of 2.50 feet to a point; thence North 43 degrees 14 minutes 34 seconds West, a distance of 5.00 feet to a point; thence North 46 degrees 45 minutes 26 seconds East, a distance of 5.00 feet to a point; thence South 43 degrees 14 minutes 34 seconds East, a distance of 5.00 feet to a point; thence North 46 degrees 45 minutes 26 seconds East, a distance of 2.50 feet to a point; thence South 43 degrees 14 minutes 34 seconds East, a distance of 69.77 feet to a point; thence North 49 degrees 57 minutes 03 seconds East, a distance of 0.44 feet to a point; thence North 40 degrees 02 minutes 57 seconds West, a distance of 25.22 feet to a point; thence North 49 degrees 57 minutes 03 seconds East, a distance of 2.45 feet to a point; thence North 40 degrees 02 minutes 57 seconds West, a distance of 3.50 feet to a point; thence North 49 degrees 57 minutes 03 seconds East, a distance of 5.00 feet to a point; thence South 40 degrees 02 minutes 57 seconds East, a distance of 3.50 feet to a point; thence North 49 degrees 57 minutes 03 seconds East, a distance of 2.55 feet to a point; thence South 40 degrees 02 minutes 57 seconds East, a distance of 25.22 feet to a point; thence North 49 degrees 57 minutes 03 seconds East, a distance of 7.61 feet to a point and the Point of Beginning.

Said Tract or Parcel contains 0.268 Acres.

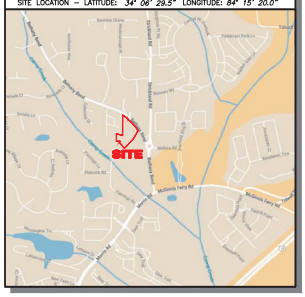
Elara At Bethany

CITY OF MILTON, FULTON COUNTY GEORGIA
LAND LOTS 972, 2ND DISTRICT, 1ST SECTION
PARENT TRACT PARCEL NUMBER: 21 547009720497,
21 547009720463, 21 547009720547

(CLERK OF COURT RECORDING INFORMATION)

VICINITY MAP

SITE LOCATION – LATITUDE: 34° 06' 29.5" LONGITUDE: 84° 15' 20.0"



GENERAL NOTES

THIS SURVEY HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF THE PERSON OR ENTITIES NAMED HEREON. NO EXPRESS OR IMPLIED WARRANTIES WITH RESPECT TO THE INFORMATION SHOWN HEREON IS OR IS TO BE EXTENDED TO ANY PERSONS OR ENTITIES OTHER THAN THOSE SHOWN HEREON.

REVISIONS LISTED ON THIS SURVEY APPLY ONLY TO THE SPECIFIC CHANGES REFERENCED, AND DO NOT CONSTITUTE AN UPDATE OF OTHER DATA ON THIS SURVEY. THE "SURVEY DATE" SHOWN HEREON IS THE APPLICABLE DATE AS RELATED TO PROVISIONS OF STATUTES OF LIMITATION UNLESS SPECIFICALLY NOTED OTHERWISE.

THIS SURVEY HAS BEEN PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE INSPECTION REPORT. EASEMENTS OR OTHER ENCUMBRANCES MAY EXIST ON PUBLIC RECORD BUT NOT BE SHOWN HEREON.

THIS PROPERTY IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA BASED ON THE FLOOD INSURANCE RATE MAP FOR THIS AREA, THE MAP NUMBER FOR THIS AREA IS 13121C0057G, AND THE DATE OF SAID MAP IS JUNE 19, 2020. THIS DETERMINATION WAS MADE BY GRAPHICALLY DETERMINING THE POSITION OF THIS SITE ON SAID FIRM MAPS UNLESS OTHERWISE NOTED.

THE DATUM FOR THIS SITE WAS ESTABLISHED UTILIZING GLOBAL POSITIONING SYSTEMS, AND BASED ON POSITIONAL VALUES FOR THE VIRTUAL REFERENCE STATION NETWORK DEVELOPED BY eGPS SOLUTIONS. THE HORIZONTAL REFERENCE FRAME IS NORTH AMERICAN DATUM OF 1983(2011)–STATE PLANE COORDINATE SYSTEM OF GEORGIA–WEST ZONE. THE VERTICAL REFERENCE FRAME IS NORTH AMERICAN VERTICAL DATUM OF 1988. ANY DIRECTIONS OR DIMENSIONS SHOWN ARE A RECTANGULAR, GROUND LEVEL PROJECTION OF THE STATE PLANE COORDINATE SYSTEM.

THE CITY OF MILTON DOES NOT ENFORCE RESTRICTIVE COVENANTS.

PROPERTY CORNERS ARE 5/8–INCH REBAR WITH A PLASTIC CAP SET UNLESS OTHERWISE NOTED.

THIS SITE DOES NOT CONTAIN ANY STATE WATERS OR WETLANDS

CITY OF MILTON AND FULTON COUNTY PERSONNEL AND/OR AGENTS SHALL HAVE FREE AND TOTAL ACCESS TO AND ACROSS ALL EASEMENTS.

CITY OF MILTON AND FULTON COUNTY PERSONNEL AND/OR AGENTS SHALL HAVE FREE AND TOTAL ACCESS TO AND ACROSS ALL EASEMENTS.

WATER SERVICE PROVIDED BY FULTON COUNTY AND WASTE WATER SERVICE PROVIDED BY FULTON COUNTY

PROOF OF FULTON COUNTY APPROVAL FOR WATER CONNECTION, SEWER CONNECTION OR SEPTIC SYSTEM SHALL BE PROVIDED PRIOR TO ISSUANCE OF A BUILDING PERMIT

SURVEY REFERENCES
1. CIVIL PLANS AS PREPARED BY PARADIGM ENGINEERING SERVICES INC. DATED 5/24/2024.

LINE TABLE

LINE	BEARING	DISTANCE
L1	S38°42'03"W	11.04'
L2	S11°07'11"W	11.74'
L3	N43°05'13"E	12.54'
L4	N89°45'07"E	12.93'
L5	N03°58'50"E	2.50'
L6	N84°01'04"W	5.00'
L7	N05°58'56"E	5.00'
L8	S84°01'04"E	5.00'
L9	N05°58'56"E	2.50'
L10	N00°55'25"E	2.48'
L11	N88°29'07"W	4.99'
L12	N00°55'25"E	5.00'
L13	S88°29'07"E	5.00'
L14	N00°55'25"E	2.52'
L15	N11°07'11"E	22.46'
L16	N38°42'03"E	8.87'
L17	N89°05'57"W	43.89'
L18	N00°54'03"E	2.50'
L19	N89°05'57"W	5.00'
L20	N00°54'03"E	5.00'
L21	S89°55'57"E	5.00'
L22	N00°54'03"E	2.50'
L23	S89°05'57"E	52.61'
L24	N49°57'03"E	10.18'
L25	N89°57'45"W	58.04'
L26	N00°02'15"E	2.50'
L27	N89°57'45"W	5.00'
L28	N00°02'15"E	2.50'
L29	S89°57'45"E	5.00'
L30	N00°02'15"E	2.50'
L31	S89°57'45"E	58.03'
L32	N43°14'54"W	64.21'
L33	N46°45'06"E	2.50'
L34	N43°14'54"W	5.00'
L35	N46°45'06"E	5.00'
L36	S43°14'54"E	5.00'
L37	N46°45'06"E	2.50'
L38	S43°14'54"E	69.77'
L39	N49°57'03"E	0.44'
L40	N40°02'57"W	29.32'
L41	N49°57'03"E	2.45'
L42	N40°02'57"W	5.00'
L43	N49°57'03"E	5.00'
L44	S40°02'57"E	5.00'
L45	N49°57'03"E	2.56'
L46	S40°02'57"E	25.29'
L47	N49°57'03"E	7.61'

CURVE TABLE

CURVE	RADIUS	ARC LENGTH	CHORD LENGTH	CHORD BEARING
C1	993.91'	9.92'	9.92'	S43°11'07"E
C2	993.91'	11.10'	11.10'	S42°34'45"E
C3	264.22'	31.32'	31.30'	N02°06'33"E

LEGEND

STANDARD ABBREVIATIONS

AC	AIR CONDITIONER
BH	BORE HOLE
BSL	BUILDING SETBACK LINE
CI	CURB INLET
CMP	CORRUGATED METAL PIPE
CMF	CONCRETE MONUMENT FND
CO	SANITARY CLEANOUT
CPED	COMMUNICATION PEDESTAL
CTP	CRIMPED TOP PIPE
DI	DROP INLET
DIP	DUCTILE IRON PIPE
DWCB	DOUBLE WING CATCH BASIN
FND	FOUND
GM	GAS METER
INV	INVERT
JB	JUNCTION BOX
MH	MANHOLE
NF	NAIL FOUND
NS	NAIL SET
OCS	OUTLET CONTROL STRUCTURE
OTP	OPEN TOP PIPE
PBX	POWER BOX
PM	POWER METER
POB	POINT OF BEGINNING
POC	POINT OF COMMENCEMENT
RCP	REINFORCED CONCRETE PIPE
RBR	IRON REINFORCING BAR
RBS	5/8"REBAR SET CAPPED LSF 621
SS	SANITARY SEWER
SWCB	SINGLE WING CATCH BASIN
TRANS	ELECTRIC TRANSFORMER

STANDARD SYMBOLS

⌀	POWER POLE
→	GUY WIRE
—W—	POWER LINE
LP	LIGHT POLE
⊠	ELECTRIC TRANSFORMER
⊠	WATER VAULT
GV	GAS VALVE
GM	GAS METER
WV	WATER VALVE
WM	WATER METER
FH	FIRE HYDRANT
—E—	UNDERGROUND ELECTRIC LINE
—G—	UNDERGROUND GAS LINE
—CM—	UNDERGROUND COMMUNICATION LINE
—W—	UNDERGROUND WATER LINE
(1)	PHOTO POSITION INDICATOR
(XX)	REGULAR PARKING SPACE COUNT
	HANDICAP PARKING SPACE
	TREE POSITION INDICATOR
	SIGN

CLOSURE STATEMENT

THE FIELD CLOSURE UPON WHICH THIS PLAT IS BASED HAS A CLOSURE PRECISION OF ONE FOOT IN 58,234', AND WAS ADJUSTED USING THE LEAST SQUARES METHOD. A TRIMBLE "S" SERIES TOTAL STATION AND TRIMBLE TSC SERIES DATA COLLECTOR WERE USED TO COLLECT THIS FIELD DATA.
THIS PLAT HAS BEEN CALCULATED FOR CLOSURE AND WAS FOUND TO BE ACCURATE WITHIN ONE FOOT IN N/A FEET. CAL. INT.

IF YOU DIG

811 Know what's below. Call before you dig. Dial 811 Or Call 800-282-7411

GRAPHIC SCALE

0 15 30 75 150
1"= 30'

OWNER & DEVELOPER

OWNER/DEVELOPER:
Mr. Ihsaan Hashem
Arkan Echo, LLC
455 Mansell Road.
Suite 300
Alpharetta, GA 30022
Ph. 678–469–1580

SURVEYOR CERTIFICATION (GA)

As required by subsection (d) of O.C.G.A. Section 15–6–67, this plat has been prepared by a land surveyor and approved by all applicable local jurisdictions for recording as evidenced by approval certificates, signatures, stamps, or statements hereon. Such approvals or affirmations should be confirmed with the appropriate governmental bodies by any purchaser or user of this plat as to intended use of any parcel. Furthermore, the undersigned land surveyor certifies that this plat complies with the minimum technical standards for property surveys in Georgia as set forth in the rules and regulations of the Georgia Board of Registration for Professional Engineers and Land Surveyors and as set forth in O.C.G.A. Section 15–6–67.

GEORGIA REGISTERED PROFESSIONAL LAND SURVEYOR CRAIG JENNINGS

Craig A. Jennings
Georgia Registered
Land Surveyor # 3043

A.B
10/28/25

GeoSurvey
Professional Land Surveying Services
1660 Barnes Mill Road
Marietta, Georgia 30062
Phone: (770) 795–9900
Fax: (770) 795–8880
www.geosurvey.com
EMAIL: info@geosurvey.com
Certificate of Authorization #LSF–000621

WATER EASEMENT EXHIBIT OF

ELARA AT BETHANY

FOR

Arkan Homes

GS JOB NO:	20247986–3	DRAWING SCALE:	1"= 30'
FIELD WORK:	MJ	CITY:	MILTON
PROJ MGR:	CAJ	COUNTY:	FULTON STATE: GA
REVIEWED:		LAND LOT:	972
DWG FILE:	20247986–3.dwg	DISTRICT:	2nd SECTION: 1st

SURVEY DATE: April–1–2025

REVISIONS (SEE GENERAL NOTES)

No.	Date	Description

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0086 **Meeting Date:** 2/18/2026

Department
Real Estate and Asset Management

Requested Action
Request approval of a Sewer Easement Dedication of 14,026 square feet to Fulton County, a political subdivision of the State of Georgia, from Arkan Bethany, LLC, for the purpose of constructing the Elara at Bethany Project at 3475-95 Bethany Bend, Milton, Georgia 30004

Requirement for Board Action
Board action is required pursuant to Article XXXIV. - Development Regulations, 34.4.1 Land disturbance permit prerequisites. In addition, pursuant to Fulton County Code Section 1-117, the Board of Commissioners has exclusive jurisdiction and control in directing and controlling all the property of the County, as they may deem expedient, according to and to exercise such other powers as are granted by law or are indispensable to their jurisdiction over County matters.

Strategic Priority Area related to this item
Open and Responsible Government

Commission Districts Affected
All Districts ☐
District 1 ☐
District 2 ☒
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?
No

Summary & Background

Scope of Work: The proposed Elara at Bethany Project, a residential development, requires a connection to the County's sewer system. Fulton County development regulations require that all new sewer line connections acknowledge Fulton County's ownership interests in the area(s) in which a connection is being made to the County's sewer system before issuing a Land Disturbance Permit.

The easement area to be conveyed to the County consists of 14,026 square feet and is located in Land Lot 972 of the 2nd District, 1st Section of Fulton County, Georgia**.**

Community Impact: The community will benefit from the extension of the County's sewer system and the addition of a residential development.

Department Recommendation: The Department of Real Estate and Asset Management recommends acceptance of the easement dedication**.**

Project Implications: Easement dedications by the owner of records to Fulton County are recorded in the public records and grant Fulton County access to perform construction, maintenance, and upgrades to the County's sewer system once the proposed improvements are installed.

Community Issues/Concerns: None

Department Issues/Concerns: None

Fiscal Impact / Funding Source

Acceptance of this easement dedication does not involve the expenditure or the receipt of funds.

[BLANK SPACE ABOVE THIS LINE IS FOR THE SOLE USE OF THE CLERK OF SUPERIOR COURT

THIS DOCUMENT MUST ONLY BE RECORDED BY PERSONNEL OF THE FULTON COUNTY LAND DIVISION

Return Recorded Document to:
Fulton County Land Division
141 Pryor Street, S.W. – Suite 8021
Atlanta, Georgia 30303

Project Name : Elara at Bethany
Tax Parcel Identification No.: 21 547009720497, 21 547009720463, 21 547009720547
Land Disturbance Permit No.: WRN24-058
Zoning/Special Use Permit No.: R-5A
(if applicable)

For Fulton County Use Only

Approval Date: _____
Initials: _____

SEWER EASEMENT
(Corporate Form)

STATE OF GEORGIA,
COUNTY OF FULTON

This indenture entered into this 3rd day of October, 2025, between Arkan Bethany, LLC, a corporation duly organized under the laws of the State of Georgia, party of the first part (hereinafter referred to as Grantor) and **FULTON COUNTY**, a Political Subdivision of the State of Georgia, party of the second part and Grantee.

WITNESSETH, that for and in consideration of $1.00 in hand paid, at and before the sealing and delivery of these presents, the receipt whereof is hereby acknowledged and in consideration of the benefits which will accrue to the undersigned from the construction of a sewer line through subject property, and in consideration of the benefits which will accrue to the subject property from the construction of a sewer line through subject property, said Grantor has granted, bargained, sold and conveyed and by these presents does grant, bargain, sell and convey to FULTON COUNTY and to successors and assigns the right, title, and privilege of easements through subject property located in Land Lot(s) 972, 1st Section (if applicable) of District 2, Fulton County, Georgia, and more particularly described as follows: To wit:

Elara at Bethany

Project Name

[See Exhibit "A" attached hereto and made a part hereof]

This right and easement herein granted being to occupy such portion of my property as would be sufficient for the construction, access, maintenance and upgrade of a sewer line through my property according to the location and size of said sewer line as shown on the map and profile now on file in the office of the Public Works Department of Fulton County, and which size and location may be modified from time to time including in the future after the date of this document to accommodate said sewer line within the aforesaid boundaries of the above-described easement.

For the same consideration, Grantor hereby conveys and relinquishes to FULTON COUNTY a right of access over Grantor's remaining lands as necessary for FULTON COUNTY to perform maintenance and repairs on said sewer line on both a routine and emergency basis.

Said Grantor hereby warrants that it has the right to sell and convey said sewer line easement and right of access and binds itself, its successors and assigns forever to warrant and defend the right and title to the above described sewer line easement unto the said FULTON COUNTY, its successors and assigns against the claims of all persons whomever by virtue of these presents.

Said Grantor hereby waives for itself, its successors and assigns all rights to any further compensation or claim to damages on account of the construction, access, upgrade or maintenance of said sewer line for the use of the property as herein agreed.

IN WITNESS HEREOF said party of the first part has hereunto affixed his/her hand and seal on the day and year first above written.

Signed, sealed and delivered this 9th day of October, 20 25
in the presence of:

Witness

Notary Public

[NOTARIAL SEAL]

SUMA VALLURI NOTARY PUBLIC FULTON COUNTY, GA EXP. July 21, 2029

GRANTOR: Arkan Bethany, LLC
CORPORATE NAME

By:

Print Name: Ihssan Hashem

Title: CEO

By:

Print Name:

Title:

[CORPORATE SEAL]

Elara At Bethany, Sanitary Sewer Easement

All that tract or parcel of land lying and being in the City of Milton in Land Lot 972 of the 2nd District, 1st Section of Fulton County, Georgia and more particularly described as follows.

Beginning 915.3 feet east of the intersection of the southern right of way line with the west side of Land Lot 952 and thence continue along said right of way along a curve to the right, said curve having an arc length of 121.49 feet with a radius of 780.68 feet, being subtended by a chord bearing of South 55 degrees 36 minutes 17 seconds East, a distance of 121.37 feet to a point; thence South 10 degrees 06 minutes 28 seconds West, a distance of 10.94 feet to a point; thence along a curve to the right, said curve having an arc length of 74.57 feet with a radius of 993.91 feet, being subtended by a chord bearing of South 49 degrees 29 minutes 18 seconds East, a distance of 74.55 feet to a point and the Point of Beginning, Thence from said Point of Beginning and continue along a curve to the right, said curve having an arc length of 20.00 feet with a radius of 993.91 feet, being subtended by a chord bearing of South 46 degrees 45 minutes 46 seconds East, a distance of 20.00 feet to a point; thence Leaving said right of way and run South 42 degrees 39 minutes 39 seconds West, a distance of 18.40 feet to a point; thence South 14 degrees 54 minutes 19 seconds West, a distance of 51.33 feet to a point; thence South 00 degrees 53 minutes 45 seconds West, a distance of 76.41 feet to a point; thence South 09 degrees 10 minutes 41 seconds West, a distance of 62.23 feet to a point; thence South 25 degrees 04 minutes 52 seconds West, a distance of 64.50 feet to a point; thence South 43 degrees 04 minutes 31 seconds West, a distance of 200.41 feet to a point; thence South 74 degrees 19 minutes 55 seconds West, a distance of 19.20 feet to a point; thence North 40 degrees 21 minutes 52 seconds West, a distance of 22.57 feet to a point; thence North 71 degrees 28 minutes 59 seconds East, a distance of 26.04 feet to a point; thence North 43 degrees 04 minutes 31 seconds East, a distance of 188.17 feet to a point; thence North 25 degrees 04 minutes 52 seconds East, a distance of 58.53 feet to a point; thence North 09 degrees 10 minutes 41 seconds East, a distance of 57.99 feet to a point; thence North 00 degrees 53 minutes 45 seconds East, a distance of 77.42 feet to a point; thence North 14 degrees 54 minutes 19 seconds East, a distance of 58.73 feet to a point; thence North 42 degrees 39 minutes 39 seconds East, a distance of 23.54 feet to a point; and the Point of Beginning.

Said tract or parcel contains 0.322 Acres.

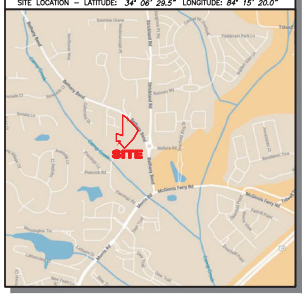
Elara At Bethany

CITY OF MILTON, FULTON COUNTY GEORGIA
LAND LOTS 972, 2ND DISTRICT, 1ST SECTION
PARENT TRACT PARCEL NUMBER: 21 547009720497,
21 547009720463, 21 547009720547

(CLERK OF COURT RECORDING INFORMATION)

VICINITY MAP

SITE LOCATION – LATITUDE: 34° 06' 29.5" LONGITUDE: 84° 15' 20.0"



GENERAL NOTES

THIS SURVEY HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF THE PERSON OR ENTITIES NAMED HEREON. NO EXPRESS OR IMPLIED WARRANTIES WITH RESPECT TO THE INFORMATION SHOWN HEREON IS TO BE EXTENDED TO ANY PERSONS OR ENTITIES OTHER THAN THOSE SHOWN HEREON.

REVISIONS LISTED ON THIS SURVEY APPLY ONLY TO THE SPECIFIC CHANGES REFERENCED, AND DO NOT CONSTITUTE AN UPDATE OF OTHER DATA ON THIS SURVEY. THE "SURVEY DATE" SHOWN HEREON IS THE APPLICABLE DATE AS RELATED TO PROVISIONS OF STATUTES OF LIMITATION UNLESS SPECIFICALLY NOTED OTHERWISE.

THIS SURVEY HAS BEEN PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE INSPECTION REPORT. EASEMENTS OR OTHER ENCUMBRANCES MAY EXIST OR PUBLIC RECORD BUT NOT BE SHOWN HEREON.

THIS PROPERTY IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA BASED ON THE FLOOD INSURANCE RATE MAP FOR THIS AREA, THE MAP NUMBER FOR THIS AREA IS 13121C0057G, AND THE DATE OF SAID MAP IS JUNE 19, 2020. THIS DETERMINATION WAS MADE BY GRAPHICALLY DETERMINING THE POSITION OF THIS SITE ON SAID FIRM MAPS UNLESS OTHERWISE NOTED.

THE DATUM FOR THIS SITE WAS ESTABLISHED UTILIZING GLOBAL POSITIONING SYSTEMS, AND BASED ON POSITIONAL VALUES FOR THE VIRTUAL REFERENCE STATION NETWORK DEVELOPED BY eGPS SOLUTIONS. THE HORIZONTAL REFERENCE FRAME IS NORTH AMERICAN DATUM OF 1983(2011)–STATE PLANE COORDINATE SYSTEM OF GEORGIA–WEST ZONE. THE VERTICAL REFERENCE FRAME IS NORTH AMERICAN VERTICAL DATUM OF 1988. ANY DIRECTIONS OR DIMENSIONS SHOWN ARE A RECTANGULAR, GROUND LEVEL PROJECTION OF THE STATE PLANE COORDINATE SYSTEM.

THE CITY OF MILTON DOES NOT ENFORCE RESTRICTIVE COVENANTS.

PROPERTY CORNERS ARE 5/8–INCH REBAR WITH A PLASTIC CAP SET UNLESS OTHERWISE NOTED.

THIS SITE DOES NOT CONTAIN ANY STATE WATERS OR WETLANDS

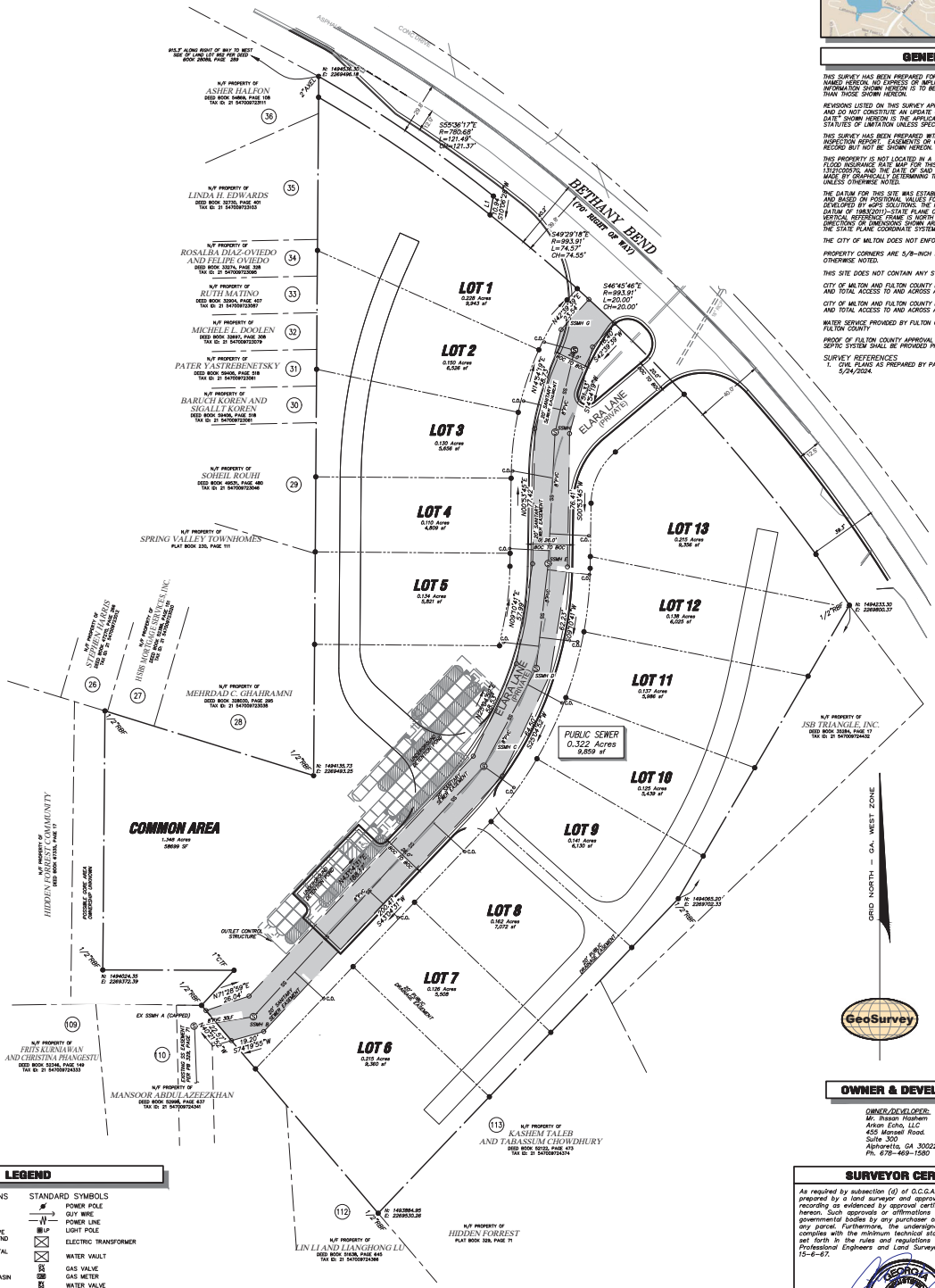
CITY OF MILTON AND FULTON COUNTY PERSONNEL AND/OR AGENTS SHALL HAVE FREE AND TOTAL ACCESS TO AND ACROSS ALL EASEMENTS.

CITY OF MILTON AND FULTON COUNTY PERSONNEL AND/OR AGENTS SHALL HAVE FREE AND TOTAL ACCESS TO AND ACROSS ALL EASEMENTS.

WATER SERVICE PROVIDED BY FULTON COUNTY AND WASTE WATER SERVICE PROVIDED BY FULTON COUNTY

PROOF OF FULTON COUNTY APPROVAL FOR WATER CONNECTION, SEWER CONNECTION OR SEPTIC SYSTEM SHALL BE PROVIDED PRIOR TO ISSUANCE OF A BUILDING PERMIT

SURVEY REFERENCES
1. CIVIL PLANS AS PREPARED BY PARADIGM ENGINEERING SERVICES INC. DATED 5/24/2024.



OWNER & DEVELOPER

OWNER/DEVELOPER:
Mr. Ihsaan Hashem
Arkan Echo, LLC
455 Mansell Road.
Suite 300
Alpharetta, GA 30022
Ph. 678–469–1580

LEGEND

STANDARD ABBREVIATIONS		STANDARD SYMBOLS	
AC	AIR CONDITIONER		POWER POLE
BH	BORE HOLE		GUY WIRE
BSL	BUILDING SETBACK LINE		POWER LINE
CI	CURB INLET		LIGHT POLE
CMP	CORRUGATED METAL PIPE		ELECTRIC TRANSFORMER
CMF	CONCRETE MONUMENT FND		
CO	SANITARY CLEANOUT		WATER VAULT
CPED	COMMUNICATION PEDESTAL		
CTP	CRIMPED TOP PIPE		GAS VALVE
DI	DROP INLET		GAS METER
DIP	DUCTILE IRON PIPE		WATER VALVE
DWCB	DOUBLE WING CATCH BASIN		WATER METER
FND	FOUND		FIRE HYDRANT
GM	GAS METER	E	UNDERGROUND ELECTRIC LINE
INV	INVERT	G	UNDERGROUND GAS LINE
JB	JUNCTION BOX	CM	UNDERGROUND COMMUNICATION LINE
MH	MANHOLE	W	UNDERGROUND WATER LINE
NF	NAIL FOUND	1	PHOTO POSITION INDICATOR
NS	NAIL SET	XX	REGULAR PARKING SPACE COUNT
OCS	OUTLET CONTROL STRUCTURE		HANDICAP PARKING SPACE
OTP	OPEN TOP PIPE		TREE POSITION INDICATOR
PBX	POWER BOX		SIGN
PM	POWER METER		
POB	POINT OF BEGINNING		
POC	POINT OF COMMENCEMENT		
RCP	REINFORCED CONCRETE PIPE		
RBR	IRON REINFORCING BAR		
RBS	5/8"RBR SET CAPPED LSF 621		
SS	SANITARY SEWER		
SWCB	SINGLE WING CATCH BASIN		
TRANS	ELECTRIC TRANSFORMER		

SURVEYOR CERTIFICATION (GA)

As required by subsection (d) of O.C.G.A. Section 15–6–67, this plat has been prepared by a land surveyor and approved by all applicable local jurisdictions for recording as evidenced by approval certificates, signatures, stamps, or statements hereon. Such approvals or affirmations should be confirmed with the appropriate governmental bodies by any purchaser or user of this plat as to intended use of any parcel. Furthermore, the undersigned land surveyor certifies that this plat complies with the minimum technical standards for property surveys in Georgia as set forth in the rules and regulations of the Georgia Board of Registration for Professional Engineers and Land Surveyors and as set forth in O.C.G.A. Section 15–6–67.

GEORGIA REGISTERED No. 3043 PROFESSIONAL LAND SURVEYOR CRAIG JENNINGS

Craig A. Jennings
Georgia Registered
Land Surveyor # 3043

CLOSURE STATEMENT

THE FIELD CLOSURE UPON WHICH THIS PLAT IS BASED HAS A CLOSURE PRECISION OF ONE FOOT IN 58,234', AND WAS ADJUSTED USING THE LEAST SQUARES METHOD. A TRIMBLE "S" SERIES TOTAL STATION AND TRIMBLE TSC SERIES DATA COLLECTOR WERE USED TO COLLECT THIS FIELD DATA.
THIS PLAT HAS BEEN CALCULATED FOR CLOSURE AND WAS FOUND TO BE ACCURATE WITHIN ONE FOOT IN N/A FEET. CAJ, INT.

IF YOU DIG

811 Know what's below. Call before you dig. Dial 811 Or Call 800-282-7411

A B
10/28/25

GRAPHIC SCALE

0 15 30 75 150
1"= 30'

GeoSurvey
Professional Land Surveying Services
1660 Barnes Mill Road
Marietta, Georgia 30062
Phone: (770) 795–9900
Fax: (770) 795–8880
www.geosurvey.com
EMAIL: info@geosurvey.com
Certificate of Authorization #LSF–000621

PUBLIC SANITARY SEWER EASEMENT EXHIBIT OF

ELARA AT BETHANY

FOR

Arkan Homes

GS JOB NO:	20247986–3	DRAWING SCALE:	1"= 30'
FIELD WORK:	MJ	CITY:	MILTON
PROJ MGR:	CAJ	COUNTY:	FULTON STATE: GA
REVIEWED:		LAND LOT:	972
DWG FILE:	20247986–3.dwg	DISTRICT:	2nd SECTION: 1st

SURVEY DATE: April–1–2025

REVISIONS (SEE GENERAL NOTES)

No.	Date	Description

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0087 **Meeting Date:** 2/18/2026

Department
Real Estate and Asset Management

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Request approval of Sanitary Sewer System Ownership, Operation, Maintenance, and Repair Agreement between Fulton County, a political subdivision of the State of Georgia, and Toll Southeast LP Company, Inc., for the purpose of granting Fulton County legal access to extend and maintain the sanitary sewer system at 1000 Lexington Farm Drive, Alpharetta, Georgia 30004.

Requirement for Board Action *(Cite specific Board policy, statute or code requirement)*
Pursuant to the Rules of the Georgia Department of Public Health for On-Site Sewage Management Systems, § 511-3-1-.03(1)(a), any building, residence, or other facility designed or used for human occupancy or congregation must provide a sewerage system within the building and that system must be connected to the public system in most situations, including the current development. In addition, pursuant to FCC § 1-117, the Board of Commissioners are vested with exclusive jurisdiction to direct and control all the property in the County, according to law. Finally, O.C.G.A. § 36-10-1 requires that all contracts entered into by a county governing authority on behalf of a county be in writing and entered on the governing authority's minutes.

Strategic Priority Area related to this item
Open and Responsible Government

Commission Districts Affected
All Districts ☐
District 1 ☐
District 2 ☒
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?
No

Summary & Background

Agenda Item No.: 26-0087 **Meeting Date:** 2/18/2026

Scope of Work: The Department of Real Estate and Asset Management, DREAM, and the Department of Public Works, in accordance with County Policy and the Statute of Frauds, request the approval of the Fulton Board of Commissioners to execute a Sanitary Sewer System Ownership, Operation, Maintenance, and Repair Agreement with Toll Southeast LP Company, Inc.

Georgia Department of Public Health regulations require that where a permitted public sanitary sewer system is available, developments and a property requiring sanitary sewer services shall obtain sanitary sewer service through an extension of the public service system.

Toll Southeast LP Company, Inc., the Owner of the real property located at 1000 Lexington Farm Drive, Alpharetta, Georgia 30004, has agreed to provide Fulton County easement access for the purpose of maintaining and expanding the county's sewer system within their Development.

The purpose of the Sanitary Sewer System Ownership, Operation, Maintenance, and Repair Agreement is to formalize maintenance responsibilities and conditions for legal access for Fulton County, Toll Southeast LP Company, Inc., and future owners that acquire the Development at 1000 Lexington Farm Drive, Alpharetta, Georgia 30004

Community Impact: The Department of Public Works has confirmed that if this Agreement is approved, the County's sewer system will not be adversely impacted and can continue to be properly maintained.

Department Recommendation: The Department of Real Estate and Asset Management accepts the Department of Public Works' recommendation to approve and execute the Sanitary Sewer System Ownership, Operation, Maintenance, and Repair Agreement and recommends its approval**.**

Project Implications: Approval of this Agreement will not restrict sewer services or access to the sewer line for necessary maintenance**.**

Community Issues/Concerns: None

Department Issues/Concerns: None

Fiscal Impact / Funding Source

Approval of the agenda item does not involve receipt or payment of funding.

After recording, please return to:
Fulton County
c/o Department of Real Estate and Asset Management
Land Division
141 Pryor Street, SW, Suite 8021
Atlanta, Georgia 30303

Cross Reference:
Book 66850, Page 303
Book 69643, Page 10

SPACE ABOVE THIS LINE FOR RECORDER'S USE ONLY

SANITARY SEWER SYSTEM OWNERSHIP, OPERATION, MAINTENANCE AND REPAIR AGREEMENT

This SANITARY SEWER SYSTEM OWNERSHIP, OPERATION, MAINTENANCE AND REPAIR AGREEMENT ("Agreement") is made and entered into this_____day of _____, 20___, by and between Toll Southeast LP Company, Inc ("Owner") and **FULTON COUNTY, GEORGIA**, a political subdivision of the State of Georgia ("County") (the words "Owner" and "County" to include their respective heirs, successors and assigns where the context requires or permits).

WITNESSETH:

WHEREAS, Owner is the owner of certain real property located on Land Lot 1248 & 1249, of the 2nd District of Fulton County, Georgia being more particularly described in **Exhibit "A"** attached hereto and incorporated herein by this reference (the "Development"); and

WHEREAS, Owner wishes to make improvements to the Development so as to provide for public and private use of the Development; and

WHEREAS, a portion of said improvements includes the installation of a sanitary sewer system to provide potable sanitary sewer to serve the users of and visitors to the Development; and

WHEREAS, County is the owner and operator of the Fulton County Sanitary Sewer System (the "System") which is permitted by the Georgia Environmental Protection Division ("EPD") as a Public Sanitary Sewer System allowed to provide sanitary sewer service to the public through a distribution system of sanitary sewer pipe lines and appurtenances; and

WHEREAS, EPD regulations require that where a permitted public sanitary sewer system is available, development and property requiring a sanitary sewer shall receive sanitary sewer service through an extension of the public service system; and

WHEREAS, Owner, for its own convenience and interests, intends to install, or has installed, a sanitary sewer system that does not conform to County standards with respect to accessibility for maintenance and repair and/or other standards not believed to affect the quality of the sewer system; and

WHEREAS, Owner intends to install, or has installed, a sanitary sewer system primarily on private property as opposed to within the public right-of-way where public sanitary sewer systems are more commonly installed with adequate access for operation, maintenance and repair; and

WHEREAS, the foregoing conditions require more explicit definitions of the responsibilities of both County and Owner, as well as future property owners within the Development that will be served by the Sanitary Sewer System.

NOW, THEREFORE, for and in consideration of the benefits to the Development and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Owner and County do hereby agree, covenant and declare the following terms and conditions to apply to the Development. These terms and conditions shall be binding on all persons claiming under and through Owner.

1. Grant of System Ownership: Owner does hereby grant, bargain, convey, sell, assign and transfer, free and clear of all claims and encumbrances, representation or recourse, to the County all of Owner's right, title and interest in and to the sanitary sewer system as an extension of County's sanitary sewer system, including without limitation all mains, taps and connections, and related appurtenances. The foregoing transfer also includes all of Owner's right, title and interest in and to all manufacturers' warranties express or implied for the sanitary sewer system.

2. Extent of System: Owner agrees that for purposes of this Agreement, the sanitary sewer system begins at the publicly owned road right-of-way on which the Development fronts and is in existence prior to initiation of the Development, or at the County installed sanitary sewer outfall servicing the Development. The system extends along and to, but not beyond, the end of each sanitary sewer main (normally 8 inches or larger), to each and to any County furnished sanitary sewer service. Where service laterals are furnished by the Owner, the system shall end at the system connection to the residential cleanout.

3. Warranty: Owner agrees that they or their contractor(s) shall maintain the installed sanitary sewer mains and appurtenances for a period of fifteen (15) months from the date of FINAL approval or until the END OF MAINTENANCE INSPECTION shows no defects or deficiencies in the system by correcting all defects or deficiencies in materials and workmanship. Owner assumes all liability associated with any defects in either construction practices or materials used during the warranty period, including cost-recovery for any repairs facilitated by Fulton County made necessary by defects that resulted in loss of customer

service. Owner further agrees that the warranty period shall be extended an additional four (4) years when the defects are a direct result of the installation of non-conforming materials or the application of non-specified construction practices or methods. Owner shall release, indemnify, defend and hold harmless Fulton County, its officers, employees, assigns and agents, from and against any losses, claims, damages, liabilities, costs and expenses arising from said installation due to the negligence of Owner, its contractor(s), their agents, or employees.

4. Access: Owner agrees to provide the County with unrestricted access to the sanitary sewer system for any purpose related to the operation and/or maintenance of the system. Owner does hereby grant, bargain, sell, and convey to County and to County's successors and assigns a perpetual non-exclusive easement to access, use, maintain, repair, upgrade, replace, relocate and remove underground sanitary sewer lines and associated facilities in the private roads located on any recorded plat(s) (hereinafter the "Plats") of said Development as described on **Exhibit "A"**. County's right to access the Easement shall include methods for gaining entry through any locked gates or fencing for the purpose of handling emergency repairs 24 hours a day, 7 days a week as well as for any other action related to the Sanitary Sewer System. The County's access rights shall be formalized in a permanent easement agreement that is recorded and dedicated to Fulton County in **Deed Book** 69643 **, Page(s)** 10 , Fulton County, Georgia Real Estate Records. If applicable, sanitary sewer system easements shall be depicted on the final plat.

5. Sanitary Sewer Quality, Monitoring, and Reports: The County shall provide and maintain sanitary sewer service of a quality that, at a minimum, meets State and Federal regulations and shall monitor and report the quality of the sanitary sewer system as required by such regulations. With respect to commercial and/or mixed-use developments, the County reserves the right to take samples internal to the system and require improvements including, but not limited to, sampling stations and flushing units as needed to maintain sanitary sewer quality.

6. Reservation of Rights: Owner reserves the right to use the Easement as described in **Deed Book** 69643 **Page** 10 for any and all lawful purposes, except that such use may not unreasonably interfere with the exercise by County of its rights in the Easement granted thereby. Without limiting the generality of the foregoing: (i) Owner may grant and establish other easements in all or any part of the Easement, so long as the grant is lawful and does not materially interfere with the rights hereby granted to County, and (ii) Owner may construct within the Easement, streets, roads, parking lots, sidewalks, fences, landscaping, signage, lighting and other architectural or entry features that may be used in conjunction with the Development of which the Easement forms a part, however, such improvements may not cause damage to the sanitary sewer lines and associated facilities within the Easement. County shall use its best efforts not to interfere with or negatively impact the quiet enjoyment of Owner in the exercise by County of its rights pursuant to this Agreement. During periods of maintenance and repair, County shall endeavor to provide reasonable access for Owner and Owner's members and invitees across the Easement.

7. Responsibility for Maintenance and Repair:

(a) Residential-only Developments:

(i) Multi-family: Owners of multi-family residential developments shall promptly notify County of any identified system failures or needed maintenance or repairs. The County shall perform or cause to be performed through a contractor, maintenance, repairs and improvements to the sanitary sewer system as needed or as may be required to meet the requirements of State and Federal regulations. Owner shall bear sole responsibility for the cost of all such maintenance, repairs and improvements. The cost shall be added to the fee for providing sanitary sewer service and billed to the account(s) servicing the Development; singularly for any single account serving the development or divided equally among all active accounts should a singular account not exist. Costs shall be established as accrued in the County's work order system for County performed work or as charged by a contractor using fees established through the County's procurement system. Such costs shall include the cost to restore the Easement to as near to its original condition as is feasible, in accordance with Fulton County Standard details. Notwithstanding any other remedies available to the County pursuant to applicable state and/or local law, Owner's failure to pay the cost of such maintenance or repair may result in the interruption of sanitary sewer service. Notwithstanding the foregoing, sanitary sewer meters installed by the County shall be the County's responsibility to maintain and repair. Any work performed by County pursuant to this Agreement shall be done in a good workmanlike manner.

(ii) Single-family: Owners of single-family residential developments shall promptly notify County of any identified system failures or needed maintenance or repairs. The County, at County's cost and expense, shall perform or cause to be performed through a Contractor; maintenance, repairs and improvements to the sanitary sewer system as needed or as may be required to meet the requirements of State and Federal regulations. County hereby covenants and agrees that it shall be responsible for and carry out any and all maintenance or repair to the Easement necessitated or caused by the use of the Easement by County, its agents, contractors and employees for the specific purpose defined in this Agreement. After any exercise of County's rights under this Agreement, County shall, at its expense, promptly restore the Easement to as near to its original condition as is feasible, in accordance with Fulton County standard details. Maintenance responsibly by County for individual sanitary sewer service lines shall extend only to the end of the sanitary sewer mains (normally 8-inches or larger). Responsibility for any maintenance beyond the clean-out will be borne by the individuals being served. Any work performed by County pursuant to this Agreement shall be done in a good workmanlike manner.

(b) Commercial/Mixed-Use Developments: Commercial/Mixed-Use developments are those developments which are not solely residential in nature. Owner shall

promptly notify County of any identified system failures or needed maintenance or repairs. Owner shall be responsible for the performance and cost of all maintenance, repairs and improvements to the sanitary sewer system, including emergency repairs, as directed by the County or as may be required to meet the requirements of State and Federal regulations. All such effort shall be performed in compliance with applicable Fulton County and city standards and building codes with respect to materials and methods and be performed by a licensed utility contractor or plumber where applicable. Owner shall provide timely notice to County and provide opportunity for County to observe and inspect Owner provided maintenance, repairs or improvements so County may determine that such maintenance, repairs or improvements to the system are in compliance with County standards and applicable codes or regulations. Owner shall provide a report to County of all maintenance, repairs, or modifications to the system, to include materials and methods of construction and description of the work performed within 72 hours of performance. Notwithstanding the foregoing, the sanitary sewer system facilities installed by the County shall be the County's responsibility to maintain and repair.

(c) Street Maintenance. The Owner shall be responsible for the adjustment to all sanitary sewer and sewer appurtenances (manhole covers, etc.) affected by street maintenance including repaving, seal coating, patching, crack sealing, topping, etc. The Owner shall adjust sanitary sewer and sewer appurtenances to fit flush with the street surface. All sewer appurtenances shall be cleaned of asphalt at the time of paving. Adjustments to take place a minimum of 24-hours to a maximum of 120-hours after maintenance. Any curbing that is replaced shall be remarked with the appropriate symbol showing the location of sewer laterals (S) in the shoulder or pavement of the road. Sewer symbols shall be painted orange. Any adjustment to the shoulder grade will also require adjustments of all sewer appurtenances affected by the adjustment to the shoulder grade. The Owner will be responsible for the adjustment of the appurtenances to the new grade.

The Owner shall be responsible to promptly notify Fulton County Department of Public Works, Sanitary Sewer Resources Unit of any proposed maintenance at 404-612-3061 in North Fulton and 404-612-3163 in South Fulton. Fulton County personnel shall inspect and approve all work performed by the Owner that affects sanitary sewer and sewer appurtenances. All work shall be done in accordance with Fulton County Standards and Specifications to the satisfaction of Fulton County personnel.

8. Notification to Future Owners: Owner shall make known to future owners of Development or any portions thereof of the requirements of this Agreement. Owner shall cause the following language to be included in all sales contracts for first owner occupants of developed property and on all plats and deeds associated with Development or subdivided parcels: "The owner and developer of this property has entered into a SANITARY SEWER SYSTEM OWNERSHIP, OPERATION, MAINTENANCE AND REPAIR AGREEMENT with Fulton County which describes certain obligations associated with the

sanitary sewer system that are responsibilities of property owners within this development. The sanitary sewer system servicing this property and any subdivided parcels shall be owned by Fulton County for the purposes of providing sanitary sewer service of a quality meeting State and Federal Regulations. The owners of property served by the sanitary sewer system may be responsible for the cost of any and all maintenance and/or repair of the sanitary sewer system. The provision of an easement allowing Fulton County access to the sanitary sewer system for any reason shall not relieve property owners of their possible responsibility for the cost of maintenance and/or repair of the sanitary sewer system."

9. Billing: Where a master meter is provided by County, Owner shall meter individual services on the sanitary sewer system using County standard meters and shall bill and collect fees for sanitary sewer usage by individual services. Individual services shall be billed based on County standard sanitary sewer service rates. Owner may incorporate a reasonable administrative fee for reading meters, calculating and transmitting bills, and collecting the fees for usage. Owner shall be responsible for any differential between master meter registered sanitary sewer usage and the sum of individual service sanitary sewer usage. Such usage shall be reconciled and billed on an annual basis or as otherwise deemed appropriate by County.

10. Indemnification: Owner, its successors and assigns, hereby agree to release, indemnify, defend and hold harmless the County, its Commissioners, officers, agents, employees, successors, assigns, elected officials, and any other person acting on its behalf, from and against any and all losses (including death), claims, demands, debts, damages, accounts, settlements, obligations, liabilities, costs, judgments and claims for attorney's fees and/or expenses of litigation, and causes of action of any kind or nature, at law or in equity, arising out of the existence, installation, maintenance, repair, alteration, modification, deterioration or failure of any sanitary sewer systems or pipes located within Development. Said Owner hereby waives for itself, its successors and assigns all rights to any further compensation or claim to damages on account of the construction, access, upgrade or maintenance of said sanitary sewer line for the use of the property as herein agreed.

11. Notices. All notices and communications required or permitted hereunder shall be in writing. Any notices or demands shall be deemed to have been duly and sufficiently given if a copy thereof has been personally served, forwarded by expedited messenger or recognized overnight courier service with evidence of delivery or mailed by United States registered or certified mail in an envelope properly stamped and addressed to the applicable party at the addresses identified below or at such other address as such party may theretofore have furnished to the other party by written notice. The effective date of such notice shall be the date of actual delivery, except that if delivery is refused, the effective date of notice shall be the date delivery is refused. Notices shall be addressed as follows:

Owner:

Toll Southeast LP Company, Inc
1140 Virginia Drive
Fort Washington, PA 19034

County:

David Clark, P.E.
Director, Department of Public Works
141 Pryor Street, S.W.
Suite 6001
Atlanta, GA 30303

12. Covenants Running with the Land: The provisions of this Agreement shall be deemed covenants running with the land for the benefit of the County and its assigns and shall pass to and be binding on Owner's heirs, assigns and successors in title to the Development or any subdivided portion thereof. Owner shall further include the provisions of this Agreement in the establishment of any other entity which may obtain ownership rights to any portion of the Development or the land thereof such as a Homeowners Association which shall own common area, or purchaser of any individual residential lot, or any tract of land for any purpose.

13. Joint and Several Liability: Owner and its successors and assigns, hereby agree that to the extent permitted by law, they shall be jointly and severally liable for all obligations defined in this Agreement, and the taking of any actions required under this Agreement.

14. Modification: This Agreement may not be modified except by written agreement between the County and all parties subject to this agreement or an entity such as a Homeowners Association representing all affected parties.

15. Governing Law: This Agreement, and the rights and obligations of the parties hereunder, shall be governed by, and construed and interpreted in accordance with the laws of the State of Georgia.

16. Severability: If any provision of this Agreement shall be invalid or unenforceable to any extent, the remainder of this Agreement shall not be affected thereby and shall be enforced to the greatest extent permitted by law.

17. Entire Agreement: This Agreement constitutes the entire agreement between the parties hereto with respect to the subject matter hereof. Neither this Agreement nor any provision hereof may be changed, waived, discharged, modified or terminated orally, except by a written instrument signed by the party against whom enforcement is sought.

18. Counterparts. This Agreement may be executed in multiple counterparts, each of which shall be deemed an original, but all of which, together, shall constitute but one and the same instrument.

19. Interpretation: No provision of this Agreement shall be construed against or interpreted to the disadvantage of any party hereto by any court or other governmental or judicial authority by reason of such party having or being deemed to have structured or dictated such provision. For all purposes of interpretation or construction of this Agreement, the singular shall include the plural, the plural shall include the singular, and the use of any gender shall be applicable to all genders.

20. Third Party Beneficiaries. This Agreement does not and is not intended to confer any rights or remedies upon any person other than the parties.

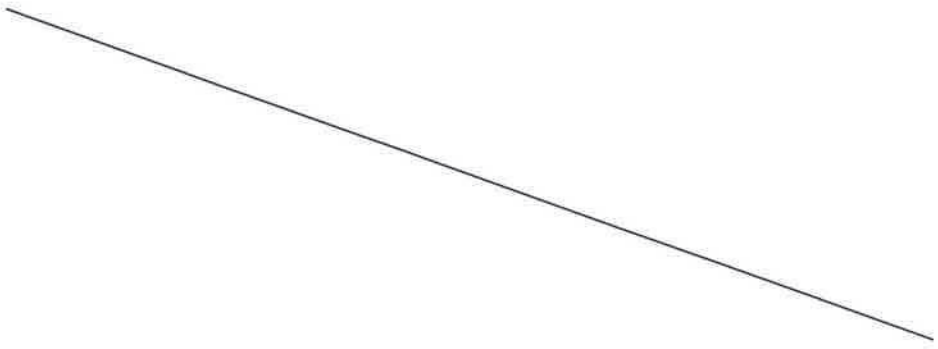
21. Waiver. Nothing in this Agreement shall be construed as a waiver of sovereign immunity.

22. Miscellaneous. This Agreement may not be modified orally or in any manner other than by a written agreement signed by the parties hereto. This Agreement shall inure to the benefit of and be binding upon the parties hereto, their successors and assigns. Time is of the essence in this Agreement. This Agreement shall be governed by the laws of the State of Georgia without regard to the conflict of law's provisions thereof.

23. Effective Date. This Agreement will become effective upon approval by the Fulton County Board of Commissioners of their interest in the Easement and will be recorded by County as soon as practicable after such approval and execution by County.

24. Recitals: All recitals contained herein are hereby incorporated by reference into this Agreement and made a part hereof

25. Recording: County shall record this document with the Clerk of the Fulton County Superior Court in the Land Records with a copy of the recorded documents provided to the Department of Public Works, Water Resources Division, and Owner.



IN WITNESS WHEREOF, the parties have executed this Agreement at Atlanta, Georgia, as of the day and year first above written.

Signatures:

Signed sealed and delivered in the presence of

Unofficial Witness

JACOB PONTIUS

Notary Public

My Commission Expires: 12/19/26

(Notary Seal)

(Notary Stamp)



OWNER

Toll Southeast LP Company, Inc

Signature (Authorized Party to Bind Owner Entity)

J.B. CROWE

Signatory's Name and Title (printed)

Owner's Address:

1140 Virginia Drive,

Fort Washington, PA 19034

[Signatures continued on next page.]

Signed, sealed and delivered this ____day of _____, 2024 in the presence of:

FULTON COUNTY, GEORGIA a political subdivision of the State of Georgia

_____
Witness

_____
Robert L. Pitts, Chairman
Fulton County Board of Commissioners

_____
[Notarial Seal]

APPROVED AS TO FORM

ATTEST:

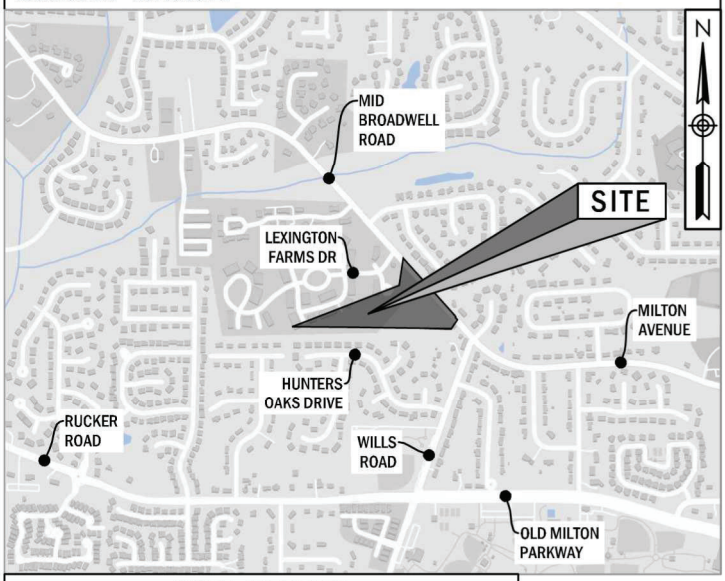
_____
Y. Soo Jo, County Attorney

_____
Tonya R. Grier
Clerk to the Commission

APPROVED AS TO CONTENT:

_____
David E. Clark, Director
Department of Public Works

LOCATION MAP - NOT TO SCALE



ENCROACHMENT TABLE	
WATER PIPE -	108 LF
18" RCP STORM PIPE -	289 LF
24" RCP STORM PIPE -	54 LF
36" RCP STORM PIPE -	27 LF
48" RCP STORM PIPE -	27 LF
TOTAL STORM PIPE -	397 LF
DROP INLETS -	1
HOODED CATCH BASINS -	4

SITE DATA

ADDRESS:	MID BROADWELL ROAD ALPHARETTA, GA 30005
TAX PARCEL ID:	22 466012490253 & 22 450012480506
ALPHARETTA LDP #:	D230012
FINAL PLAT CASE #:	FP250002

SEWER EASEMENT AREA NOTE

SANITARY SEWER EASEMENT HAS A TOTAL OF 52,704.6 SQUARE FEET (1.21 ACRES)

OWNER / DEVELOPER

TOLL SOUTHEAST LP COMPANY, INC
4080 MCGINNIS FERRY ROAD
ALPHARETTA, GA 30005
PHONE: 678.699.1403
CONTACT: J.R. CROWE
EMAIL: JCROWE1@TOLLBROTHERS.COM

CONTRACTOR

A.L. GRADING CONTRACTORS
110 PEACHTREE INDUSTRIAL BLVD
SUGAR HILL, GA 30518
PHONE: 770.945.5059
CONTACTS: BLAKE WOOD / DAVID ARMENTA
EMAILS: BLAKE@ALGC.NET / DAVID@ALGC.NET

ENGINEER

KIMLEY HORN AND ASSOCIATES, INC
1200 PEACHTREE STREET NE, SUITE 800
ATLANTA, GA 30309
PHONE: 404.419.8700
CONTACT: BENJAMIN W. SKIDMORE
EMAIL: BEN.SKIDMORE@KIMLEY-HORN.COM

SURVEYOR

PAPE-DAWSON GEORGIA, LLC
NORTHWINDS III
2500 NORTHWINDS PKWY, SUITE 360
ALPHARETTA, GA 30009
PHONE: 404.693.1618
CONTACT: DENVER YOUNGBLOOD
EMAIL: DENVER.YOUNGBLOOD@PAPE-DAWSON.COM

CURVE TABLE				
CURVE	BEARING	RADIUS	ARC	CHORD
C1	N 24°24'22"E	113.50'	92.77'	90.21'
C2	S 69°24'22"W	113.50'	85.52'	83.51'
C3	N 24°24'22"E	86.50'	70.70'	68.75'
C4	S 69°24'22"W	86.50'	65.18'	63.64'

LINE TABLE		
LINE	BEARING	DISTANCE
L1	N 31°59'34"W	31.08'
L2	N 00°59'30"E	27.00'
L3	N 10°48'02"W	33.57'
L4	N 11°23'57"E	26.47'
L5	N 10°48'02"W	65.78'
L6	N 00°23'05"E	114.02'
L7	N 68°51'07"E	21.50'
L8	S 00°23'05"W	119.95'
L9	S 10°48'02"E	63.82'
L10	S 33°00'01"E	26.47'
L11	S 10°48'02"E	41.92'
L12	N 00°59'30"E	76.70'
L13	N 42°10'45"W	136.50'
L14	N 47°49'15"E	20.00'
L15	S 42°10'45"E	102.83'
L16	S 42°10'45"E	91.33'
L17	S 47°49'15"W	20.00'
L18	S 89°00'30"E	27.00'
L19	N 00°59'30"E	76.70'
L20	S 89°00'30"E	40.86'

PAPE-DAWSON GEORGIA, LLC
CERTIFICATE OF AUTHORIZATION # LSF000953

GEORGIA REGISTERED No. 3620 10-22-25 LAND SURVEYOR JAMES T. DOTSON

SHEET 1 OF 7

PAPE-DAWSON

2500 NORTHWINDS PKWY, STE 360 I ALPHARETTA, GA 30009 I 404.693.1618

DRAWN BY:	JTD/KR
DATE:	10-22-2025
JOB NO.:	2024-151
SCALE:	AS SHOWN

SANITARY SEWER EASEMENT EXHIBIT

FOR EMBERLY SUBDIVISION - PREPARED FOR

TOLL SOUTHEAST LP COMPANY, INC & FULTON COUNTY

LOCATED IN LAND LOTS 1248 AND 1249, 2ND DISTRICT, 2ND SECTION
CITY OF ALPHARETTA, FULTON COUNTY, GA

LEGAL DESCRIPTION - EMBERLY SUBDIVISION - SANITARY SEWER EASEMENT

ALL THAT CERTAIN TRACT OR PARCEL OF LAND LYING AND BEING IN LAND LOTS 1248 AND 1249 OF THE 2ND LAND DISTRICT, 2ND SECTION OF FULTON COUNTY, THE CITY OF ALPHARETTA, GEORGIA, CONTAINING 1.21 ACRES (52,704.6 SF) AND BEING MORE PARTICULARLY DESCRIBED AS A "SANITARY SEWER EASEMENT" ON A SANITARY SEWER EASEMENT EXHIBIT FOR EMBERLY SUBDIVISION, PREPARED FOR TOLL SOUTHEAST LP COMPANY, INC AND FULTON COUNTY, PREPARED BY PAPE-DAWSON GEORGIA, LLC, DATED 10-22-2025, WHICH READS AS FOLLOWS:

COMMENCING AT A POINT LOCATED AT THE LAND LOT CORNER COMMON TO LAND LOTS 1248, 1249, 1272, AND 1273; THENCE NORTH 31°59'34" WEST ALONG A TIE LINE A DISTANCE OF 31.08' TO A POINT, WHICH IS THE POINT OF BEGINNING.

BEGINNING AT SAID POINT; THENCE NORTH 00°59'30" EAST A DISTANCE OF 27.00' TO A POINT; THENCE SOUTH 89°00'30" EAST A DISTANCE OF 210.16' TO A POINT; THENCE NORTH 10°48'02" WEST A DISTANCE OF 33.57' TO A POINT; THENCE NORTH 11°23'57" EAST A DISTANCE OF 26.47' TO A POINT; THENCE NORTH 10°48'02" WEST A DISTANCE OF 65.78' TO A POINT; THENCE NORTH 00°23'05" EAST A DISTANCE OF 114.02' TO A POINT LOCATED ON THE SOUTHERN EDGE OF AN EXISTING 20' SANITARY SEWER EASEMENT; THENCE ALONG THE SOUTHERN EDGE OF THE EXISTING EASEMENT NORTH 68°51'07" EAST A DISTANCE OF 21.50' TO A POINT; THENCE LEAVING THE SOUTHERN EDGE OF THE EXISTING EASEMENT SOUTH 00°23'05" WEST A DISTANCE OF 119.95' TO A POINT; THENCE SOUTH 10°48'02" EAST A DISTANCE OF 63.82' TO A POINT; THENCE SOUTH 33°00'01" EAST A DISTANCE OF 26.47' TO A POINT; THENCE SOUTH 10°48'02" EAST A DISTANCE OF 41.92' TO A POINT; THENCE SOUTH 89°00'30" EAST A DISTANCE OF 251.76' TO A POINT; THENCE NORTH 00°59'30" EAST A DISTANCE OF 76.70' TO A POINT; THENCE NORTH 24°24'22" EAST CLOCKWISE ALONG THE ARC OF A CURVE (ARC=92.77', RADIUS=113.50') WHICH SUBTENDS A CHORD DISTANCE OF 90.21' TO A POINT; THENCE NORTH 47°49'15" EAST A DISTANCE OF 225.50' TO A POINT; THENCE NORTH 42°10'45" WEST A DISTANCE OF 136.50' TO A POINT; THENCE NORTH 47°49'15" EAST A DISTANCE OF 20.00' TO A POINT; THENCE SOUTH 42°10'45" EAST A DISTANCE OF 102.83' TO A POINT; THENCE SOUTH 42°10'45" EAST A DISTANCE OF 91.33' TO A POINT; THENCE SOUTH 42°10'45" EAST A DISTANCE OF 368.61' TO A POINT; THENCE SOUTH 47°49'15" WEST A DISTANCE OF 20.00' TO A POINT; THENCE NORTH 42°10'45" WEST A DISTANCE OF 148.28' TO A POINT; THENCE SOUTH 47°49'15" WEST A DISTANCE OF 156.81' TO A POINT; THENCE SOUTH 69°24'22" WEST CLOCKWISE ALONG THE ARC OF A CURVE (ARC=85.52', RADIUS=113.50') WHICH SUBTENDS A CHORD DISTANCE OF 83.51' TO A POINT; THENCE NORTH 89°00'30" WEST A DISTANCE OF 701.27' TO A POINT, WHICH IS THE POINT OF BEGINNING. SAID TRACT OR PARCEL HAVING AN AREA OF 2.639 ACRES (114,969.41 SF)

LESS AND EXCEPT THE FOLLOWING AREA CONTAINING 1.429 ACRES (62,264.83 SF)

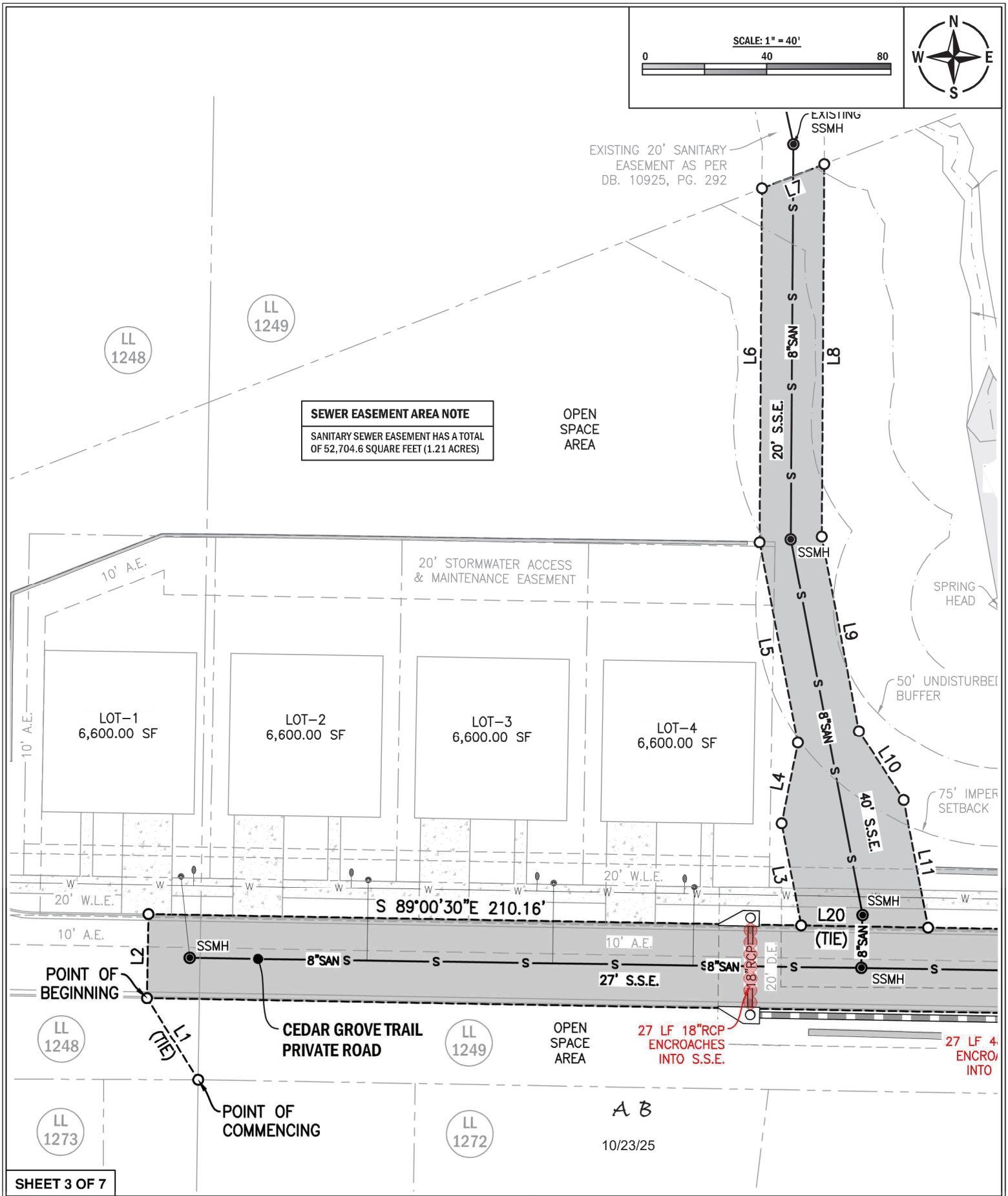
COMMENCING AT A POINT LOCATED AT THE LAND LOT CORNER COMMON TO LAND LOTS 1248, 1249, 1272, AND 1273; THENCE NORTH 31°59'34" WEST ALONG A TIE LINE A DISTANCE OF 31.08' TO A POINT; THENCE NORTH 00°59'30" EAST A DISTANCE OF 27.00' TO A POINT; THENCE SOUTH 89°00'30" EAST A DISTANCE OF 210.16' TO A POINT; THENCE SOUTH 89°00'30" EAST ALONG A TIE LINE A DISTANCE OF 40.86' TO A POINT; THENCE SOUTH 89°00'30" EAST A DISTANCE OF 251.76' TO A POINT; THENCE SOUTH 89°00'30" EAST ALONG A TIE LINE A DISTANCE OF 27.00' TO A POINT, WHICH IS THE POINT OF BEGINNING.BEGINNING AT SAID POINT; THENCE NORTH 00°59'30" EAST A DISTANCE OF 76.70' TO A POINT; THENCE NORTH 24°24'22" EAST CLOCKWISE ALONG THE ARC OF A CURVE (ARC=70.70', RADIUS=86.50') WHICH SUBTENDS A CHORD DISTANCE OF 68.75' TO A POINT; THENCE NORTH 47°49'15" EAST A DISTANCE OF 225.50' TO A POINT; THENCE SOUTH 42°10'45" EAST A DISTANCE OF 224.00' TO A POINT; THENCE SOUTH 47°49'15" WEST A DISTANCE OF 156.81' TO A POINT; THENCE SOUTH 69°24'22" WEST CLOCKWISE ALONG THE ARC OF A CURVE (ARC=65.18', RADIUS=86.50') WHICH SUBTENDS A CHORD DISTANCE OF 63.64' TO A POINT; THENCE NORTH 89°00'30" WEST A DISTANCE OF 171.49' TO A POINT, WHICH IS THE POINT OF BEGINNING.

SAID EASEMENT IS LOCATED ENTIRELY WITHIN FULTON COUNTY TAX PARCEL ID NUMBERS 22 466012490253 & 22 450012480506

PAPE-DAWSON
2500 NORTHWINDS PKWY, STE 360 I ALPHARETTA, GA 30009 I 404.693.1618

DRAWN BY:	JTD/KR
DATE:	10-22-2025
JOB NO.:	2024-151
SCALE:	AS SHOWN

SANITARY SEWER EASEMENT EXHIBIT
FOR EMBERLY SUBDIVISION - PREPARED FOR
TOLL SOUTHEAST LP COMPANY, INC & FULTON COUNTY
LOCATED IN LAND LOTS 1248 AND 1249, 2ND DISTRICT, 2ND SECTION
CITY OF ALPHARETTA, FULTON COUNTY, GA



SHEET 3 OF 7

PAPE-DAWSON

2500 NORTHWINDS PKWY, STE 360 I ALPHARETTA, GA 30009 I 404.693.1618

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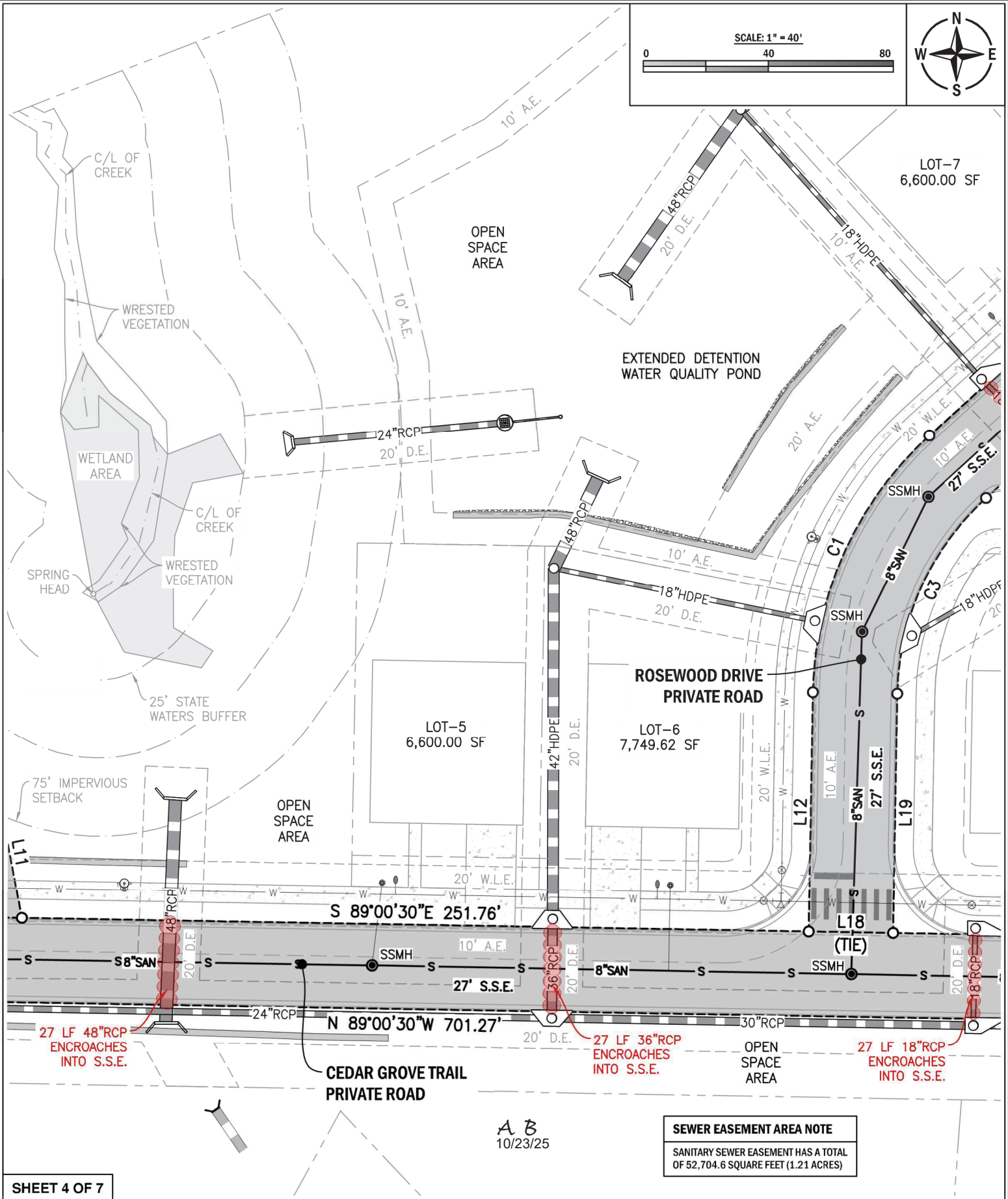
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TOLL SOUTHEAST LP COMPANY, INC & FULTON COUNTY

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CITY OF ALPHARETTA, FULTON COUNTY, GA



A B
10/23/25

SEWER EASEMENT AREA NOTE

SANITARY SEWER EASEMENT HAS A TOTAL OF 52,704.6 SQUARE FEET (1.21 ACRES)

SHEET 4 OF 7

PAPE-DAWSON

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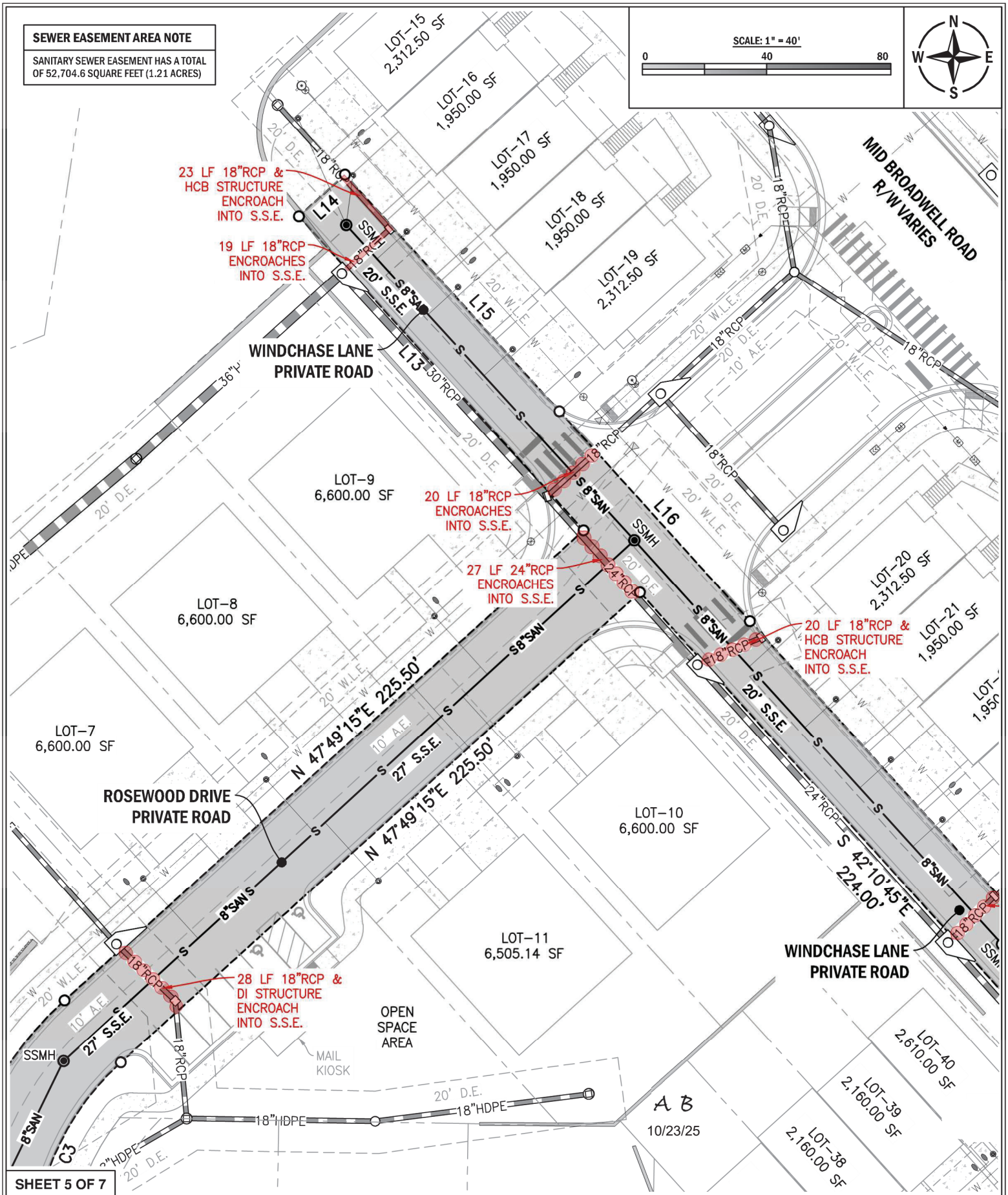
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CITY OF ALPHARETTA, FULTON COUNTY, GA



SHEET 5 OF 7

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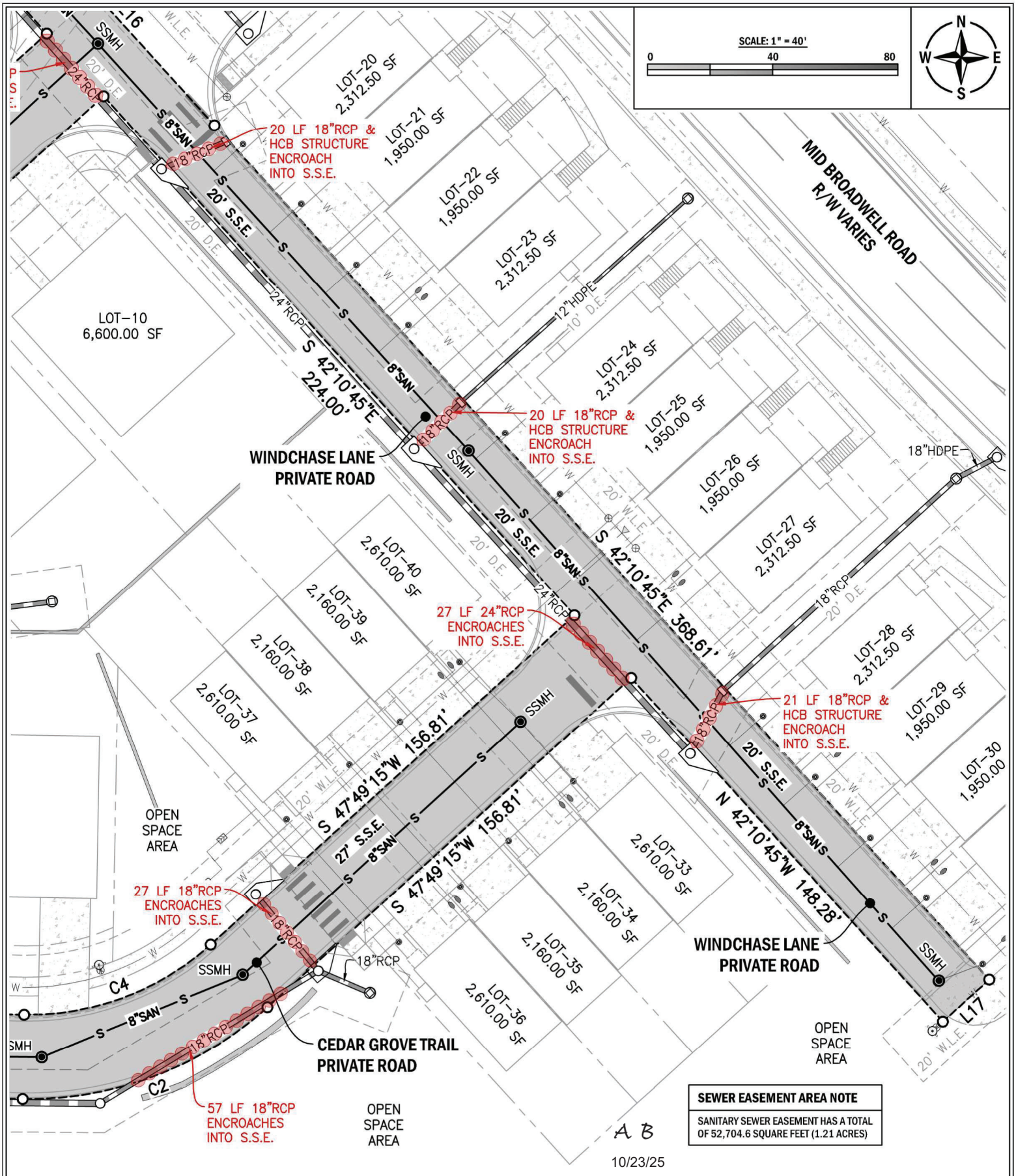
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CITY OF ALPHARETTA, FULTON COUNTY, GA



SEWER EASEMENT AREA NOTE
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A B

10/23/25

SHEET 6 OF 7

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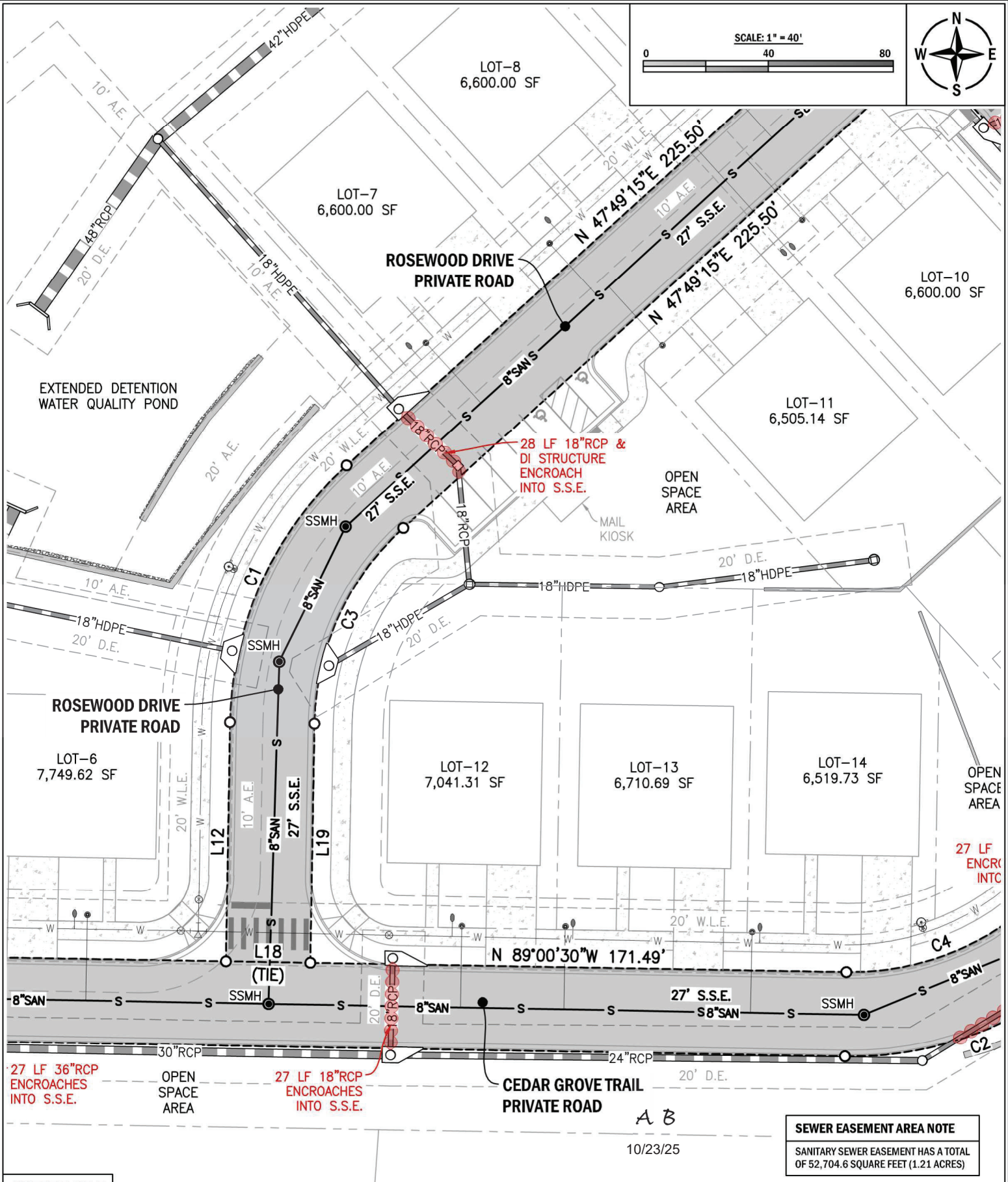
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LOCATED IN LAND LOTS 1248 AND 1249, 2ND DISTRICT, 2ND SECTION

CITY OF ALPHARETTA, FULTON COUNTY, GA



A B

10/23/25

SEWER EASEMENT AREA NOTE

SANITARY SEWER EASEMENT HAS A TOTAL OF 52,704.6 SQUARE FEET (1.21 ACRES)

SHEET 7 OF 7

PAPE–DAWSON

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TOLL SOUTHEAST LP COMPANY, INC & FULTON COUNTY

LOCATED IN LAND LOTS 1248 AND 1249, 2ND DISTRICT, 2ND SECTION

CITY OF ALPHARETTA, FULTON COUNTY, GA

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0088 **Meeting Date:** 2/18/2026

Department
Real Estate and Asset Management

Requested Action
Request approval of a Resolution approving a Fourth Amendment to the Governmental Agreement between the City of Atlanta, Fulton County, Georgia, and the City of Atlanta and Fulton County Recreation Authority regarding the Atlanta Zoo for the purpose of releasing the Abana Courtyard from the Leased Premises; authorizing the Chairman to execute the Fourth Amendment and any related documents; authorizing the County Attorney to approve the Fourth Amendment and any related documents as to form and make necessary modifications thereto prior to execution; and for other purposes.

Requirement for Board Action
Pursuant to Fulton County Code § 1-117, the Fulton County Board of Commissioners has exclusive jurisdiction and control over directing and controlling all the property of Fulton County, as they may deem expedient, according to law.

Strategic Priority Area related to this item
Open and Responsible Government

Commission Districts Affected
All Districts ☒
District 1 ☐
District 2 ☐
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?
No

Summary & Background

Scope of Work: The City of Atlanta and the City of Atlanta and Fulton County Recreation Authority have requested that the Fulton County Board of Commissioners approve the Fourth Amendment to

the Governmental Agreement among the City, the Authority, and the County for the purpose of removing an area approximately 1,955 square feet in size from the leased premises under the Agreement. The area to be removed is a small portion of property formally known as the Abana Courtyard (see depiction in Exhibit B attached hereto) and will thereafter be accessible to all patrons of Grant Park. The Department of Real Estate and Asset Management (DREAM) and the City of Atlanta have negotiated mutually acceptable rental terms to remove the Abana Courtyard area, subject to the approval of the Board of Commissioners.

The City of Atlanta Parks Department will complete all required onsite construction to repurpose the area for park services and provide ongoing maintenance once all planned construction is completed. All other terms within the Agreement will remain in effect and the County will not be required to participate in daily operations, maintenance or financially.

Community Impact: The City of Atlanta's Park Department construction plans will optimize the subject area and positively impact public visits to the Atlanta Zoo and Grant Park for all by providing a safe, inclusive, and accessible environment.

Department Recommendation: The Department of Real Estate and Asset Management, DREAM recommends approving the Fourth Amendment to Governmental Agreement to formalize the negotiated terms with the City of Atlanta.

Project Implications: The approval of the requested Fourth Amendment to Governmental Agreement will serve as a public affirmation of the collaborative partnership between Fulton County and the City of Atlanta, confirming a shared commitment to enhancing the delivery of government services for all residents and visitors throughout Fulton County and the city of Atlanta**.**

Community Issues/Concerns: None

Department Issues/Concerns: None

Fiscal Impact / Funding Source

Approval of the agenda item does not require the payment or receipt of funds.

Prepared by and upon
recording return to:

Douglass P. Selby, Esq.
Hunton Andrews Kurth LLP
Bank of America Plaza, Suite 4100
600 Peachtree Street, N.E.
Atlanta, Georgia 30308

THIS SPACE FOR RECORDER'S USE ONLY

FOURTH AMENDMENT TO
GOVERNMENTAL AGREEMENT REGARDING
THE ATLANTA ZOO

THIS FOURTH AMENDMENT, dated as of the __ day of _____, 2026 (this "**Fourth Amendment**"), to that certain Governmental Agreement Regarding the Atlanta Zoo made and entered into as of June 1, 2007 (the "**Original Governmental Agreement**") by and among the **CITY OF ATLANTA**, a municipal corporation of the State of Georgia (the "**City**"), **FULTON COUNTY**, a political subdivision of the State of Georgia (the "**County**"), and **CITY OF ATLANTA AND FULTON COUNTY RECREATION AUTHORITY**, a body corporate and politic and a political subdivision of the State of Georgia (the "**Authority**"), as previously amended by the First Amendment, dated as of January 25, 2010 (the "**First Amendment**"), the Second Amendment, dated as of April 1, 2015 (the "**Second Amendment**") and the Third Amendment, dated as of December 29, 2017 (the "**Third Amendment**," together with the Original Governmental Agreement, the First Amendment, the Second Amendment and this Fourth Amendment (the "**Governmental Agreement**") is amended as provided below:

W I T N E S E T H :

WHEREAS the City, the County and the Authority entered into the Original Governmental Agreement pursuant to which an approximately 36.42-acre parcel of land, improvements thereon and associated facilities at Grant Park owned by the City (the "**Leasehold**") are leased to the Authority and currently operated as a public zoo (the "**Atlanta Zoo**") for amusement and educational purposes; and

WHEREAS, Atlanta-Fulton County Zoo, Inc. ("**Zoo Atlanta**") currently operates the Atlanta Zoo on the Leasehold, pursuant to an Operating Agreement for the Atlanta Zoo, dated as of June 1, 2007 (the "**Operating Agreement**"), between the Authority and Zoo Atlanta; and

WHEREAS, pursuant to the First Amendment, the Original Governmental Agreement was amended to add an approximately one-acre parcel to the Leasehold on which the City of Atlanta Office of Parks Southeast Maintenance Facility is located; and

WHEREAS, pursuant to the Second Amendment, the Original Governmental Agreement was further amended to include in the Leasehold the Atlanta Cyclorama Building (the "**Cyclorama**") and an area on which to construct an African Savanna Elephant Exhibit, such that when the Leasehold was amended it consisted of approximately 41.283 acres in total, as shown on Exhibit A of said Second Amendment; and

WHEREAS, pursuant to the Third Amendment, the Governmental Agreement was amended to exclude the Cyclorama from the Leasehold in order to facilitate its renovation and rehabilitation through a tax credit financing arrangement; and

WHEREAS, the current Leasehold includes an area of Grant Park known as the Abana Courtyard (the "**Courtyard**"); and

WHEREAS, the parties desire that the Leasehold be further amended by this Fourth Amendment to exclude the Courtyard from the Leasehold and return control of the Courtyard to the City in order to permit the City to allow public access to the Courtyard.

NOW, THEREFORE, in consideration of the premises and the mutual covenants, conditions and promises hereinafter set forth and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereby do covenant and agree as follows:

Section 1. Capitalized Terms. Terms used in this Fourth Amendment but not defined herein shall have the meanings set forth in the Governmental Agreement unless a different meaning for a word or term clearly appears from the context in which the word or term is used.

Section 2. Rules of Construction. The rules of construction of this Fourth Amendment shall be the same as the rules for the construction of the Governmental Agreement, as amended.

Section 3. Replacement of Exhibit A of the Governmental Agreement. The Governmental Agreement is hereby amended by replacing Exhibit A of the Governmental Agreement with Exhibit A attached hereto and incorporated herein by reference.

Section 4. Remaining Provisions of Governmental Agreement to Continue in Full Force and Effect. This Fourth Amendment and all terms and provisions herein contained shall form a part of the Governmental Agreement as fully and with the same effect as if all such terms and provisions had been set forth therein, and the Governmental Agreement remains in full force and effect in accordance with the terms and provisions thereof, as amended hereby.

Section 5. Severability. In the event any provision of this Fourth Amendment shall be held invalid or unenforceable by any court of competent jurisdiction, such holding shall not invalidate or render unenforceable any other provision hereof.

Section 6. Execution in Counterparts. This Fourth Amendment may be executed in several counterparts, each of which shall be an original but all of which shall constitute one and the same instrument.

Section 7. Governing Law. This Fourth Amendment shall be governed by, construed and enforced in accordance with the laws of the State of Georgia.

Section 8. Entire Agreement. The Governmental Agreement, as amended by the First Amendment, Second Amendment, Third Amendment and this Fourth Amendment, constitutes the entire agreement of the parties relative to the subject matter hereof.

[Remainder of Page Intentionally Left Blank]

IN WITNESS WHEREOF, the parties hereto have caused this Fourth Amendment to be executed, delivered and sealed by their duly authorized representatives all as of the date first above written.

CITY OF ATLANTA

By:_____
Mayor

ATTEST:

_____
Municipal Clerk

(SEAL)

APPROVED AS TO FORM:

By:_____
City Attorney

Signed, sealed and delivered
in the presence of:

_____
Unofficial Witness

_____
Notary Public

My Commission Expires:

(NOTARIAL SEAL)

CITY OF ATLANTA AND FULTON COUNTY RECREATION AUTHORITY

By: _____
Name:
Title:

ATTEST:

_____

Signed, sealed and delivered
in the presence of:

_____
Unofficial Witness

_____
Notary Public

My Commission Expires:

(NOTARIAL SEAL)

FULTON COUNTY

_____
Robert L. Pitts, Chairman
Fulton County Board of Commissioners

ATTEST

_____
Tonya R. Grier, Clerk to the Commission

Approved as to form:

_____
Y. Soo Jo, County Attorney

Signed, sealed and delivered
in the presence of:

_____
Unofficial Witness

_____
Notary Public

My Commission Expires:

(NOTARIAL SEAL)

EXHIBIT "A"
LEGAL DESCRIPTION

ATLANTA ZOO BOUNDARY WITH 2026 MODIFICATIONS

All that tract or parcel of land lying and being in Land Lot 43, 14th District, Fulton County, Georgia, as shown on the Property Swap Exhibit prepared for Zoo Atlanta, prepared by GeoSurvey, Ltd., certified by Jamey R. Coleman, Georgia Registered Land Surveyor No. 2798, dated May 10, 2013, being more particularly described as follows:

Beginning at an iron rebar set in concrete on the North right of way line of Atlanta Avenue, (48 feet R/W), and the North edge of a 5.5 feet concrete sidewalk. Said rebar being point No. 1 and being the "POINT OF BEGINNING". Said Point being N 1,356,876.57 and E 438,400.73 according to the U. S. Coast and Geodetic Survey of Georgia, thence proceeding:
lto 2.
North O degrees 48 minutes 47 seconds East, a distance of 616.97 feet to an iron rebar placed in concrete, (Cor. 2), 1.0 feet East of an existing fence, thence proceeding;

2 to 3.
North 15 degrees 7 minutes 14 seconds East, along the edge of said fence, a distance of 136.39 feet to an iron rebar set in concrete (Cor. 3), 1.4 feet East of said fence, thence proceeding;

3 to 4.
along the curvature of said fence, an arc distance of 93.99 feet to an iron rebar set in concrete. The bearing of the chord being North 35 degrees 28 minutes 23 seconds East, a distance of 91.47 feet, (Cor. 4), thence proceeding;

4 to 5.
along the East side of said fence, North 54 degrees 37 minutes 01 seconds East, a distance of 34.84 feet to an iron rebar placed in concrete, (Cor. 5), 1.4 feet Northeast of an existing fence comer, thence proceeding;

5 to 6.
North 44 degrees 27 minutes 49 seconds West, a distance of 54.03 feet, and following said fence line, a distance of 54.03 feet to an iron rebar placed in concrete at the Northwest edge of an existing 6 inch curb (Cor. 6), thence proceeding;

6 to 7.
along the Northwest edge of said curb, North 45 degrees 41 minutes 51 seconds East, a distance of 45.57 feet to an iron rebar placed at the Northwest edge of ·said curb, (Cor. 7), thence proceeding;

7 to 8.
along the arc and curvature of the Northwest and West side of the curb, a distance of 29.87 feet, to an iron rebar placed, (Cor. 8), the chord of said arc being North 25 degrees 58 minutes 12 seconds East, a distance of 28.80 feet, thence proceeding;

8 to 9.
North 01 degrees 08 minutes 03 seconds East, along the Western side of said curb, a distance of 47.51 feet to a concrete nail placed at the projected intersection of the back curb line and the curb line ahead, if they were to form an intersection instead of a curve, (Cor. 9), thence proceeding;

9 to 10.
North 81 degrees 23 minutes 49 seconds West, and following the South side of said curb, a distance of 29.93 feet to an iron rebar placed, (Cor. 10), thence proceeding;

10 to 11.
West and Northwesterly and following the Southerly side of said curb, an arc distance of 320.49 feet to an iron spike placed between the curb and a concrete sidewalk, (Cor. 11), the chord of said arc having a bearing of North 40 degrees 29 minutes 30 seconds West, a distance of 296.20 feet, thence proceeding;

1 l to 12.
North 01 degrees 04 minutes 26 seconds East along the line separating the West side of the curb and the East side of the concrete sidewalk, a distance of 156.13 feet to an iron spike placed, (Cor. 12), thence proceeding;

12 to 13.
North 66 degrees 20 minutes 37 seconds West, a distance of 225.96 feet to an iron rebar placed in concrete, (Cor. 13), thence proceeding;

13 to 14.
South 74 degrees 19 minutes 53 seconds West, a distance of 189.60 feet to an iron rebar placed in concrete, (Cor. 14), said bar being 21.92 feet from the CYCLORAMA building, if measured as the perpendicular offset distance from the face of the building, thence proceeding;

14 to 15.
parallel to the face of the CYCLORAMA, south 05 degrees 47 minutes 04 seconds West, a distance of 26.32 feet to a mark in a concrete sidewalk, (Cor. 15), thence proceeding;

15 to 16.
parallel to the face of the CYCLORAMA, South 41 degrees 19minutes 03 seconds West, a distance of 52.74 feet to an iron rebar placed in concrete, (Cor. 16), thence proceeding;

16 to 17.
parallel to the face of the CYCLORAMA, South 77 degrees 41 minutes 16 seconds West, a distance of 50.58 feet to an iron rebar placed in concrete, (Cor. 17), thence proceeding;
17 to 18.

South 89 degrees 42 minutes 08 seconds West, a distance of 301.66 feet to the Southeast comer of a retaining wall around the VISITORS CENTER building, (Cor. 18), said wall being approximately 10 feet East from the face of the building, thence proceeding;

18 to 19.
North 00 degrees 06 minutes 27 seconds West, and following the East face of said retaining wall, a distance of 138.32 feet to the Northeast comer of the wall around the VISITORS CENTER, (Cor. 19), thence proceeding;

19 to 20.
South 89 degrees 47 minutes 43 seconds West, and following the North face of said retaining wall, a distance of 118.48 feet to the Northwest corner of the wall around the VISITORS CENTER, (Cor. 20), thence proceeding;

20 to 21.
South 00 degrees 03 minutes 20 seconds East, and following the West face of said retaining wall, a distance of 138.51 feet to the Southwest comer of the wall around the VISITORS CENTER, (Cor. 21), thence proceeding;

21 to 22.
South 00 degrees 07minutes 57 seconds East, a distance of 31.59 feet to an iron rebar placed in concrete at the Eastern intersection of an existing curb line, (Cor. 22), thence proceeding;

22 to 23.
along the Eastern side and the rear of said curb line and following the curvature thereof, an arc distance of 100.35 feet to an iron rebar (Cor. 23), the chord bearing South 21 degrees 10 minutes 15 Seconds West, a distance of 97.22 feet, thence proceeding;

23 to 24.
South 43 degrees 31 minutes 56 seconds West and along the East side of said curb, a distance of 40.28 feet to an iron rebar, (Cor. 24), thence proceeding;

24 to 25.
along the Eastern side of said curb line and following the curvature thereof, an arc distance of 179.92 feet to an iron rebar placed, (Cor. 25), the chord bearing South 22 degrees 12 minutes 25 seconds West, a distance of 176.00 feet, thence proceeding;

25 to 26.
South 06 degrees 10 minutes 46 seconds West, and following the Eastern side of said curb line, a distance of 111.74 feet, to an iron rebar placed in concrete, (Cor. 26), thence proceeding;

26 to 27.
North 87 degrees 26 minutes 50 seconds West, a distance of 192.46 feet to an iron rebar placed on the East right of way line of Cherokee Avenue (60 feet RIW), (Cor. 27), also the East edge of a concrete sidewalk, thence proceeding;

27 to 28.
South 00 degrees 06 minutes 48 seconds East, along the East right of way of Cherokee Avenue, (60 feet R/W), also the East edge of a concrete sidewalk, a distance of 438.70 feet to an iron rebar placed in concrete (Cor. 28), thence proceeding;

28 to 29.
South 82 degrees 53 minutes 46 seconds East, a distance of 98.53 feet to a concrete nail placed in the asphalt of a Park road, (Cor. 29), thence proceeding;

29 to 30.
South 01 degrees 59 minutes 03seconds West, a distance of 141.12 feet to an iron rebar placed in concrete near an existing fence corner(Car.30), thence proceeding;

30 to 31.
South 70 degrees 29 minutes 42 seconds East, and following said existing fence line approximately 00.50 feet South, a distance of 87.54 feet to an iron rebar placed in concrete near a fence comer, (Cor. 31), thence proceeding;

31 to 32.
along the West side of said fence, South 04 degrees 13minutes 00 seconds West, a distance of 217.55 feet to an iron rebar placed in concrete near said fence, (Cor. 32), thence proceeding;

32 to 33.
along the North curb line of a Park Street, North 86 degrees 34 minutes 53 seconds East, a distance of 114.49 feet, to a concrete nail placed in the asphalt at the intersection of the projection of the North curb lines of the said Park Street if extended to a point instead of a curve, (Cor. 33), thence proceeding;

33 to 34.
along the Northern side of said curb line, North 58 degrees 57 minutes 37 seconds East, a distance of 61.69 feet to an iron rebar placed in concrete near a fence comer, (Cor. 34), thence proceeding;

34 to 35.
North 72 degrees 58 minutes 07 seconds East, a distance of 235.21 feet to an iron rebar placed in concrete, (Car. 35), thence proceeding;

35 to 36.
South 34 degrees 32 minutes 22 seconds East, along the Northeastern edge of a concrete spillway, a distance of 92.42 feet to an iron rebar, (Cor. 36), thence proceeding;

36 to 37.
along the Eastern and Southern side of said concrete spillway and following the curvature thereof, an arc distance of 53.34 feet to an iron rebar placed, (Car. 37), chord bearing South 16 degrees 29 minutes 58 seconds West, a distance of 44.88 feet, thence proceeding;

37 to 38.
South 78 degrees 42 minutes 00 seconds West, a distance of 28.02 feet to the Eastern side of an existing fence, 0.50 feet East, and to an iron rebar set in concrete, (Car. 38), thence proceeding;

38 to 39.
along the Eastern side of said existing fence, South 01 degrees 23 minutes 26 seconds West, a distance of 48.03 feet to a chisel mark made in the North edge of the sidewalk, and the right of way, (50 feet) of Atlanta Avenue, (Car. 39), thence proceeding;

39 to 40.
along the Northern right of way (50 feet) of Atlanta Avenue, South 89 degrees 18minutes 02 seconds East, and said right of way line being the Land Lot Line separating the South line of Land Lot 43 and the North line of Land Lot 42, a distance of 289.88 feet to an iron rebar placed at the Northern edge of a concrete sidewalk, (Car. 40), thence proceeding;

40 to 41.
South 86 degrees 00 minutes 24 seconds East, across a presently closed Entrance into Grant Park, and along the right of way of Atlanta Avenue as it changes fro  50 feet to 48 feet, a distance of 59.30 feet to an iron rebar placed in concrete at the North edge of a concrete sidewalk and the right of way of Atlanta Avenue, (Car. 41) , thence proceeding;

41 to 1. (POINT OF BEGINNING.)
South 89 degrees 11minutes 13seconds East, along the North right of way line, and the North edge of a concrete sidewalk of Atlanta Avenue, a distance of 402.85 feet to an iron rebar placed and the POINT OF BEGINNING.

Said described property being improved property known as 'THE ATLANTA ZOO." Property contains 36.462 acres and is more particularly shown on a Plat of Survey prepared for the City of Atlanta, Department of Parks and Recreation - Park Design Section by C. Sam Davis, Georgia Registered Land Surveyor No. 1229 and dated June 14, 1985.

THE PREVIOUSLY DESCRIBED TRACT TOGETHER WITH THE FOLLOWING REAL PROPERTY

TO FIND THE TRUE POINT OF BEGINNING FOR TRACT 2, COMMENCE at the intersection of the eastern right-of-way of Cherokee Avenue (sixty foot right-of-way) and the northern right-of-way of Atlanta Avenue (variable right-of-way), thence in an easterly direction along the northern right-of-way of said Atlanta Avenue a distance of 1313.66 feet to a point; leaving said right-of-way, thence along the shown existing common property line separating property now or formerly owned by Zoo Atlanta and the City of Atlanta, the following calls and distances:

North 00 degrees 48 minutes 47 seconds East a distance of 204.81 feet to a rebar found in concrete; continuing thence North 00 degrees 48 minutes 47 seconds East a distance of 135.11 feet to a rebar found in concrete;
continuing thence North 00 degrees 48 minutes 47 seconds East a distance of 64.53 feet to a rebar found in concrete;
continuing thence North 00 degrees 48 minutes 47 seconds East a distance of 212.52 feet to a point;
thence North 15degrees 07 minutes 15 seconds East a distance of 136.39 feet to a point;
thence in a northeasterly direction along the arc of a curve to the right an arc distance of 56.96 feet (said arc being subtended by an arc having a chord bearing of North 26 degrees 23 minutes 12 seconds East, a chord length of 56.40 feet and a radius of 116.74 feet) to a rebar set, leaving said existing common property line,

thence North 36 degrees 24 minutes 00 seconds East along the proposed new common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 30.76 feet; thence North 20 degrees 39 minutes 43 seconds East along the proposed new common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 45.00 feet to a point; said point being the TRUE POINT OF BEGINNING FOR TRACT 2;

FROM SAID TRUE POINT OF BEGINNING FOR TRACT 2, thence North 44 degrees 27 minutes 48 seconds West a distance of 22.20 feet to a point on the existing common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta; thence North 45 degrees 41 minutes 32 seconds East along the existing common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 37.38 feet to a.point on the proposed new common property line separating property now or formerly of Zoo Atlanta arid of the City of Atlanta; thence South 13 degrees 55 minutes 33 seconds West along the proposed new common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 36.90 feet to a point; thence South 20 degrees 39 minutes 43 seconds West along the proposed new common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 6.57 feet to a point, said point being the TRUE POINT OF BEGINNING FOR TRACT 2, containing 0.010 acres (429 square feet), more or less.

LESS AND EXCEPT THE FOLLOWING REAL PROPERTY

All that tract or parcel of land lying and being in Land Lot 43, 14th District, Fulton County, Georgia being Tract 1 as shown on that Property Swap Exhibit prepared for Zoo Atlanta, prepared by GeoSurvey, Ltd., certified by Jamey R. Coleman, Georgia Registered Land SurveyorNo.2798, dated May 10, 2013, being more particularly described as follows:

TO FIND THE TRUE POINT OF BEGINNING FOR TRACT 1, COMMENCE at the intersection of the eastern right-of-way of Cherokee Avenue (sixty foot right-of-way) and the northern right-of-way of Atlanta Avenue (variable right-of-way), thence in an easterly direction along the northern right-of-way of said Atlanta Avenue a distance of 1313.66 feet to a point; leaving said right-of-way, thence along the shown existing common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta, the following calls and distances:

North 00 degrees 48 minutes 47 seconds East a distance of 204.81 feet to a rebar found in concrete; continuing thence North 00 degrees 48 minutes 47 seconds East a distance of 135.11 feet to a rebar found in concrete;
continuing thence North 00 degrees 48 minutes 47 seconds East a distance of 64.53 feet to a rebar found in concrete; •
continuing thence North 00 degrees 48 minutes 47 seconds East a distance of 212.52 feet to a point;
thence North 15 degrees 07 minutes 15seconds East a distance of 136.39 feet to a point;
thence in a northeasterly direction along the arc of a curve to the right an arc distance of 56.96 feet (said arc being subtended by an arc having a chord bearing of North 26 degrees 23 minutes 12 seconds East, a chord length of 56.40 feet and a radius of 116.74 feet) to a rebar set, said point being the TRUE POINT OF BEGINNING FOR TRACT 1;

FROM SAID TRUE POINT OF BEGINNING FOR TRACT 1, thence North 36 degrees 24 minutes 00 seconds East along the proposed new common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 30.76 feet; thence North 20 degrees 39 minutes 43 seconds East along the proposed new common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 45.00 feet to a point; leaving said proposed new common property line, thence South 44 degrees 27 minutes 48 seconds East a distance of 31.83 feet to a point located on the existing common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta; thence South 54 degrees 37 minutes 01 seconds West along the existing common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 34.84 feet to a point; thence in a southwesterly direction along the arc of a curve to the left along the existing common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta an arc distance of 37.03 feet (said arc being subtended by an arc having a chord bearing of South 49 degrees 27 minutes 04 seconds West, a chord length of 36.87 feet and a radius of 116.74 feet to a point, said point being the TRUE POINT OF BEGINNING FOR TRACT 1, containing 0.019 acres (851 square feet), more or less.

FURTHER LESS AND EXCEPT THE FOLLOWING REAL PROPERTY

TO FIND THE TRUE POINT OF BEGINNING FOR TRACT 3, COMMENCE at the intersection of the eastern right-of-way of Cherokee Avenue (sixty foot right-of-way) and the northern right-of-way of Atlanta Avenue (variable right-of-way), thence in an easterly direction along the northern right-of-way of said Atlanta Avenue a distance of 1313.66 feet to a point; leaving said right-of-way, thence along the shown existing common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta, the following calls and distances:

North 00 degrees 48 minutes 47 seconds East a distance of 204.81 feet to a rebar found in concrete; continuing thence North 00 degrees 48 minutes 47 seconds East a distance of 135.11 feet to a rebar found in concrete;
continuing thence North 00 degrees 48 minutes 47 seconds East a distance of 64.53 feet to a rebar found in concrete;
continuing thence North 00 degrees 48 minutes 47 seconds East a distance of 212.52 feet to a point; thence North 15 degrees 07 minutes 15 seconds East a distance of 136.39 feet to a point; thence in a northeasterly direction along the arc of a curve to the right an arc distance of 56.96 feet (said arc being subtended by an arc having a chord bearing of North 26 degrees 23 minutes 12 seconds East, a chord length of 56.40 feet and a radius of 116.74 feet) to a rebar set, leaving said existing common property line,

thence North 36 degrees 24 minutes 00 seconds East along the proposed new common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 30.76 feet; thence North 20 degrees 39 minutes 43 seconds East along the proposed new common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 45.00 feet to a point; thence North 20 degrees 39:minutes 43 seconds East along the proposed new common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 6.57 feet to a point; thence North 13 degrees 55 minutes 33 seconds East along the proposed new common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 36.90 feet to a rebar set, said point being the TRUE POINT OF BEGINNING FOR TRACT 3;

FROM SAID TRUE POINT OF BEGINNING FOR TRACT 3 thence North 13 degrees 55 minutes 33 seconds East along the proposed new common property line separating property now or formerly of by Zoo Atlanta and of the City of Atlanta a distance of 36.16 feet to a rebar set; thence North 40 degrees 29 minutes 17 seconds East along the proposed new common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 15.51 feet to a rebar set on the existing common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta; thence South 01 degrees 08 minutes 03 seconds West along the existing common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 15.29 feet to a point; thence in a

southwesterly direction along the arc of a curve to the right along the existing common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta an arc distance of 29.87 feet (said arc being subtended by a chord having a chord bearing of South 25

degrees 58 minutes 12 seconds West, a chord length of 28.80 feet and a radius of 31.99 feet) to a point; thence South 45 degrees 41 minutes 32 seconds West along the existing common property line separating property now or formerly of Zoo Atlanta and of the City of Atlanta a distance of 8.19 feet to rebar set, said point being the TRUE POINT OF BEGINNING FOR TRACT 3; containing 0.008 acres (368 square feet), more or less.

The within described property being one contiguous parcel comprised of all of the property described in that Governmental Agreement Regarding the Atlanta Zoo dated as of June 1,2007 together with and less and except the certain parcels described herein.

FURTHER LESS AND EXCEPT THE FOLLOWING REAL PROPERTY

ALL THAT TRACT OR PARCEL OF LAND LYING IN AND BEING A PART OF LAND LOT 43 OF THE 14TH DISTRICT, CITY OF ATLANTA, FULTON COUNTY, GEORGIA, AND BEING MORE PARTICULARYLY DESCRIBED AS FOLLOWS:

COMMINCING AT A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF CHEROKEE AVENUE HAVING AN APPARENT 50' RIGHT-OF-WAY; SAID POINT BEING LOCATED AT NORTH: 1357437.567' AND EAST: 2233694.518 ACCORDING TO THE NORTH AMERICAN DATUM OF 1982 (NAD83-2011) GEORGIA WEST ZONE; THENCE LEAVING THE SAID RIGHT-OF-WAY OF CHEROKEE AVENUE SOUTH 82 DEGREES 52 MINUTES 14 SECONDS EAST A DISTANCE OF 98.53 FEET TO A POINT, SAID POINT BEING THE TRUE POINT OF BEGINNING SAID POINT BEING LOCATED AT NORTH: 1357425.338' AND EAST: 2233792.286' ACCORDING TO THE SAID NORTH AMERICAN DATUM OF 1982;

THENCE FROM THE POINT OF BEGINNING AS THUS ESTABLISHED, SOUTH 82 DEGREES 52 MINUTES 14 SECONDS EAST A DISTANCE OF 4.57 FEET TO A POINT; THENCE SOUTH 00 DEGREES 00 MINUTES 47 SECONDS EAST A DISTANCE OF 21.74 FEET TO A POINT; THENCE ALONG A CURVE TO THE RIGHT, HAVING A RADIUS OF 19.21 FEET, BEING SUBTENDED BY A CHORD BEARING OF SOUTH 00 DEGREES 32 MINUTES 23 SECONDS WEST A DISTANCE OF 37.03 FEET, HAVING A ARC LENGTH OF 49.98 FEET TO A POINT; THENCE SOUTH 86 DEGREES 07 MINUTES 48 SECONDS WEST A DISTANCE OF 26.97 FEET TO A POINT; THENCE SOUTH 00 DEGREES 00 MINUTES 47 SECONDS EAST A DISTANCE OF 20.75 FEET TO A POINT; THENCE NORTH 87 DEGREES 59 MINUTES 25 SECONDS WEST A DISTANCE OF 7.51 FEET TO A POINT; THENCE NORTH 02 DEGREES 00 MINUTES 35 SECONDS EAST A DISTANCE OF 84.24 FEET TO A POINT, SAID POINT BEING THE TRUE POINT OF BEGINNING;

SAID TRACT OR PARCEL OR TRACT OF LAND CONSISTS OF 0.045 ACRES MORE OR LESS. AS SHOWN ON THE EXHIBIT DATED JUNE 19, 2025 BY PATRIOT SURVEYING & INFRASTRUCTURE, PLLC;

A RESOLUTION APPROVING A FOURTH AMENDMENT TO THE GOVERNMENTAL AGREEMENT AMONG THE CITY OF ATLANTA, FULTON COUNTY, GEORGIA AND THE CITY OF ATLANTA AND FULTON COUNTY RECREATION AUTHORITY REGARDING THE ATLANTA ZOO FOR THE PURPOSE OF RELEASING THE ABANA COURTYARD FROM THE LEASED PREMISES; AUTHORIZING THE CHAIRMAN TO EXECUTE THE FOURTH AMENDMENT AND ANY RELATED DOCUMENTS; AUTHORIZING THE COUNTY ATTORNEY TO APPROVE THE FOURTH AMENDMENT AND ANY RELATED DOCUMENTS AS TO FORM AND MAKE NECESSARY MODIFICATIONS THERETO PRIOR TO EXECUTION; AND FOR OTHER PURPOSES.

WHEREAS, Fulton County, Georgia ("Fulton County") is a political subdivision of the State of Georgia, existing as such under and by the Constitution, statutes, and laws of the State of Georgia; and

WHEREAS the City of Atlanta ("City"), the City of Atlanta and Fulton Country Recreation Authority ("Authority") and Fulton County previously entered into an Agreement Regarding the Atlanta Zoo, dated December 5, 1985, as amended on March 27, 1992 and December 1, 2003, pursuant to which an approximately 36.42-acre parcel of land, improvements, and associated facilities ("Leasehold") owned by the City and located at Grant Park were leased to the Authority and operated as a public zoo ("Atlanta Zoo") for amusement and educational purposes; and

WHEREAS, the Authority, the City, and Fulton County subsequently entered into a Governmental Agreement Regarding the Atlanta Zoo, dated June 1, 2007, and as amended by the First Amendment dated as of January 25, 2010, the Second Amendment dated as of April 1, 2015, and the Third Amendment dated as of December 29, 2017 (as amended, the "Governmental Agreement"), pursuant to which the City re-conveyed the Leasehold to the Authority; and

WHEREAS, pursuant to the First Amendment, an approximately one-acre parcel was added to the Leasehold on which the City of Atlanta Office of Parks Southeast Maintenance Facility is located; and

WHEREAS, pursuant to the Second Amendment, the Atlanta Cyclorama Building and an area on which to construct an African Savanna Elephant Exhibit were added to the Leasehold, such that it then consisted of approximately 41.283 acres; and

WHEREAS, pursuant to the Third Amendment, the Cyclorama was excluded from the Leasehold in order to facilitate its renovation and rehabilitation through a tax credit financing arrangement; and

WHEREAS, the current Leasehold includes an area of Grant Park known as the Abana Courtyard; and

WHEREAS, the City and Authority have requested that the parties approve and execute the Fourth Amendment to Governmental Agreement, for the purpose of excluding the Abana Courtyard from the Leasehold and returning control of the Abana Courtyard to the City in order to permit the City to open the Abana Courtyard for public access and enjoyment of a newly restored seating plaza, and the Fulton County Department of Real Estate and Asset Management recommends that the Governmental Agreement be amended as requested; and

WHEREAS, pursuant to Fulton County Code § 1-117, the Fulton County Board of Commissioners has exclusive jurisdiction and control over directing and controlling all the property of Fulton County, as they may deem expedient, according to law.

NOW THEREFORE BE IT RESOLVED, that the Board of Commissioners hereby approves the Fourth Amendment to Governmental Agreement Regarding the Atlanta Zoo among the City of Atlanta, the City of Atlanta and Fulton Country Recreation Authority, and Fulton County, in substantially the form attached hereto as Exhibit A, for the purpose of excluding the Abana Courtyard from the Leasehold under the Governmental Agreement.

BE IT FURTHER RESOLVED, that the Chairman of the Board of Commissioners is hereby authorized to execute the Fourth Amendment and any related documents.

BE IT FURTHER RESOLVED that prior to execution by the Chairman, the County Attorney shall approve the Fourth Amendment and any related documents as to form and make any necessary changes thereto to protect Fulton County's interests.

BE IT FINALLY RESOLVED, that this Resolution shall become effective upon its adoption, and that all resolutions and parts of resolutions in conflict with this Resolution are hereby repealed to the extent of the conflict.

PASSED AND ADOPTED by the Board of Commissioners of Fulton County, Georgia, this _____ day of _____, 2026.

FULTON COUNTY BOARD OF COMMISSIONERS

_____
Robert L. Pitts, Chairman (At Large)
Fulton County Board of Commissioners

ATTEST:

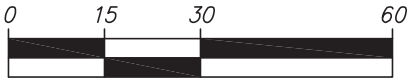
_____
Tonya R. Grier, Clerk to the Commission

APPROVED AS TO FORM:

_____
Y. Soo Jo, County Attorney

EXHIBIT A

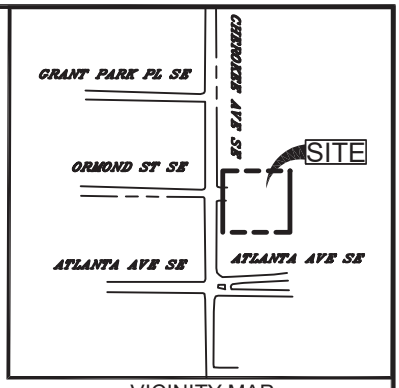
Fourth Amendment to Governmental Agreement Regarding the Atlanta Zoo



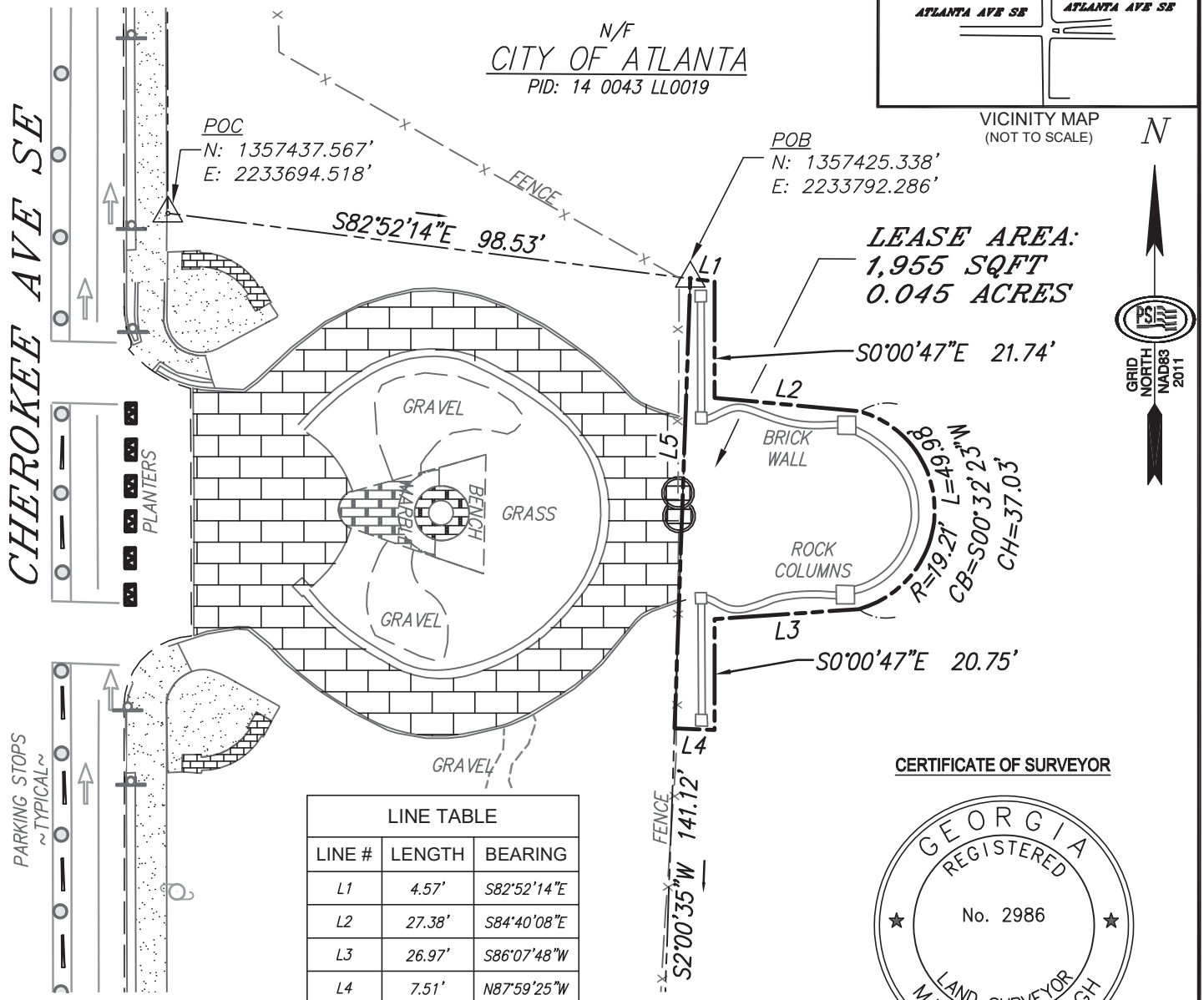
1 INCH = 30 FEET

PATRIOT SURVEYING & INFRASTRUCTURE

PATRIOT SURVEYING & INFRASTRUCTURE, PLLC.
205 CREEKSTONE RIDGE WOODSTOCK, GA 30188
TEL: 1-800-270-4229 FIRM # LSF0014234



VICINITY MAP
(NOT TO SCALE)



LINE TABLE		
LINE #	LENGTH	BEARING
L1	4.57'	S82°52'14"E
L2	27.38'	S84°40'08"E
L3	26.97'	S86°07'48"W
L4	7.51'	N87°59'25"W
L5	84.24'	N02°00'35"E

CERTIFICATE OF SURVEYOR



THIS PLAT IS NOT VALID UNLESS IT CONTAINS THE ORIGINAL SIGNATURE, IN BLUE INK, OF THE REGISTRANT ACROSS THE REGISTRANTS SEAL.

OWNER'S SIGNATURE DATE

NOTE:

THE SOLE PURPOSE OF THIS EASEMENT EXHIBIT IS TO SHOW THE LOCATION OF THE PROPOSED EASEMENTS (PERMANENT, CONSTRUCTION AND/OR TEMPORARY) AS THEY CROSS THE SUBJECT PROPERTY SHOWN HEREON. THIS EASEMENT EXHIBIT IS INTENDED TO DEPICT THE LEGAL DESCRIPTION(S) OF THE EASEMENTS(S) DESCRIBED ABOVE AND IS NOT INTENDED IN AND OF ITSELF TO TRANSFER PROPERTY FROM ONE PARTY TO ANOTHER IN ANY WAY EXCEPT WHEN ATTACHED TO ANOTHER EASEMENT DOCUMENT WHICH DESCRIBES THE PURPOSES OF SUCH EASEMENT AND IS PREPARED FOR SUCH PUBLIC RECORDATION. THE PROPERTY LINES SHOWN HEREON ARE DEPICTED USING FIELD EVIDENCE OF IRON PINS AND MONUMENTS FOUND AND RECORD EVIDENCE OF DEEDS, PLATS AND TAX MAPS FOUND IN THE OFFICIAL PUBLIC RECORDS OF THE COUNTY.

LEGEND:

METAL FENCE —
ADJOINER PROPERTY BOUNDARY LINE —
PAINT STRIPING —
EXISTING EASEMENT LINE —

PID — PARCEL IDENTIFIER
POC — POINT OF COMMENCEMENT
POB — POINT OF BEGINNING
△ — COMPUTED POINT
GATE POST
UTILITY POLE
SINGLE POST SIGN

NO.	REVISION	DATE
0	ISSUED FOR REVIEW	06/19/25

EXHIBIT FOR
GRANT PARK CONSERVANCY
ACROSS THE LANDS OF
CITY OF ATLANTA
PID: 14 0043 LL0019 LAND LOT 43, DISTRICT 14, FULTON COUNTY, GEORGIA

DATE:	06-19-2025
SCALE:	1" = 30'
DRAWN BY:	TJS
APPROVED BY:	MGH
SHEET 1 OF 1	

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0089 **Meeting Date:** 2/18/2026

Department
Real Estate and Asset Management

Requested Action
Request approval of a Resolution authorizing the acceptance by Fulton County, Georgia of certain leasehold interests held by the Building Authority of Fulton County; of title in fee simple of certain real property owned by the Building Authority of Fulton County; of title in fee simple to all real or personal property, equipment, and assets of any kind, including assets later discovered, from the Building Authority of Fulton County; authorizing the Chairman to execute all documents necessary to effectuate the acceptance of leasehold interests, real property, and any other assets from the Building Authority of Fulton County; authorizing the transfer of a leasehold interest to the City of South Fulton; authorizing the Chairman to execute all documents necessary to effectuate the transfer of a leasehold interest to the City of South Fulton; authorizing the County Attorney to prepare and approve as to form all documents necessary and appropriate to accomplish these transactions; and for other purposes.

Requirement for Board Action
Pursuant to Fulton County Code § 1-117, the Fulton County Board of Commissioners has exclusive jurisdiction and control over directing and controlling all the property of Fulton County, as they may deem expedient, according to law

Strategic Priority Area related to this item
Open and Responsible Government

Commission Districts Affected
All Districts ☒
District 1 ☐
District 2 ☐
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?
No

Agenda Item No.: 26-0089 **Meeting Date:** 2/18/2026

Summary & Background

Scope of Work: The Department of Real Estate and Asset Management (DREAM) and the Fulton County Department of Finance are seeking approval from the Fulton County Board of Commissioners to accept the assignment of all leasehold interests held in the name of the Fulton County Building Authority, the transfer of real property located at 162 and 166 Mitchell Street SW, Atlanta, Georgia 30303 (Tax IDs 14-0077-0006-058-1 and 14-0077-0006-057-3), and the transfer of any real property and personal property currently held in the name of the Fulton County Building Authority to Fulton County, and the assignment of the cell tower leasehold interest under the cell tower lease agreement located at 4760 Fulton Industrial Boulevard to the City of South Fulton.

A review of the current lease agreements for the cell tower antenna located on fire station properties confirmed the Fulton County Building Authority as the landlord for two leases located at 4760 Fulton Industrial Blvd and 3175 Bethsaida Road. The County previously transferred ownership of the fire station property located at 4760 Fulton Industrial Boulevard to the City of South Fulton, and now wishes to assign the Building Authority's leasehold interests in the cell tower agreement at that location to the City of South Fulton.

Community Impact: Fulton County's acceptance of leasehold interests, fee simple title, and all other property interests from the Fulton County Building Authority is required to complete the transfer of all remaining assets of the Building Authority into Fulton County.

Department Recommendation: DREAM recommends approval to accept the leasehold interests for the cell tower lease agreements, fee simple title to real property located at 162 and 166 Mitchell Street SW, Atlanta, Georgia 30303 (Tax IDs 14-0077-0006-058-1 and 14-0077-0006-057-3), as well as any other real or person property, in the name of the Fulton County Building Authority that is now known or may be later discovered.

Project Implications: Approval of the requested real estate transactions are required to complete the sale of the fire station property locate at 4760 Fulton Industrial Blvd to the City of South Fulton and formally confirm the County's cell tower leasehold interests at 3175 Bethsaida Road, and to allow Fulton County to hold title to real property located at 162 and 166 Mitchell Street SW, Atlanta, Georgia 30303 (Tax IDs 14-0077-0006-058-1 and 14-0077-0006-057-3).

Community Issues/Concerns: None

Department Issues/Concerns: None

Fiscal Impact / Funding Source

Annual rental incomes to be received from the cell tower lease agreement will be deposited into Accounting Line 100-333-3333-5216.

Tax Parcel No. _____

----------[Space Above Provided For Recording Data]----------

After Recording Return To:
_____
_____
_____

STATE OF GEORGIA
COUNTY OF FULTON

QUIT CLAIM DEED

THIS INDENTURE, made as of the _____ day of _____, 20__ between the **BUILDING AUTHORITY OF FULTON COUNTY,** as party of the first part, hereinafter called Grantor, and **FULTON COUNTY, GEORGIA,** a political subdivision of the State of Georgia, as party of the second part, hereinafter called Grantee (the words "Grantor" and “Grantee" to include their respective heirs, successors and assigns where the context requires or permits).

WITNESSETH, that Grantor, for and in consideration of the sum of Ten Dollars ($10.00) and other good and valuable consideration in hand paid at and before the sealing and delivery of these presents, the receipt of which is hereby acknowledged, by these presents does hereby bargain, sell, remise, release, convey and forever QUITCLAIM unto Grantee all the right, title, interest, claim or demand which Grantor has or may have had in and to the following described property, to-wit:

> **ALL THAT TRACT OR PARCEL OF LAND** lying and being in Land Lot ____ of the ____ District of Fulton County, Georgia, and being more particularly described In Exhibit "A," which is attached hereto and incorporated herein by reference.

TO HAVE AND TO HOLD the said described premises to Grantee, so that neither Grantor nor any person or persons claiming under Grantor shall at any time, by any means or ways, have, claim or demand any right or title to said premises or appurtenances, or any rights thereof.

IN WITNESS WHEREOF, Grantor has signed and sealed this deed, the day and year first above written.

Signed, sealed, and delivered this___
day of_____
in the presence of:

_____
Notary Public

_____
Witness

BUILDING AUTHORITY OF FULTON COUNTY

_____
Chairman

Approved as to Form:

_____
Attorney to the Building Authority

EXHIBIT A
LEGAL DESCRIPTION

ASSIGNMENT OF LEASE AND NOVATION

This **ASSIGNMENT OF LEASE AND NOVATION** (this "Agreement") is entered into this ___ day of _____, 2026 between the **BUILDING AUTHORITY OF FULTON COUNTY** ("Lessor"), **FULTON COUNTY**, a political subdivision of the State of Georgia (the "Successor Lessor"), and _____, a _____ (the "Lessee"), with all collectively referred herein as the "Parties".

WHEREAS, Lessor previously owned certain improved premises known and designated as _____ (the "Property"), a portion of which Property, consisting of approximately _____ acres (___ square feet), is currently under lease to Lessee pursuant to that certain *Land Lease Agreement* dated _____, attached hereto as Attachment 1, incorporated herein by reference (the "Land Lease"); and

WHEREAS, the Property is no longer owned by Lessor, and Lessor desires to transfer to Successor Lessor all of its rights, duties, and interests in and to the Land Lease so that Successor Lessor may either hold such interests as Lessor or transfer all of its rights, duties, and interests in and to the Land Lease to the current owner of the Property; and

WHEREAS, all the Parties hereto now desire through this written Agreement to acknowledge and agree that upon execution of this Agreement and assignment of the Land Lease to Successor Lessor, the Lessor has no further interest in or benefits to be received from the Land Lease and no further obligations, duties or other responsibilities to Lessee, and that as of the execution of this Agreement, for all purposes, Successor Lessor is the sole "Lessor" with all rights and obligations with respect to the Lessee under the Land Lease; and

WHEREAS, all recitals are hereby incorporated into the body of this Agreement as if fully set forth therein.

NOW, THEREFORE, in consideration of the mutual promises, covenants, agreements, understandings, releases, responsibilities and other obligations set forth herein, and for other good and valuable consideration, the receipt sufficiency and value of which are hereby acknowledged by the Parties, the undersigned hereby agree as follows:

1. Assignment of Land Lease.

(a) Lessor hereby sells, assigns, transfers and conveys all of its right, title, obligation and interest in and to the Land Lease to Successor Lessor.

(b) Lessor hereby covenants to Successor Lessor that (i) it is the sole holder of the "Lessor's" interest under the Land Lease and (ii) Lessor has not defaulted under any of its obligations under the terms of the Land Lease.

(c) Pursuant to the Land Lease, Lessee acknowledges that it has received a copy duly certified by the appropriate public official, of the recorded instrument or instruments evidencing

Successor Lessor's ownership of the Property, if applicable, and will make all future rental payments to Successor Lessor.

(e) Lessee hereby fully accepts the assignment of the Land Lease from Lessor to Successor Lessor.

(f) For purposes of notice to Successor Lessor and Lessee, parties shall use the following addresses:

SUCCESSOR LESSOR:

LESSEE:

(g) If applicable, Lessor, Successor Lessor, and Lessee agree to execute and record the *Amendment to Memorandum of Lease Agreement*, in substantially the form attached hereto as Attachment 2.

2. Substitution of Lessor.

All Parties hereto agree that this Agreement constitutes a novation and that Successor Lessor is hereby substituted as "Lessor" under the Land Lease. Lessor and Lessee agree and acknowledge that, as the execution of this Agreement, neither of the Parties has any obligations, duties or responsibilities to or claims against the other under the Land Lease; provided however, that nothing herein shall be interpreted to mean that either Party has waived any accrued liability or obligation due from the other under the Land Lease. For all purposes, Successor Lessor and Lessee are the parties to the Land Lease and prospectively will look solely to the other to secure the performance of each other's obligations.

IN WITNESS WHEREOF, the Parties hereto have hereunto set their hands and seals on the day and year first above written.

[SIGNATURES CONTAINED ON FOLLOWING PAGES]

"SUCCESSOR LESSOR"

FULTON COUNTY, GEORGIA

_____
Robert L. Pitts, Chairman
Fulton County Board of Commissioners

ATTEST:

_____
Tonya R. Grier, Clerk to the Commission

APPROVED AS TO FORM:

_____
Y. Soo Jo, County Attorney

[SIGNATURES CONTINUED ON FOLLOWING PAGES]

"LESSOR"

THE BUILDING AUTHORITY OF FULTON COUNTY, GEORGIA

_____
Robert L. Pitts, Chairman
Building Authority of Fulton County

WITNESS:

_____

NOTARY:

Sworn to and subscribed before
me this the _____ day of
_____, 2026

_____
Notary Public

My Commission Expires: _____

APPROVED AS TO FORM:

_____
Y. Soo Jo, Attorney to Building Authority
of Fulton County

[SIGNATURES CONTINUED ON FOLLOWING PAGE]

Said assignment is acknowledged and consented to by the undersigned:

"**LESSEE**"

_____

_____
By: _____
Its: _____

Sworn to and subscribed before
me this the _____ day of
_____, 2026

_____
Notary Public

My Commission Expires: _____

Attachment 1

Land Lease Agreement

[See attached]

Attachment 2

Site Name: _____
Site ID#: _____
Site Address: _____

Cross Reference: Deed Book, Page

After Recording Return to:
_____
_____
_____
_____

AMENDMENT TO MEMORANDUM OF LAND LEASE AGREEMENT

This **AMENDMENT TO MEMORANDUM OF LAND LEASE AGREEMENT,** dated _____, 2026 by and between the _____ (the "Lessor") and _____ ("Lessee") covering that certain premises located in the County of Fulton, State of Georgia, amends that certain *Memorandum of Lease Agreement* dated _____ by and between _____ as Lessor and Lessee, and as recorded at _____ ("Memorandum").

RECITALS

WHEREAS, _____ ("Prior Lessor") previously owned certain improved premises known and designated as _____ (the "Property"), of which it leased a portion consisting of approximately ____ acres (____ square feet) to Lessee pursuant to that certain *Land Lease Agreement* dated _____ (the "Land Lease"); and

WHEREAS, Prior Lessor assigned its interest as Lessor to _____, as _____ now owns the underlying Property; and

WHEREAS, all parties agree and acknowledge that the current Lessor under the Land Lease is _____.

NOW THEREFORE, for good and valuable consideration the receipt and sufficiency of which is hereby acknowledged:

1. All references to "Lessor" in the Memorandum shall hereafter refer to _____.

2. There shall be no other changes or amendments to the Memorandum except as stated herein.

[**Signatures on Next Page**]

IN WITNESS WHEREOF, the parties have executed this Amendment as of the day and year first above written.

LESSEE:

_____
Name:
Title:

WITNESS: _____

Notary:

Sworn to and subscribed before
me this the _____ day of
_____, 2026

_____
Notary Public

My Commission Expires: _____

[Signatures Continue on Following Page]

LESSOR:

_____

ATTEST:

_____
Name:
Title:

NOTARY

Sworn to and subscribed before
me this the _____ day of
_____, 2026

_____
Notary Public

My Commission Expires: _____

APPROVED AS TO FORM:

_____

[Signatures Continue on Following Page]

AGREED AND ACKNOWLEDGED BY:

PRIOR LESSOR:

_____
Name:
Title:

WITNESS:

_____

NOTARY:

Sworn to and subscribed before
me this the _____ day of
_____, 2026

_____
Notary Public

My Commission Expires: _____

APPROVED AS TO FORM:

_____

A RESOLUTION AUTHORIZING THE ACCEPTANCE BY FULTON COUNTY, GEORGIA OF CERTAIN LEASEHOLD INTERESTS HELD BY THE BUILDING AUTHORITY OF FULTON COUNTY; OF TITLE IN FEE SIMPLE OF CERTAIN REAL PROPERTY OWNED BY THE BUILDING AUTHORITY OF FULTON COUNTY; OF TITLE IN FEE SIMPLE TO ALL REAL OR PERSONAL PROPERTY, EQUIPMENT, AND ASSETS OF ANY KIND, INCLUDING ASSETS LATER DISCOVERED, FROM THE BUILDING AUTHORITY OF FULTON COUNTY; AUTHORIZING THE CHAIRMAN TO EXECUTE ALL DOCUMENTS NECESSARY TO EFFECTUATE THE ACCEPTANCE OF LEASEHOLD INTERESTS, REAL PROPERTY, AND ANY OTHER ASSETS FROM THE BUILDING AUTHORITY OF FULTON COUNTY; AUTHORIZING THE TRANSFER OF A LEASEHOLD INTEREST TO THE CITY OF SOUTH FULTON; AUTHORIZING THE CHAIRMAN TO EXECUTE ALL DOCUMENTS NECESSARY TO EFFECTUATE THE TRANSFER OF A LEASEHOLD INTEREST TO THE CITY OF SOUTH FULTON; AUTHORIZING THE COUNTY ATTORNEY TO PREPARE AND APPROVE AS TO FORM ALL DOCUMENTS NECESSARY AND APPROPRIATE TO ACCOMPLISH THESE TRANSACTIONS; AND FOR OTHER PURPOSES.

WHEREAS, Fulton County, Georgia ("Fulton County") is a political subdivision of the State of Georgia, existing as such under and by the Constitution, statutes, and laws of the State; and

WHEREAS, the Building Authority of Fulton County ("Authority") is a body corporate and politic, duly created and existing as an instrumentality of the State of Georgia and a public corporation under the County Building Authorities Act, Ga. Laws 1980, p. 4488 et seq., as amended; and

WHEREAS, the Authority was created for the purpose of financing, in whole or in part, the construction of buildings, facilities, and improvements for various departments, boards, commissions and agencies located in Fulton County; and

WHEREAS, on February 18, 2026, the Authority authorized the transfer to Fulton County of the leasehold interests in two cell tower leases: (1) the Land Lease Agreement, dated September 17, 2014, between the Authority, as Lessor, and Tower Assets Newco IX, LLC, as Lessee, for a portion of the property located at 4760 Fulton Industrial Blvd,

Atlanta, GA, 30336, Parcel No. 14-F-0057-LL-0305 ("FIB Lease"), and (2) the Land Lease Agreement, dated April 16, 2014, between the Authority, as Lessor, and TV6-W, LLC, as Lessee, for a portion of the property located at 3175 Bethsaida Rd, South Fulton, GA 30213, Parcel No. 13-0162-LL0230 (collectively the "Cell Tower Leases"); and

WHEREAS, on February 18, 2026, the Authority authorized the transfer to Fulton County of its fee simple real property interest and title to the real property consisting of (1) the commercial building located at 162 Mitchell Street SW, Atlanta, Georgia 30303, Parcel No. 14-0077-0006-058-1, and all other improvements thereon; and (2) the commercial building located at 166 Mitchell Street SW, Atlanta, Georgia 30303, Parcel No. 14-0077-0006-057-3, and all other improvements thereon (collectively the "Mitchell Street Properties"); and

WHEREAS, on February 18, 2026, the Authority authorized the transfer to Fulton County of its fee simple property interests in any remaining properties, equipment, or any other assets, as well as any later discovered assets of any kind owned by the Authority; and

WHEREAS, Fulton County desires to accept (1) the transfer of the leasehold interests in the Cell Tower Leases, (2) the transfer of title in fee simple of the Mitchell Street Properties, and (3) the transfer of any and all real property, equipment, or any other assets, as well as any later discovered assets of any kind, owned by the Authority; and

WHEREAS, the City of South Fulton ("City") owns the real property underlying the FIB Lease, and desires to have the FIB Lease transferred to it by Fulton County; and

WHEREAS, Fulton County desires to transfer the FIB Lease to the City; and

WHEREAS, pursuant to Fulton County Code § 1-117, the Fulton County Board of Commissioners has exclusive jurisdiction and control over directing and controlling all the property of the County, as they may deem expedient, according to law.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Commissioners hereby approves and authorizes acceptance from the Authority its leasehold interests in (1) the Land Lease Agreement, dated September 17, 2014, between the Authority, as Lessor, and Tower Assets Newco IX, LLC, as Lessee, for a portion of the property located at 4760 Fulton Industrial Blvd, Atlanta, GA, 30336, Parcel No. 14-F-0057-LL-0305, and (2) the Land Lease Agreement, dated April 16, 2014, between the Authority, as Lessor, and TV6-W, LLC, as Lessee, for a portion of the property located at 3175 Bethsaida Rd, South Fulton, GA 30213, Parcel No. 13-0162-LL0230.

BE IT FURTHER RESOLVED, that the Board of Commissioners hereby approves and authorizes acceptance from the Authority of its fee simple property interests and title to the real property consisting of (1) the commercial building located at 162 Mitchell Street SW, Atlanta, Georgia 30303, Parcel No. 14-0077-0006-058-1, and all other improvements thereon; and (2) the commercial building located at 166 Mitchell Street SW, Atlanta, Georgia 30303, Parcel No. 14-0077-0006-057-3, and all other improvements thereon.

BE IT FURTHER RESOLVED, that the Board of Commissioners hereby approves and authorizes acceptance from the Authority of its fee simple property interests in any remaining properties, equipment, or assets of any kind still, as well as any later discovered assets of any kind, owned by the Authority.

BE IT FURTHER RESOLVED, that the Chairman of the Board of Commissioners is hereby authorized to execute all documents necessary to effectuate the acceptance of

the Cell Tower Leases, the Mitchell Street Properties, and any remaining properties, equipment, or assets of any kind, as well as any later discovered assets of any kind without further action by the Board of Commissioners.

BE IT FURTHER RESOLVED, that the Board of Commissioners hereby approves and authorizes the transfer of Fulton County's interest in the Land Lease Agreement, dated September 17, 2014, between the Authority, as Lessor, and Tower Assets Newco IX, LLC, as Lessee, for a portion of the property located at 4760 Fulton Industrial Blvd, Atlanta, GA, 30336, Parcel No. 14-F-0057-LL-0305 to the City of South Fulton; and

BE IT FURTHER RESOLVED, that the County Attorney is hereby authorized to prepare and to approve as to form any and all documents that are necessary and appropriate to accomplish the transactions authorized by this Resolution, including via quit claim deed in substantially the form attached hereto as Exhibit A and Assignment of Lease and Novation in substantially the form attached hereto as Exhibit B, and other necessarily related purposes and functions, prior to execution by the Chairman.

BE IT FINALLY RESOLVED, that this Resolution shall become effective upon its adoption, and that all resolutions and parts of resolutions in conflict with this Resolution are hereby repealed to the extent of the conflict.

PASSED AND ADOPTED by the Board of Commissioners of Fulton County, Georgia, this _____ day of _____, 2026.

FULTON COUNTY BOARD OF COMMISSIONERS

_____

Robert L. Pitts, Chairman

Board of Commissioners

ATTEST:

_____

Tonya R, Grier, Clerk to the
Commission

APPROVED AS TO FORM:

_____

Y. Soo Jo, County Attorney

Exhibit A

Form of Quit Claim Deed

Exhibit B

Form of Assignment of Lease and Novation

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0090 **Meeting Date:** 2/18/2026

Department
Real Estate and Asset Management

Requested Action
Request approval to close out a contract - Department of Real Estate and Asset Management, 22ITB134833C-MH, Fire Extinguisher Testing and Maintenance Services**,** in the amount not to exceed $10,582.20 with (B) Summit Fire & Security (Loganville, GA), to cover the final payment to close out the contract for services rendered. This contract provided on-site fire extinguisher testing and maintenance services for Fulton County facilities for FY2025. Effective upon BOC approval.

Requirement for Board Action
In accordance with Purchasing Code Section 102-416(g), the purpose of the closeout process is to verify that both parties to the contract have fulfilled their contractual obligations and that there are no responsibilities remaining. A contract is completed when all goods and services have been received and accepted; all reports have been delivered and accepted; all administrative actions have been accomplished; all County-furnished equipment and material has been returned; and final payment has been made to the contractor.

Strategic Priority Area related to this item
Open and Responsible Government

Commission Districts Affected
All Districts ☒
District 1 ☐
District 2 ☐
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?
Choose an item.

Summary & Background On November 16, 2022, as Item 22-0874, the BOC approved award of 22ITB134833C-MH, Fire Extinguisher Testing and Maintenance Services, in the total amount of $75,000.00 to (A) Cintas Fire Protection, Inc. (Norcross, GA) in the amount not to exceed $45,000.00 and (B) Summit Fire & Security (Loganville, GA) in the amount not to exceed $30,000.00, to provide

fire extinguisher testing and maintenance services on an “as-needed” basis for Fulton County facilities. The contract was first renewed on October 4, 2023 as Item 23-0847 for FY 2024, and was renewed for its second and final time on November 6, 2024, as Item 24-0702 for FY2025 (both renewals in the total amount of $75,000.00). Both parties have satisfactorily performed and completed the scope of work for the contract term ending December 31, 2025.

Now, DREAM is requesting approval to close out a contract to allow the final payment of invoices to (B) Summit Fire & Security in the total amount of $10,582.20 which invoices were not covered under the original spending authority.

Scope of Work: These contracts furnish all materials, parts, labor, equipment, transportation, and appurtenances necessary to provide on-site fire extinguisher testing and maintenance services for Fulton County facilities.

Community Impact: This service ensures the safety of the patrons and County staff by following the fire and life safety codes.

Department Recommendation: The Department of Real Estate and Asset Management recommends approval.

This is a time and materials contract and the total requested amount of $10,582.20, will cover the final costs for replacement of all parts/components and labor for inspections and maintenance repairs for fire extinguisher testing completed for Fulton County facilities through December 31, 2025.

Project Implications: These contracts provide all the necessary fire extinguisher testing, maintenance and replacement services needed to maintain various fire extinguishers at Fulton County north, south, and downtown area locations. Fire and Life Safety Code applicable for buildings mandate that the fire extinguishers are checked and maintained at least once a year. Fulton County does not have the staff trained or experienced in carrying out this work.

Community Issues/Concerns: None on which the Department is aware.

Department Issues/Concerns: If this close out contract is not approved, the Department will not be able to pay final payment of invoices for preventive and corrective services rendered that were not covered under the original spending authority to provide fire extinguisher testing and maintenance services Countywide.

Contract Modification

(B) Summit Fire & Security

Current Contract History	BOC Item	Date	Dollar Amount
Original Award Amount	22-0874	11/16/22	$30,000.00
1st Renewal	23-0874	10/4/23	$30,000.00
2nd Renewal	24-0702	11/6/24	$30,000.00

Amendment No.1 (Close-Out)			**$10,582.20**
Total Revised Amount			$100,582.20

Contract & Compliance Information *(Provide Contractor and Subcontractor details.)*

Contract Value: **$10,582.20**

Prime Vendor: **Summit Fire & Security**
Prime Status: **Non-Minority**
Location: **Loganville, GA**
County: **Gwinnett County**
Prime Value: **$10,582.20 or 100.00%**

Total Contract Value: **$10,582.20 or 100.00%**
Total Certified Value: **$0.00 or 0.00%**

Exhibits Attached *(Provide copies of originals, number exhibits consecutively, and label all exhibits in the upper right corner.)*

Exhibit 1: Amendment No. 1 to Form of Contract
Exhibit 2: Supporting Invoices

Contact Information

Joseph N. Davis, Director, Department of Real Estate and Asset Management, (404) 612-3772

Contract Attached

Yes

Previous Contracts

Yes

Total Contract Value

Original Approved Amount: $30,000.00
Previous Adjustments: $60,000.00
This Request: $10,582.20
TOTAL: $100,582.20

Fiscal Impact / Funding Source

Funding Line 1:

100-520-5220-1116: General, Real Estate and Asset Management, Building Maintenance- $9,244.05

Agenda Item No.: 26-0090 **Meeting Date:** 2/18/2026

Funding Line 2:

100-520-5221-1116: General, Real Estate and Asset Management, Building Maintenance- $1,338.15

Key Contract Terms	
Start Date: N/A	**End Date:** N/A
Cost Adjustment:	**Renewal/Extension Terms**: N remaining renewal options. This action closes out the contract.

Overall Contractor Performance Rating: N/A

Would you select/recommend this vendor again?
Yes

Report Period Start: **N/A**

Report Period End: **N/A**

AMENDMENT NO. 1 TO FORM OF CONTRACT

Contractor: **Summit Fire & Security**

Contract No. **22ITB134833C -MH, Fire Extinguisher Testing and Maintenance Services**

Address: **2330 Pro Tec Way**
City, State **Loganville, GA 30052**

Telephone: **(770) 385-7311**

E-mail: **jtaylor1@summitfiresecurity.com**

Contact: **James Taylor, Manager**

W I T N E S S E T H

WHEREAS, Fulton County ("County") entered into a Contract with **Summit Fire & Security** to provide Fire Extinguisher Testing and Maintenance Services, dated January 1, 2023, on behalf of the Department of Real Estate and Asset Management; and

WHEREAS, the purpose for of this amendment is approval to close out a contract to cover final payment for services rendered to provide on-site fire extinguisher testing and maintenance services for Fulton County facilities; and

WHEREAS, the Contractor has performed satisfactorily over the period of the contract; and

WHEREAS, this amendment was approved by the Fulton County Board of Commissioners on **, BOC Item** .

NOW, THEREFORE, the County and the Contractor agree as follows:

This Amendment No. 1 to Form of Contract is effective as of the _18_ day of February, 2026, between the County and **Summit Fire & Security**, who agree that all Services specified will be performed in accordance with this Amendment No. 1 to Form of Contract and the Contract Documents.

1. **SCOPE OF WORK TO BE PERFORMED:** Close out of final payment due. To furnish all labor, materials, tools, equipment and appurtenances necessary to provide on-site fire extinguisher testing and maintenance services for Fulton County facilities.

2. **COMPENSATION:** The services described under Scope of Work herein shall be performed by Contractor for a total amount not to exceed **$10,582.20** (Ten

Thousand Five Hundred Eighty-Two Dollars and Twenty Cents).

3. **LIABILITY OF COUNTY:** This Amendment No. 1 to Form of Contract shall not become binding on the County and the County shall incur no liability upon same until such agreement has been executed by the Chair to the Commission, attested to by the Clerk to the Commission and delivered to Contractor.

4. **EFFECT OF AMENDMENT NO. _1_ TO FORM OF CONTRACT:** Except as modified by this Amendment No. _1_ to Form of Contract, the Contract, and all Contract Documents, remain in full force and effect.

[INTENTIONALLY LEFT BLANK]

IN WITNESS THEREOF, the Parties hereto have caused this Contract to be executed by their duly authorized representatives as attested and witnessed and their corporate seals to be hereunto affixed as of the day and year date first above written.

OWNER:

FULTON COUNTY, GEORGIA

Robert L. Pitts, Chairman
Fulton County Board of Commissioners

ATTEST:

Tonya R. Grier
Clerk to the Commission

(Affix County Seal)

APPROVED AS TO FORM:

Office of the County Attorney

APPROVED AS TO CONTENT:

Joseph N. Davis, Director
Department of Real Estate and Asset Management

CONSULTANT:

SUMMIT FIRE & SECURITY

James Taylor,
Manager

ITEM#:_____ RCS:_____ **RECESS MEETING**	**ITEM#:_____ RM:_____** **REGULAR MEETING**

Invoice #	Location	Invoice Date	Balance
2363816	Northside Branch Main Bldg	11/12/25	$139.00
2486063	N. Fulton Service Ctr Main	11/13/25	$244.05
2495935	10 Park Place	11/13/25	$124.20
2547614	N Spruill Oaks Branch M	11/17/25	$141.40
2547719	N'Hood Union Health Ctr Main	11/18/25	$149.25
2715703	Southeast Library	11/18/25	$230.70
2715914	Metropolitan Library	11/18/25	$89.55
2722883	New Horizons N'Hood Sr. Ctr	11/21/25	$395.00
2722889	Dogwood N'Hood Sr. Ctr Main	11/22/25	$120.75
2723797	Harriett Darnellsr Multi Pur	11/22/25	$749.45
2725358	Jail Intake Office	11/22/25	$166.45
2729520	SE N'hood Sr Ctr Main	11/22/25	$74.70
2732873	Auburn N'hood Sr Ctr Main Bl	11/22/25	$300.20
2732899	Roswell N'Hood Sr. Ctr Main	11/26/25	$472.35
2915430	Bowden Sr Multi Purpo	11/26/25	$441.00
2915436	Hapeville N'Hood Sr Ctr	11/28/25	$69.00
2915505	Central Maintenance Facility	11/28/25	$25.50
2915534	Bowden Sr Multi Purpo	12/2/25	$80.15
2915552	North Fulton Training Center	12/2/25	$135.00
2915657	Hapeville N'Hood Sr Ctr	12/2/25	$11.10
3126335	Clubhouse For Youth Main	12/4/25	$28.30
3189701	Roswell N'Hood Sr. Ctr Main	12/4/25	$198.00
3190103	Dorothy Benson Sr. Multi-Pur	12/4/25	$11.60
3190110	Bowden Sr Multi Purpo	12/4/25	$491.00
3190836	New Horizons N'Hood Sr. Ctr	12/7/25	$198.00
3190839	Dogwood N'Hood Sr. Ctr Main	12/8/25	$1,709.05
3190841	Oak Hill Child&Adol/Ivan All	12/12/25	$601.25
3190853	Central Training Ctr Main Bl	12/17/25	$117.95
3194101	Harriett Darnellsr Multi Pur	12/18/25	$631.00
3194943	Palmetto N'Hood Comm Ctr	12/19/25	$94.50
3195026	Tom Lowe Skeet Range	12/19/25	$377.00
3195031	New Beginnings N'Hood Sr. Ct	12/19/25	$449.00
3195034	Camp Truitt N'Hood Sr Ctr	12/19/25	$424.15
3195059	Quality Living Bldg/Pavillion	12/22/25	$295.90
3195062	Palmetto N'Hood Comm Ctr	12/29/25	$293.50
3448168	N. Fulton Service Ctr Main	12/29/25	$12.70
3563340	Government Ctr Assembly	12/29/25	$490.50
			$10,582.20

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0093 **Meeting Date:** 2/18/2026

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Presentation of Proclamations and Certificates.

Proclamation recognizing “Government Communicators Appreciation Day.” **(Pitts/BOC)**

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0095 **Meeting Date:** 2/18/2026

Department
County Manager

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Presentation of the Fulton County Operational Report.

Requirement for Board Action *(Cite specific Board policy, statute or code requirement)*

Strategic Priority Area related to this item *(If yes, note strategic priority area below)*
Open and Responsible Government

Commission Districts Affected

All Districts	☒
District 1	☐
District 2	☐
District 3	☐
District 4	☐
District 5	☐
District 6	☐

Is this a purchasing item?
No



Fulton County Operational Report

February 18, 2026

Board of Commissioners Meeting

AGENDA

Justice

- Justice System
- Jail Facilities

Focus Areas

- Tax Assessment Process
- Animal Shelter and Field Services
- Strategic Plan Schedule
- Warming Centers

Finance and Purchasing

- ARPA Reporting
- Monthly Financials
- Emergency and County Manager Contracts

Justice System Update



FULTON COUNTY GOVERNMENT

Justice System Update

FEBRUARY 18, 2026

AGENDA

01 JUSTICE SYSTEM SCORECARD

02 JAIL POPULATION UPDATE

03 DIVERSION CENTER UTILIZATION UPDATE

JUSTICE SYSTEM SCORECARD
MONTHLY UPDATE

MEASURE	GOAL	MAY 2023 BASELINE	DECEMBER 2025	JANUARY 2026	DELTA *(previous month vs. current month)*
Average Length of Stay	30 days	71 days	45 days	37 days	8 day decrease
Jail Population Unindicted without other charges	10%	34%	17%	15%	2% decrease
Clearance Rate for Felony Criminal Cases	100%	72%	82%	177%	95% increase
Felony Cases Disposed within 180 Days	90%	25%	36%	37%	1% increase
Felony Cases Disposed within 365 Days	98%	63%	62%	59%	3% decrease

Average length of stay calculated only after individuals have been booked out of the jail and does not include currently incarcerated inmates



FULTON COUNTY GOVERNMENT

Justice System Update

FEBRUARY 18, 2026

AGENDA

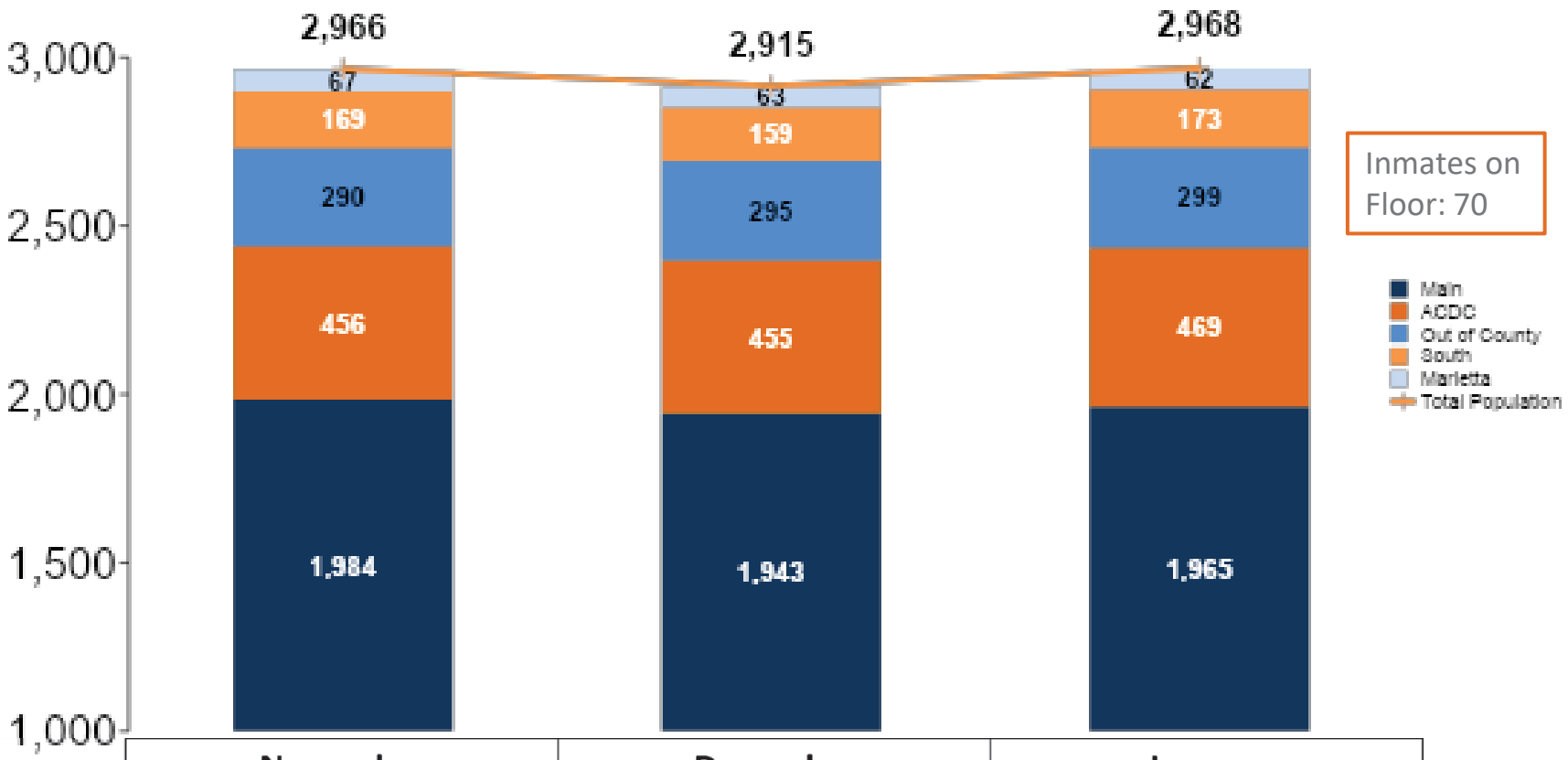
01 JUSTICE SYSTEM SCORECARD

02 JAIL POPULATION UPDATE

03 DIVERSION CENTER UTILIZATION UPDATE

AVERAGE MONTHLY POPULATION

2,939
as of 2/11/2026



	November	December	January
Book In	1747	1836	1852
Book Out	1809	1834	1790
Net	62	-2	-62

AVERAGE MONTHLY JAIL POPULATION

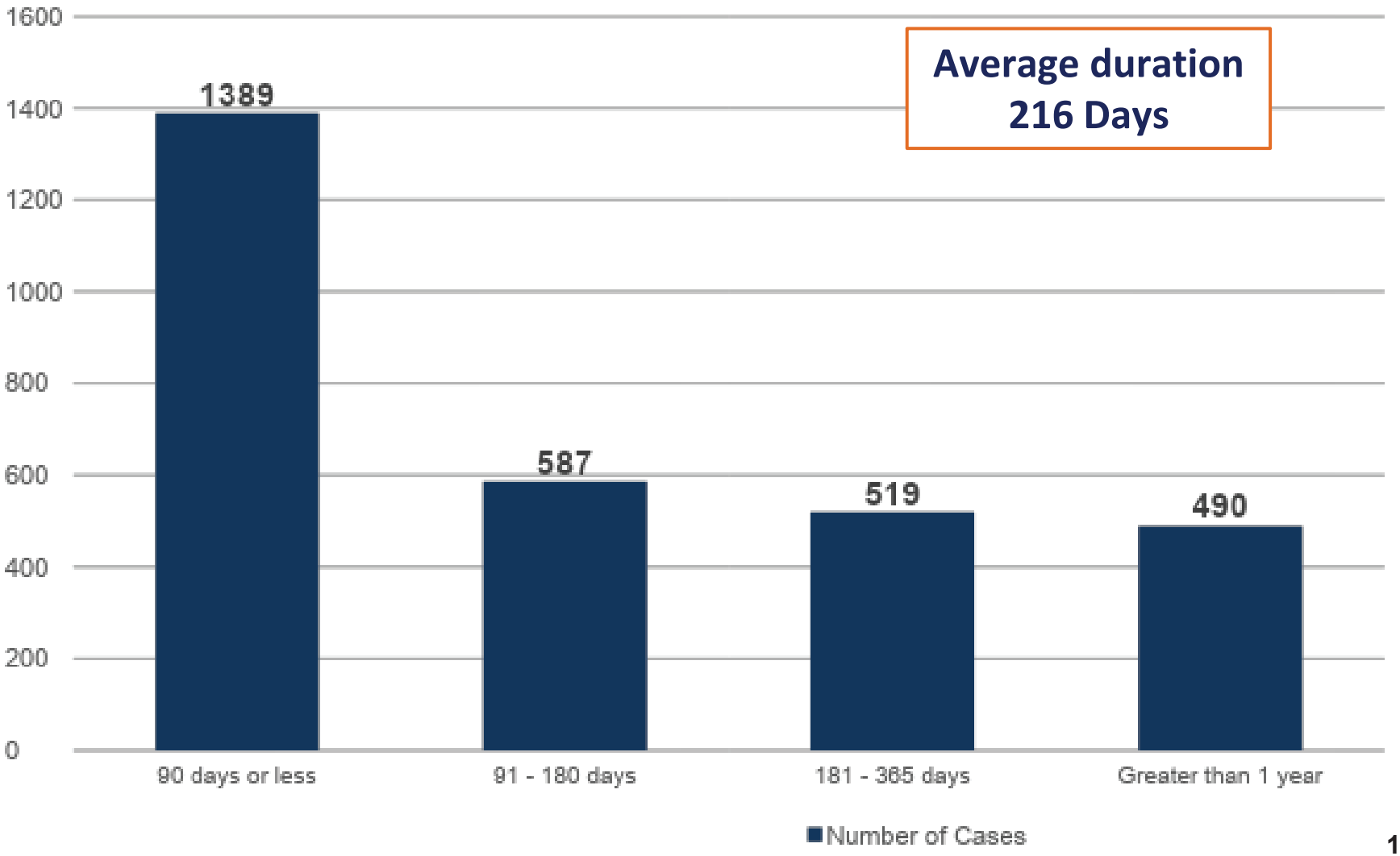
POPULATION BY FACILITY

Inmates on Floor: **70**

	NOVEMBER	DECEMBER	JANUARY	2/11/2026
Main	1,984	1,943	1,965	1,959
ACDC	456	455	469	451
Out of County	290	295	299	294
South Annex	169	159	173	175
Marietta Annex	67	63	62	60
TOTAL	2,966	2,915	2,968	2,939

LENGTH OF STAY FOR CURRENTLY INCARCERATED

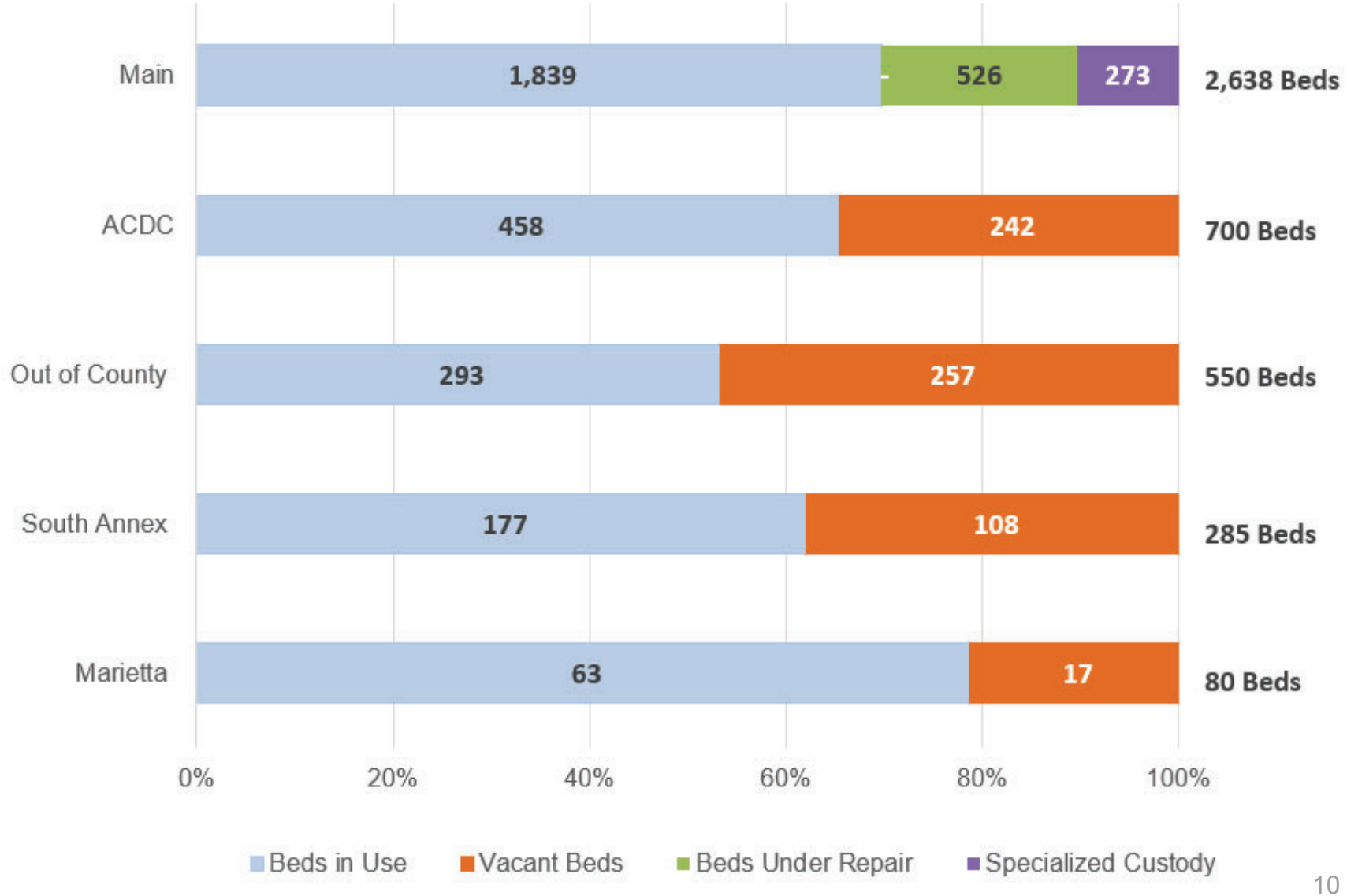
INMATES IN JAIL AS OF 2/1/2026



JAIL POPULATION
FACILITY UTILIZATION AS OF 2/09/2026

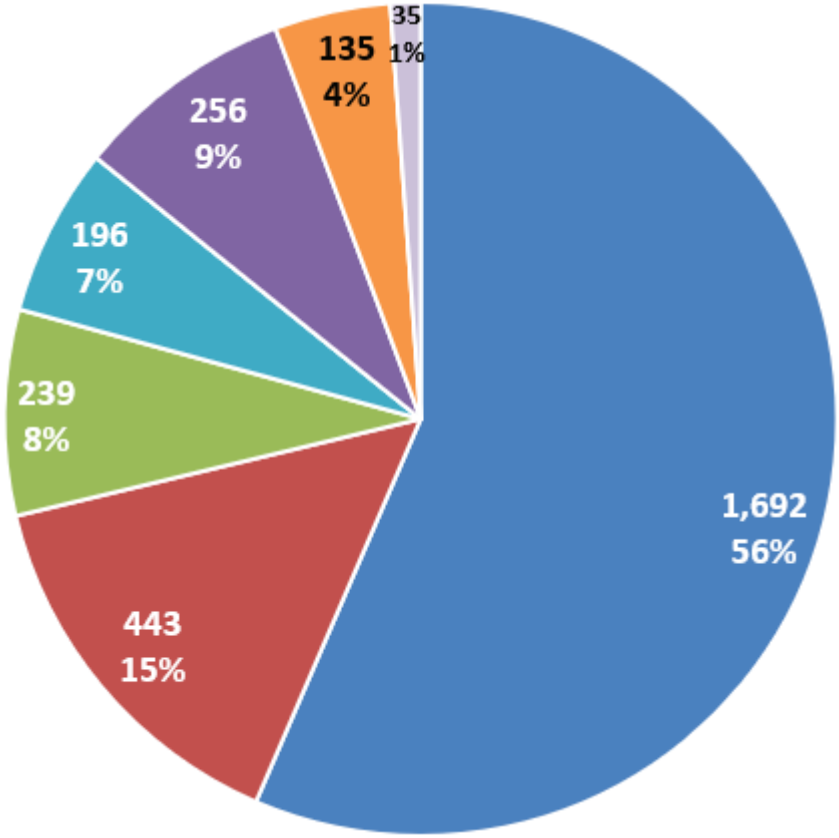
Specialized Custody: inmate classification, competency, discipline, protective custody

FULTON COUNTY



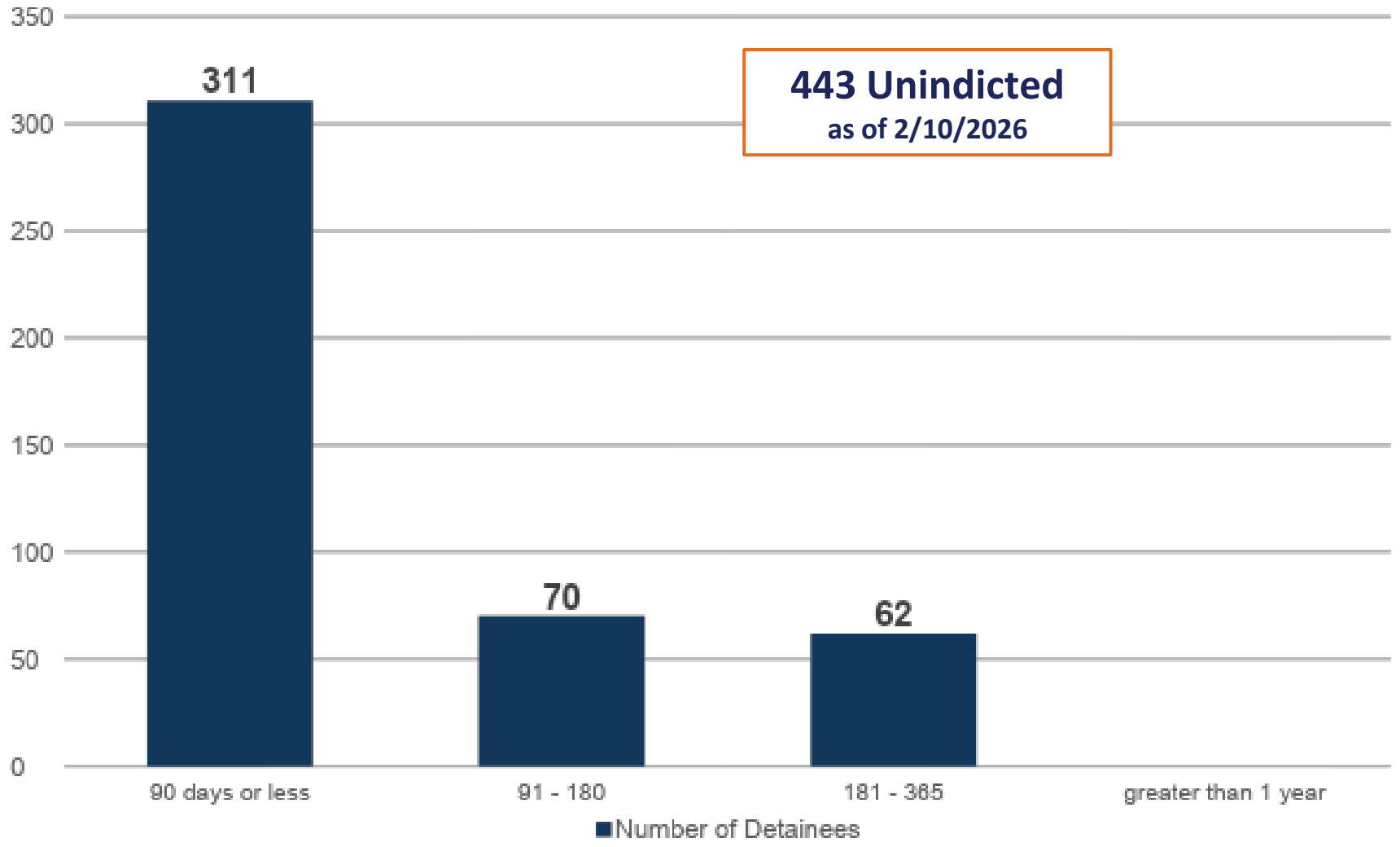
JAIL POPULATION
FULL INMATE ANALYSIS AS OF 2/10/2026

Status	Number of Inmates	
Unindicted	443	15%
Unaccused	35	1%
Indicted	1,692	56%
Accused	239	8%
Accused and Indicted	256	9%
Serving Sentence/CPO	135	4%
Other Hold Condition	196	7%
TOTAL	**2,996**	**100%**



UNINDICTED JAIL POPULATION

DAYS IN JAIL AS OF 2/10/2026

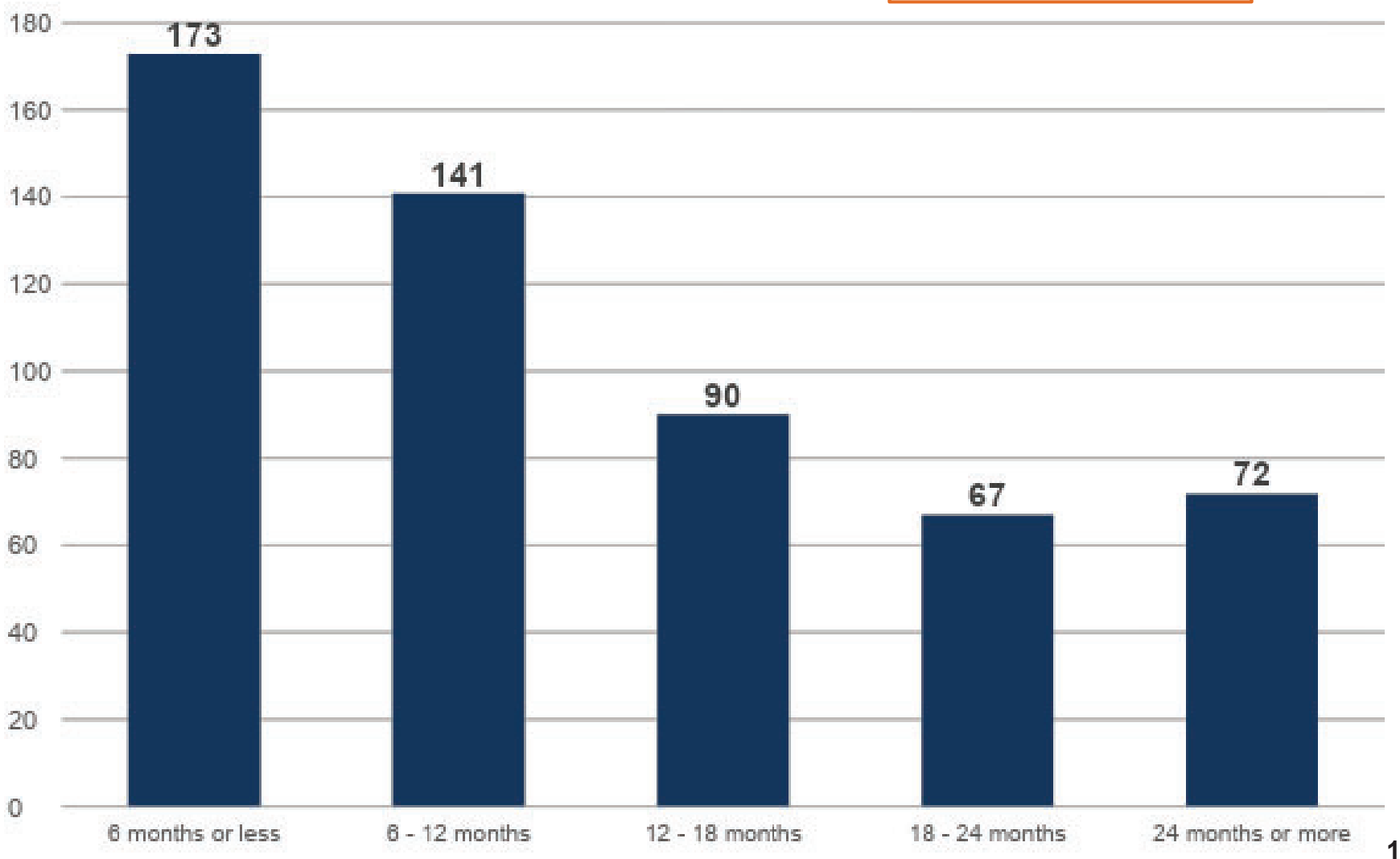


Excludes detainees with pending indicted cases and holds (Probation Violations, Failure to Appears and foreign and/or other agency holds)

ELECTRONIC MONITORING UPDATE

MONTHS ON MONITOR AS OF 2/02/2026

543 Participants
as of 2/2/2026



ELECTRONIC MONITORING UPDATE
6 MONTH ROLLING PARTICIPATION

	6 months or less	6 – 12 months	12 – 18 months	18 – 24 months	Greater than 24 months	TOTAL	% less than 1 year	% greater than 1 year
JAN 2026	173	141	90	67	72	**543**	58%	42%
DEC 2025	169	143	90	66	71	**539**	58%	42%
NOV 2025	160	140	91	53	70	**514**	58%	42%
OCT 2025	167	179	123	31	72	**572**	60%	40%
SEP 2025	181	204	143	38	76	**642**	60%	40%
AUG 2025	196	198	134	51	64	**643**	61%	39%



FULTON COUNTY GOVERNMENT

Justice System Update

FEBRUARY 18, 2026

AGENDA

01 JUSTICE SYSTEM SCORECARD

02 JAIL POPULATION UPDATE

03 DIVERSION CENTER UTILIZATION UPDATE

DIVERSIONS AND SERVICES

MONTH OF JANUARY AS OF 1/31/2026

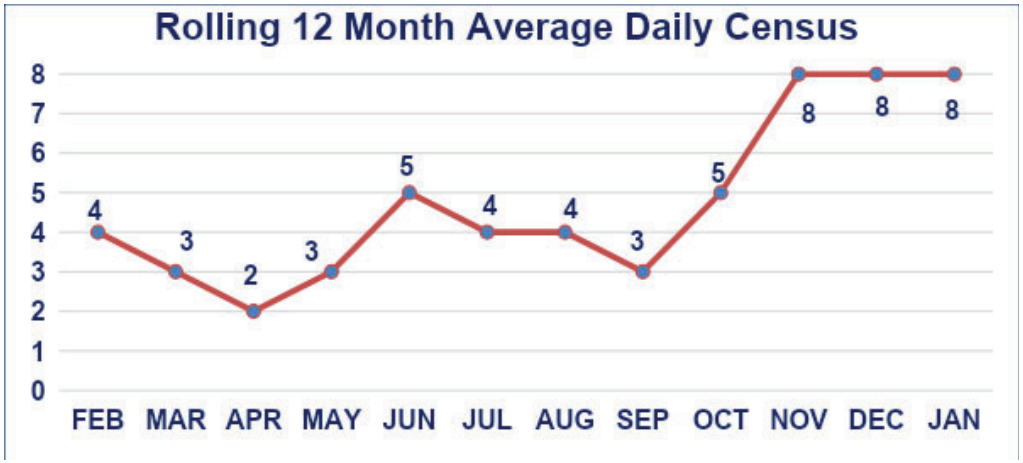
Jurisdiction	Number of Diversions	
Atlanta	151	62%
MARTA	46	19%
Atlanta Airport	19	8%
Fulton Co. Police Dept.	11	5%
Georgia Tech	4	2%
South Fulton	3	1%
Morehouse	2	1%
Sandy Springs	1	<1%
Hapeville	1	<1%
Fairburn	1	<1%
Georgia State	1	<1%
GWCC	1	<1%
TOTAL	**243**	**100%**

Charges	Number of Diversions	
Criminal Trespass	138	57%
Loitering	29	12%
Pedestrian Related	13	5%
Disorderly Conduct	11	5%
Shoplifting	11	5%
Urban Camping	11	5%
Public Indecency	8	3%
Violence Related	4	2%
Prop Destruction	3	1%
Def/Urin in Public	1	<1%
Littering	1	<1%
Soliciting Money	1	<1%
TOTAL	**243**	**100%**

Connected Services	Count	
Housing	152	26%
Mental Health Care	136	23%
Transportation	99	17%
Food/Clothing	75	13%
Substance Abuse Prgm.	42	7%
Medications	38	7%
Income Support	27	5%
Health Care	14	2%
TOTAL	**583**	**100%**

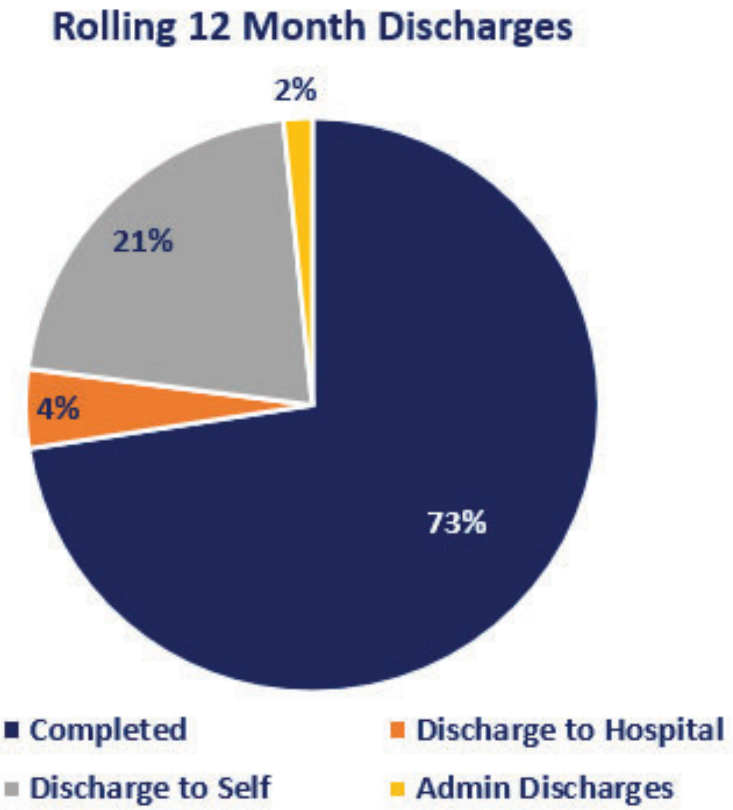
2026 DIVERSIONS

DIVERSIONS AND DISCHARGES AS OF 1/31/2026





Total Diversions
1,757

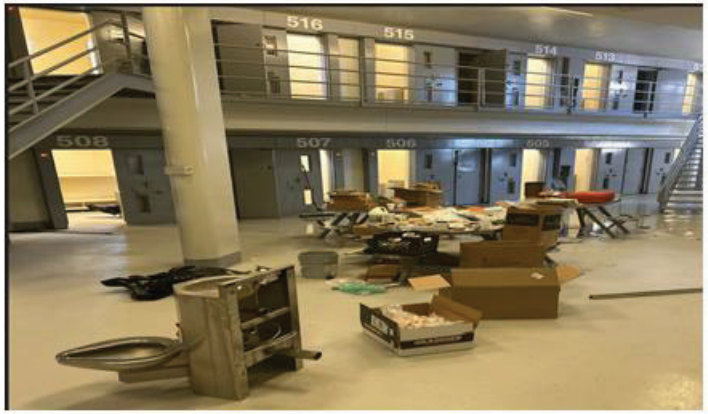


QUESTIONS

Jail Blitz Plan

Jail Maintenance Blitz







- **Overall Blitz Project Update**
  - **10** of **11** housing units completed = **91%**
  - **7 South** completed on November 27, 2025
  - **7 North Zone 600**: Fire on 12/12/2025 requires major mechanical and aesthetic remediation. Smoke damaged zones (100-500) have been remediated.
  - Current blitz areas: **3 South**
    - 3 South critical for housing residents requiring physical and behavioral health concerns.
    - **Projected Completion: January 30, 2026**
- **6 North** & **6 South** will begin in Q1 2026

Jail Maintenance - Bed Availability

- Beds out of service due to active/scheduled repairs

Location	# of Beds
3 South *(active blitz)*	204
3 North	2
4 North	2
4 South	36
6 South *(scheduled blitz)*	69
6 North *(scheduled blitz)*	53
7 North	*32 (198)*
TOTAL	**398/564***

- 7 North total reflects only zone 600 (fire) as 5 of 6 zones available for use.



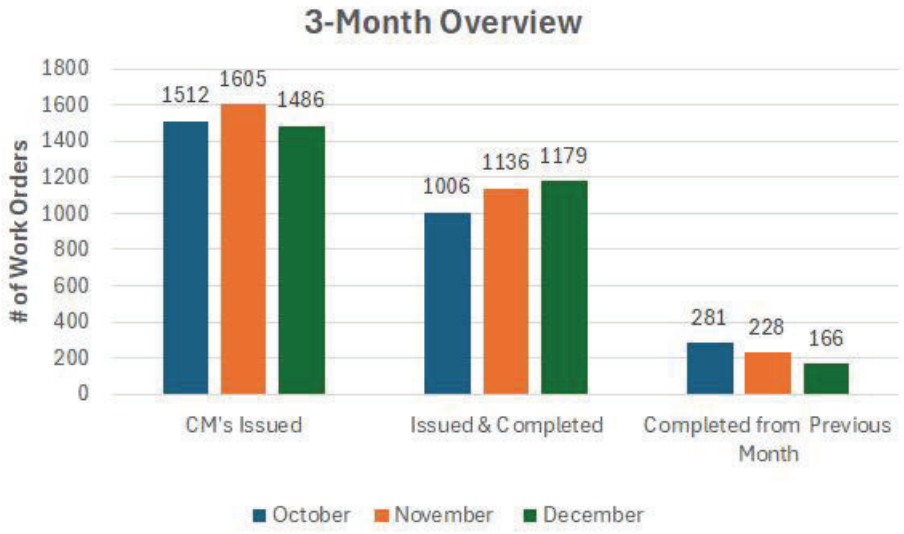


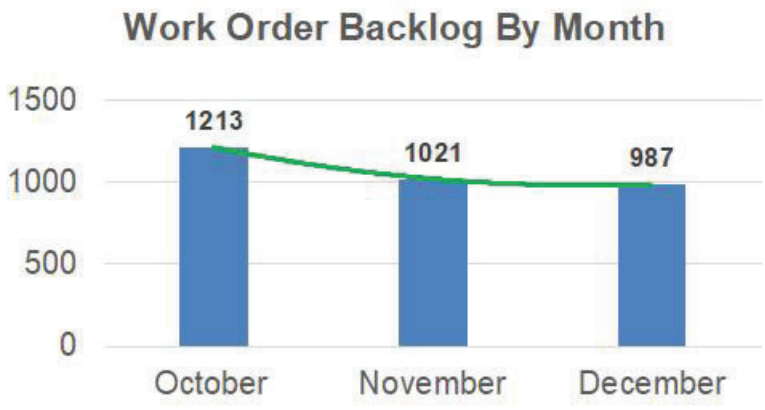
Jail Maintenance Performance

Thru 1/13/2026

- **Corrective Maintenance (Dec. 2025)**
  - **1,179** of **1,486** issued & completed: **79%**
  - **166 December** CM WO's completed in **Jan** = **90%**
  - **1,513** total work orders completed in December
- **Preventive Maintenance (Dec. 2025)**
  - **327** of **368** PM's scheduled & completed: **89%**
- **Open Work Orders > 30 days = 987**
  - Upcoming blitz areas: **510**
  - Blitz areas require units to be unoccupied







Immediate Repairs Update

- **BOC approved $3.2M for several critical repairs/upgrades**

DESCRIPTION	COST	STATUS
Fire Alarm Upgrade	$723,865	**Primary Fire Panel Upgrade Completed:** 8/4/2025. 2nd phase to address field devices began on 9/29/2025. Phase 2 completion projected: Apri 2026.
Padded Cells @ South Annex	$260,000	**Completed** 1/17/2025.
Kitchen Equipment Replacement	$212,302	**Completed** 6/11/2025
Laundry Equipment Replacement	$346,657	Two (2) new washers ordered and will be installed by 1/26/2026.
Elevator Modernization	$1,652,000	Solicitation advertised. Bid closed on December 4th. Currently in evaluation.
TOTAL	**$3,194,824**	

QUESTIONS

Tax Assessment Process

Progress on Assessment Process

Target Date of April 20, 2026 to get the Tax Digest files to the Tax Commissioner's Office

- **Appeals**
  - **Processing of appeals**
- **Deed Processing**
  - **Timely processing of recorded deeds to maintain accurate ownership records**
- **Parcel Creation and Maintenance**
  - **Creation of new parcels (land packages)**

FULTON COUNTY

Progress on Assessment Process

- **Homestead Administration**
  - **Filings deadline - April 1**
    - **Processing and verification of homestead filings**
      - **Any homeowner, regardless of age, that does not currently have a homestead exemption in place for their primary, owner-occupied residence**
      - **Homeowners who may qualify for other income-based senior exemptions**

FULTON COUNTY

Progress on Assessment Process

- **Automatic Application of New Exemptions (No Action Required)**
  - **Atlanta Public Schools and Fulton County School District**
  - **Proactive relief for qualifying taxpayers**
  - **In alignment with DeKalb County which also administers homestead filings for the City of Atlanta**
- **Communications Efforts**
  - **Website updates, public outreach, and internal staff training for consistent messaging**
  - **Postcard mailing**

FULTON COUNTY

Progress on Assessment Process

- **Market Analysis**
  - **Review of sales data and market trends**
- **Permitted Activity**
  - **Review of building permits**
- **Final Assessment Development**
  - **Preparation of Annual Notices of Assessment**

FULTON COUNTY

QUESTIONS

Animal Shelter and Field Services

Animal Shelter Population

KPI for Kennel Usage as of 2/12/26

In Shelter Daily Dog Kennel Usage Inventory

Total Count of In-Shelter Dogs

Measuring

396
Dogs

as of today

Total Count of Kennels Occupied by Dogs

Measuring

380
Kennels

as of today

Count of Open Green/Yellow Spaces

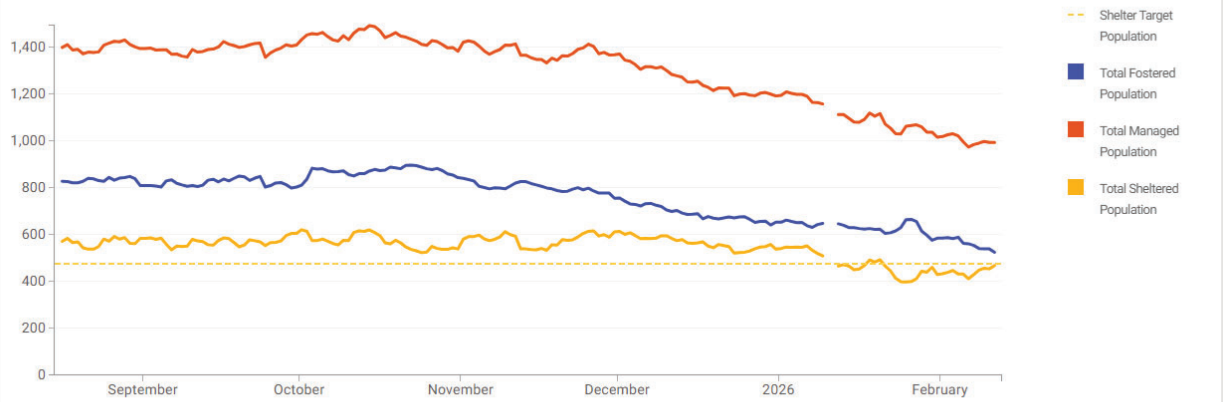
Measuring

30
Spaces

as of today

Total Managed, Sheltered, and Fostered Population per Day

Last 180 Days



FULTON COUNTY

Intake and Adoptions

Total Intakes Per Month

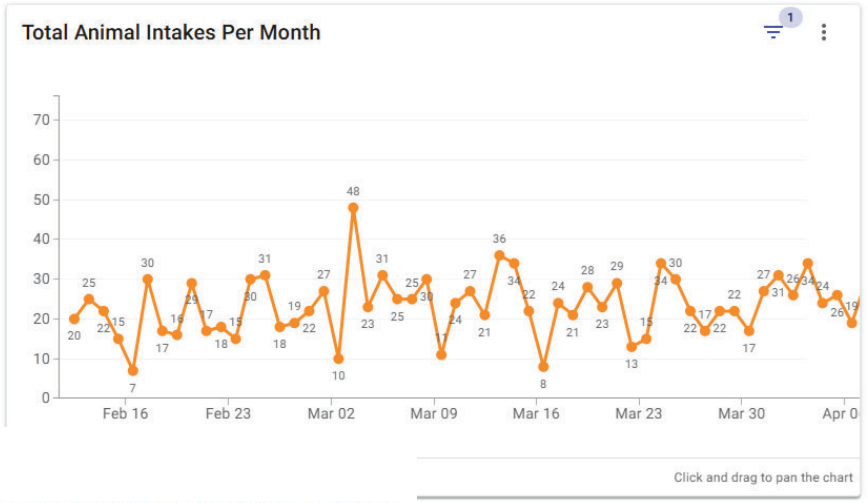
This line graph shows the total number of animal intakes that Lifeline is processing each month. This trend line demonstrates the trends month over month that affect the total animal shelter population.

Total Intakes, Last Quarter

Measuring

2,791

10/1/25 - 12/31/25



Adoption Outcomes Details

By choosing to adopt from an animal shelter citizens give a second chance to a deserving pet and contribute to the welfare of animals that are in need. But it's not only the deep sense of fulfillment that comes from giving a home to an animal in need. but the happiness and bond between a shelter pet and its adopter is truly special.

Adoptions Quarterly Count

Adoption Outcomes, Last Quarter

Measuring

1,641

10/1/25 - 12/31/25

Adoptions Monthly Count

Adoption Outcomes, Monthly

Measuring

502

1/1/26 - 1/31/26

Adoptions Weekly Count

Adoption Outcomes, Weekly

Measuring

138

2/2/26 - 2/8/26

FULTON COUNTY

Facility Updates

- Play Yard Drainage
- Construction of two offices
- Trailer for the Field Services Staff
- Conex Storage Containers and Concrete Slab



FULTON COUNTY

Field Services Updates

Total Number of Calls this Year

Measuring

1,320
calls

1/1/26 to today

Total Number of Calls in the Last Quarter

Measuring

4,120
calls

10/1/25 - 12/31/25

Total Number of Calls in the Last Month

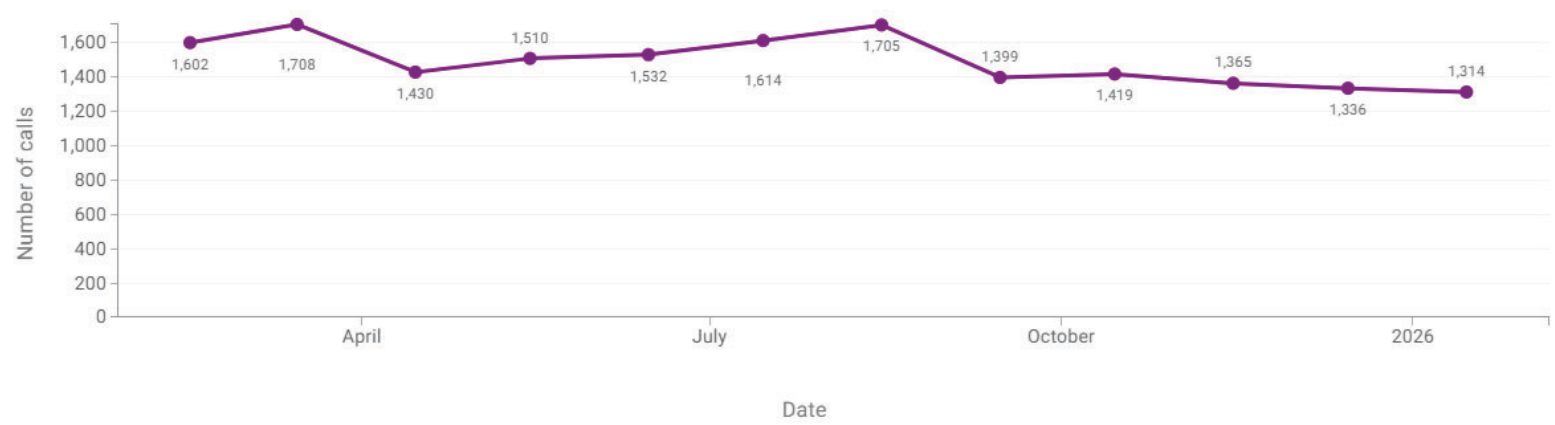
Measuring

1,314
calls

1/1/26 - 1/31/26

Monthly Animal Services Calls Trends

Last 12 Months



FULTON COUNTY

Field Services Response Times

This data is not available for this report

Staff is currently working on updates to the reporting system due to upgrade to the systems and changes in the coding and classification of call types that will provide more accurate reporting



FULTON COUNTY

Animal Welfare Board Recommendation

- **Staff is proposing changes to the code to limit the role of the Animal Welfare Board to community/public input and fundraising**
  - Staff is working with the County Attorney's Office to draft the necessary changes for a March BOC meeting.
  - Limited staff time and County resources need to remain focused on legally mandated and higher-risk responsibilities,
    - Legal representation,
    - Dangerous Dog Hearings
    - Enforcement-related proceedings that directly impact public safety and due process.
  - The Board has also experienced vacancies, resignations, inconsistent attendance

FULTON COUNTY

Strategic Plan Schedule

Alignment with Service Delivery Strategy

Proposing to bring a final plan back once the Service Delivery Strategy and Public Input are finalized

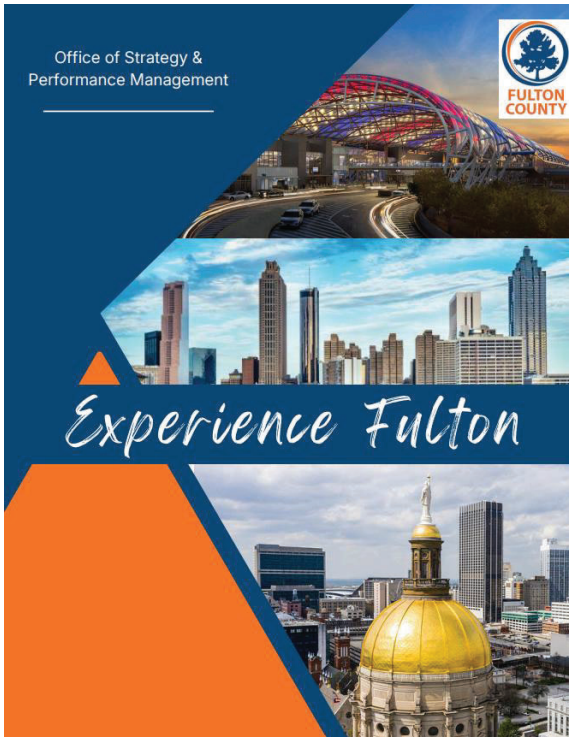
- Recently got notice that the legal issues have been resolved
- Requires the approval by the Department of Community Affairs (DCA) by December 31, 2026
- Highly structured process for producing required updates and documents for a Service Delivery Strategy (SDS)
- County Manager and the County Attorney's Office are coordinating on a plan to work with the cites to finalize a plan
- Need to allow for time to schedule series of meeting with the cities to complete the Service Delivery Strategies
- Need to submit to DCA and receive approval by January 1, 2027, or sanctions could start

FULTON COUNTY

Schedule Update

Finalize the Strategic Plan by November 2026 to align with Service Delivery Strategy Plan (SDS)

- Allows for any updates to strategies base on the SDS negotiations
- Allow staff the time to receive public input on the plan
- Ensure alignment and the strengthening of Key Performance Indicators (KPI's) for all departments/agencies



FULTON COUNTY

QUESTIONS

Warming Centers

Warming Center Policy Recommendation

Recommended Policy on Extreme Weather Response Coordination (Warming & Cooling Centers) during a declared emergency

I. Policy Statement

The Fulton County Board of Commissioners recognizes the importance of protecting residents during extreme cold and extreme heat events, particularly people experiencing homelessness, seniors, and medically vulnerable individuals during a declared emergency.

The County supports a coordinated approach to extreme weather response that engages municipalities and community partners consistent with Georgia's emergency management framework and federal Continuum of Care (CoC) guidance.

FULTON COUNTY

Warming Center Policy Recommendation

II. Purpose

The purpose of this policy is to:

· Clarify the County's governance and coordination role in extreme weather response during a declared emergency

· Authorize a standardized verification and coordination process

· Support the identification of gaps

· Define the County's role as one of coordination, rather than as a default operator, of warming and cooling centers

FULTON COUNTY

Warming Center Policy Recommendation

III. Scope of Authority

1. County Emergency Management Framework

Fulton County Emergency Management provides countywide coordination, situational awareness, resource support pathways, and information synchronization to support municipal-led operations. Municipalities retain authority for operational decisions and facility operations within their jurisdictions, including the operation of warming and cooling centers.

2. Discretionary Protective Actions

The Board acknowledges that warming and cooling centers are discretionary protective actions, activated based on prevailing conditions, capacity, and intergovernmental coordination, and not automatically assigned as a County operated function.

3. Federal Alignment

This policy aligns with HUD and Continuum of Care guidance emphasizing planning, coordination, and system readiness, rather than default County-operated facilities.

FULTON COUNTY

Warming Center Policy Recommendation

IV. County Role

Under this policy, Fulton County's role during extreme weather events is to:

- Verify municipal and partner response status
- Coordinate with municipalities, Community Service Program grantees and CoC partners
- Support access to services, including transportation and logistics where feasible
- Publish warming/cooling center locations and hours of operation on County communications platforms
- Identify and document gaps in coverage
- Recommend response options to County leadership

This policy does not establish Fulton County as the default operator of warming or cooling centers.

FULTON COUNTY

Warming Center Policy Recommendation

V. Authorization of SOP

The Board hereby authorizes the County Manager and the Director of Emergency Management to:

- Develop, maintain, and implement a Standard Operating Procedure (SOP) for extreme weather response during a declared emergency
- Utilize a verification checklist and gap assessment process to guide decision-making
- Activate partner coordination and support mechanisms as appropriate
- Escalate recommendations for County operational involvement only when conditions warrant and leadership authorization is obtained

The SOP shall be operational in nature and may be updated administratively without further Board action.

FULTON COUNTY

Warming Center Policy Recommendation

VI. Oversight and Accountability

- Emergency Management shall brief County leadership on verification findings and actions taken during emergency weather events
- The SOP and policy implementation shall be reviewed periodically and after major extreme weather events
- Updates may be recommended to the Board as needed

VII. Effective Date

This policy shall take effect immediately upon adoption.

FULTON COUNTY

QUESTIONS

Finance and Purchasing

COVID 19 Reserve & ARPA Spend Update

ARPA Reporting

Fulton County Government
American Rescue Plan Report as of 2/11/2026

Project/Initiative	Budget Amount	Approved by the BOC	Contracted (Y/N)	Encumbrance	Expenditure	Difference	Comment	Active or Closed
Behavioral Health Crisis Center	16.1	Yes	Yes	0.0	16.07	-	Remaining purchase orders of $38.2k	Active
Developmental Disabilities Training Center	5.3	Yes	Yes	0.0	5.25	-	In progress	Active
Infrastructure Modernization (141 Pryor)	31.6	Yes	Yes	11.0	20.53	-	In progress	Active
Court Backlog Project - ORCA	79.3	Yes	Yes	0.0	79.24	(0.0)	Remaining purchase orders for services performed through 12/31/24 for Superior Court	Closed
Fulton Fresh 2025 and 2026	0.4	Yes	Yes	0.4	-	-	Project encumbered.	Active
Living Assistance	0.5	Yes	Yes	0.5	-	-	Project encumbered.	Active
Tiny Homes	1.5	Yes	Yes	-	1.50	-	In progress	Active
IT Virtual Support -Cloud Based ERP	9.7	Yes	Yes	4.2	5.44	-	In progress	Active
IT Virtual Support - Cybersecurity Betterment	1.7	Yes	Yes	-	1.73	-	In progress	Active

FULTON COUNTY

Financial/Performance Measures Update

Monthly Financial Report

General Fund Expenditure Analysis 2025 vs 2026 -January

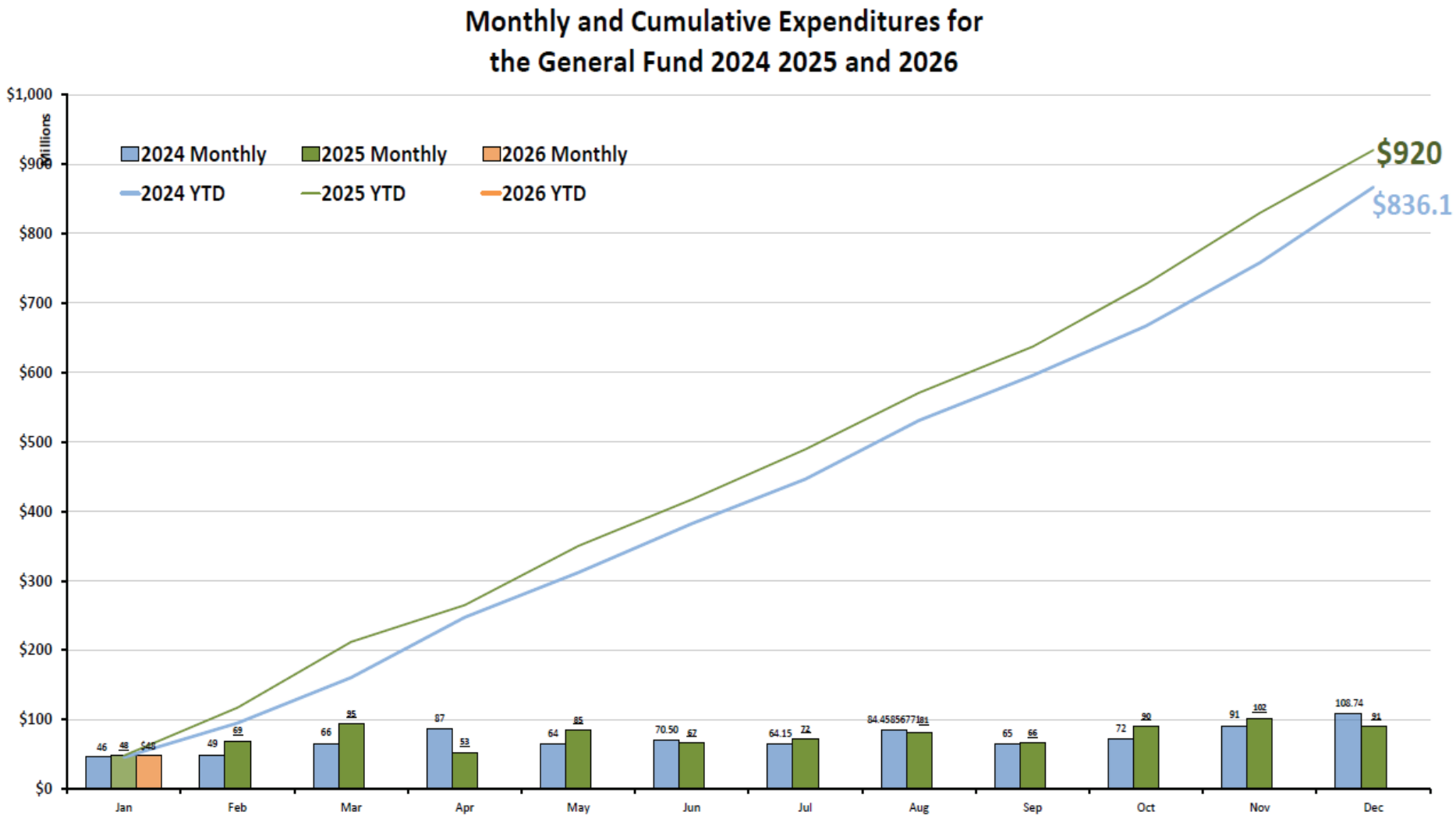
		2025			2026			
		A	B	A/B	C	D	C/D	(C/D)-(A/B)
Department		YTD 2025 Exp	2025 -Budget	%	YTD 2026 Exp	2026 Budget	%	% Change
Arts & Culture	181	$ 237,168	$ 6,090,899	4%	$ 247,718	$ 7,406,499	3%	-1%
Behavioral Health	755	$ 282,088	$ 19,655,052	1%	$ 344,034	$ 23,262,936	1%	0%
Board of Health	750	$ 47,899	$ 11,050,000	0%	$ 46,116	$ 10,936,058	0%	0%
Child Attorney	237	$ 295,492	$ 3,930,086	8%	$ 271,743	$ 3,902,851	7%	-1%
Commission Districts	101	345,284	5,065,339	7%	$ 321,751	$ 5,282,910	6%	-1%
Community Development	121	225,148	10,405,955	2%	$ 228,481	$ 10,375,306	2%	0%
County Attorney	235	465,591	5,587,092	8%	$ 460,790	$ 5,529,481	8%	0%
County Comm Clerk	110	221,850	1,398,473	16%	$ 230,066	$ 1,389,001	17%	1%
County Manager	118	291,081	4,275,412	7%	$ 285,702	$ 4,355,948	7%	0%
County Marshal	419	571,562	8,128,058	7%	$ 573,354	$ 8,237,763	7%	0%
District Attorney	480	2,615,673	39,354,311	7%	$ 2,804,487	$ 39,369,619	7%	0%
Diversity and Civil Rights	186	87,262	1,675,883	5%	$ 123,486	$ 1,885,671	7%	1%
DREAM	520	2,336,200	45,649,766	5%	$ 2,533,611	$ 48,136,728	5%	0%
Economic Development	120	117,763	1,524,606	8%	$ 73,242	$ 1,509,965	5%	-3%
Emergency Management	335	103,391	2,140,674	5%	$ 99,413	$ 2,345,016	4%	-1%
Emergency Services	333	126,739	3,478,261	4%	$ 88,818	$ 3,852,073	2%	-1%
External Affairs	130	171,378	2,985,602	6%	$ 165,966	$ 2,980,883	6%	0%
Family & Children's Services	620	22,105	1,684,840	1%	$ 22,105	$ 1,667,467	1%	0%
Finance	210	522,910	8,383,491	6%	$ 488,321	$ 8,197,500	6%	0%
Grady Hospital	730	516,545	51,535,540	1%	$ 515,603	$ 52,537,909	1%	0%
HIV Elimination	270	11,158	179,910	6%	$ 2,328	$ 178,055	1%	-5%
Human Resources	215	407,889	6,270,385	7%	$ 383,290	$ 6,018,456	6%	0%
Information Technology	220	1,443,139	43,727,572	3%	$ 1,267,587	$ 48,707,625	3%	-1%
Juvenile Court	405	1,320,466	18,150,397	7%	$ 1,251,204	$ 18,720,904	7%	-1%
Library	650	1,943,638	31,557,685	6%	$ 1,975,548	$ 32,469,665	6%	0%
Magistrate Court	422	394,086	5,161,258	8%	$ 343,709	$ 6,126,928	6%	-2%
Medical Examiner	340	460,190	6,586,101	7%	$ 565,880	$ 6,809,431	8%	1%
Non-Agency	999	9,413,041	249,159,911	4%	$ 10,265,234	$ 276,062,253	4%	0%
Office of the County Auditor	119	104,279	1,633,708	6%	$ 117,608	$ 1,628,766	7%	1%
Police	320	997,625	14,047,164	7%	$ 1,112,979	$ 14,789,739	8%	0%
Probate Court	410	494,660	6,482,323	8%	$ 488,896	$ 6,399,635	8%	0%
Public Defender	490	2,225,860	27,547,416	8%	$ 1,961,191	$ 28,395,566	7%	-1%
Public Works	540	41,667	500,000	8%	$ 41,237	$ 494,844	8%	0%
Purchasing	230	329,341	5,130,323	6%	$ 325,527	$ 5,109,393	6%	0%
Regis & Elect	265	358,592	22,408,078	2%	$ 342,305	$ 32,061,069	1%	-1%
Senior Services	183	1,725,798	30,286,934	6%	$ 1,127,227	$ 31,395,506	4%	-2%
Sheriff	330	7,277,595	153,787,661	5%	$ 7,694,451	$ 156,663,989	5%	0%
State Court-All Judges	421	516,622	7,181,411	7%	$ 526,531	$ 8,487,876	6%	-1%
State Court-General	420	653,452	9,232,810	7%	$ 559,000	$ 9,832,354	6%	-1%
State Court-Solicitor	400	949,851	13,209,975	7%	$ 992,233	$ 16,149,063	6%	-1%
Superior Court-All judges	451	759,108	10,278,927	7%	$ 720,794	$ 10,168,410	7%	0%
Superior Court-Clerk	470	2,039,199	23,526,563	9%	$ 1,681,765	$ 24,620,261	7%	-2%
Superior Court-General	450	1,897,247	26,804,150	7%	$ 1,836,589	$ 28,562,196	6%	-1%
Tax Assessor	240	1,491,967	23,022,579	6%	$ 1,354,100	$ 23,744,799	6%	-1%
Tax Commissioner	245	1,330,392	19,900,404	7%	$ 1,374,649	$ 20,342,030	7%	0%
Grand Total		$ 48,189,989	$ 989,772,985	5%	$ 48,236,668	$ 1,057,100,397	5%	-0.3%

C/D Color Legend

8% of the Year (Jan)

FULTON COUNTY

Monthly Financial Report



Monthly Financial Report

General Fund Summary

Personnel Vacancy Analysis 2026 - January- Full Time Permanent Positions

Department	FY26 YTD Expense	FY26 Budget	Personnel Count and Vacancies / Full Time Permanent 2026 Perm. Pos.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Avg. Vac.TD
Commission Districts	311,656	4,486,730	27	3												11%
County Comm Clerk	80,780	1,046,671	8	0												0%
County Manager	280,363	3,641,973	21	0												0%
County Auditor	116,117	1,501,972	9	0												0%
Community Development	224,842	3,153,693	24	0												0%
External Affairs	163,487	2,255,511	18	2												11%
Arts & Culture	235,985	2,830,088	29	0												0%
Senior Services	756,946	10,739,651	122	13												11%
Diversity and Civil Rights	116,689	1,527,336	13	0												0%
Finance	472,317	7,041,776	62	9												15%
Human Resources	351,131	4,962,004	43	3												7%
IT	1,220,588	17,738,174	120	19												16%
Purchasing	317,803	4,338,390	36	2												6%
Child Attorney	264,722	3,725,900	23	2												9%
Tax Assessor	1,286,448	17,262,411	187	16												9%
Tax Commissioner	1,298,210	16,710,411	188	6												3%
Regis & Elect	333,262	7,427,884	41	2												5%
HIV Elimination	2,328	170,055	1	0												0%
Police	538,259	7,014,287	67	6												9%
Sheriff	7,332,867	94,838,581	936	131												14%
Emergency Services	87,052	1,977,538	14	4												29%
Emergency Management	99,024	1,350,572	9	0												0%
Medical Examiner	480,313	5,902,267	44	3												7%
State Court-Solicitor	968,569	12,966,815	104	6												6%
Juvenile Court	1,218,785	17,198,862	159	14												9%
Probate Court	446,380	5,687,563	53	3												6%
County Marshal	542,507	7,362,102	72	5												7%
State Court-General	525,197	7,298,581	66	6												9%
State Court-All Judges	519,641	8,177,807	48	6												13%
Magistrate Court	334,083	5,458,544	20	2												10%
Superior Court-General	1,720,389	22,562,340	202	11												5%
Superior Court-Alljudges	699,363	9,429,343	80	2												3%
Superior Court-Clerk	1,561,626	20,396,229	206	12												6%
District Attorney	2,726,699	34,835,928	266	10												4%
Public Defender	1,934,283	25,034,077	162	2												1%
DREAM	1,119,190	16,311,149	182	25												14%
Library	1,900,175	26,267,703	292	13												4%
Behavioral Health	334,896	4,345,815	56	8												14%
Non-Agency	5,875,470	70,081,826	0	0												#DIV/0!
Economic Development	69,386	1,097,803	6	0												0%
Grand Total	$ 38,867,829	$ 516,156,362	4016	346												9%

*Vacant positions in the County's HR system as of 2/1/2026. Does not include an internal department reconciliation of positions which may include active job offers, FMLA, military leave and other off-payroll positions.

FULTON COUNTY

QUESTIONS

Monthly Emergency Purchase Orders & Monthly CM Contract Approval

EMERGENCY PURCHASE ORDERS AND CONTRACTS

FULTON COUNTY EMERGENCY PROCUREMENTS 12/9/2025 – 1/9/2026				
Date	Description of Emergency	Department/ User Agency	Contractor/Vendor Name	Amount
12/19/2025	Emergency procurement of 100 self-contained breathing apparatus units and associated equipment for the Fulton County Jail	DREAM	MES Life Safety, Inc.	$658,117.00
12/22/2025	Emergency services for the relocation of Magistrate and State Courts at the Justice Center as a result of the appointment by the Governor's Office of two (2) new State Court Judges	DREAM	Allied Commercial Services	$5,495.00
1/5/2026	Emergency Change Order * to cover the cost of services provided under the terms and conditions of the existing contract that to ensure the continuity of both routine jail maintenance service as well as the jail blitz project at the Fulton County Jail, the Jail South Annex and supporting the Jail Bridging Plan	DREAM	Johnson Controls, Inc.	$804,206.00

** This Change Order was approved by the County Manager pursuant to Purchasing Code Section 102-420(g)(2), wherein the County Manager is authorized to approve change orders due to extraordinary circumstances and the potential for the Contractor to cease providing services poses a threat to essential service delivery, life-safety and security, and require that extraordinary action be taken by the County Manager to ensure continuation of the services.*

County Manager Contract Approvals Less Than $100K

DATE	PROJECT NUMBER	CONTRACTOR/VENDOR NAME	CONTRACT PURPOSE	DEPARTMENT	AMOUNT
12/9/2025	25COOPREQ1549718B-PS	CIVITAS, LLC	Community Development Block Grant (CDBG) Consulting Services	Community Development	$38,000.00
12/9/2025	25COOPREQ1541810B-PS	CIVITAS, LLC	Continuum of Care Technical Assistance	Community Development	$66,550.00
12/12/2025	25RFQ1514537A-ST(A)	ATLANTA LUNCH BOWL EXPRESS, LLC	Food Services for Accountability Court Programs	Superior Court Administration	$30,000.00
12/12/2025	25RFQ1514537A-ST(B)	PICCADILLY HOLDINGS, LLC	Food Services for Accountability Court Programs	Superior Court Administration	$30,000.00
12/15/2025	25RFQ1514537A-ST(C)	S&S COOKIN LLC	Food Services for Accountability Court Programs	Superior Court	$30,000.00
12/15/2025	WC9999-SPD-0000136-00	CORPORATE TEMPS, INC.	Temporary Staffing Services	Community Development	$87,110.40
12/15/2025	25RFQ1532601A-ST	CULLIGAN QUENCH	Services for Drinking Water Purifier w/Reverse Osmosis	Superior Court Administration	$13,248.00
12/16/2025	25SSN1575780A-JWT	MICRO DISTRIBUTING, INC.	Live Remote Drug Testing Services	Superior Court Administration	$31,950.00
12/17/2025	25SS149097A-KM	GLOBAL VISION TECHNOLOGIES	Rapid Case Management Platform	District Attorney	$30,660.00
12/30/2025	25ITB1483477C-JH(C)	JONES WELDING & INDUSTRIAL SUPPLY, INC.	Fire Extinguisher Testing and Maintenance Services	DREAM	$15,000.00

QUESTIONS

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0096 **Meeting Date:** 2/18/2026

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*

Request approval to renew an existing contract - Department of Community Development, 25RFP1347583B-EC, Housing Rehabilitation Program in the amount not to exceed $1,002,791.54 with Meals on Wheels Atlanta Inc. (Atlanta, GA), to provide housing rehabilitation services including general program administration. The action exercises the first of two renewal options. One renewal option remains. Effective dates: April 1, 2026, through December 31, 2026.

Requirement for Board Action *(Cite specific Board policy, statute or code requirement)*

In accordance with Purchasing Code Section 102-394(6), the Purchasing Department shall present all renewal requests to the Board of Commissioners at least 90 days prior to the contract renewal date, 60 days if the contract term is six (6) months or less.

Strategic Priority Area related to this item *(If yes, note strategic priority area below)*

Health and Human Services

Commission Districts Affected

All Districts ☒
District 1 ☐
District 2 ☐
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?

Yes

Summary & Background

Approval of the contract renewal will allow Meals on Wheels of Atlanta to continue to provide housing rehabilitation services including general program administration, contractor oversight, applicant screening and qualification and project management.

The Department of Community Development (“Community Development”) contract agreement with Meals on Wheels, Inc in the amount of $860,341.54 ($647,875.54 in General Funds and $212,466 in CDBG grant funds) to deliver owner-occupied housing rehabilitation was approved by the Board of Commissioners on May 7, 2025 (Agenda Item # 25-0354). The Housing Rehabilitation Program is funded by County general funds and federal grant funds awarded to Fulton County by the U.S. Department of Housing and Urban Development (HUD). The implementing agency (Meals on Wheels) will administer the Housing Rehabilitation Program and is responsible for general program

administration, customer relations, applicant screening and qualification, project management and contractor oversight and reporting. Community Development is responsible for general oversight of the program, which includes policy oversight, compliance and community relations issues associated with the program. Housing rehabilitation is a key service outlined in Fulton County's Consolidated Plan and Annual Action Plan to support residents in need (primarily seniors).

Scope of Work: The Housing Rehabilitation Program provides a mechanism for eligible homeowners to bring their eligible houses into compliance with local codes and provide safe, decent housing for lower-income individuals. Meals on Wheels of Atlanta issues program funds to contractors that perform specified repairs to the homes of eligible homeowners.

Community Impact: Community Development, through Meals on Wheels, in 2025 repaired 43 homes for Fulton County constituents.

Department Recommendation: Recommends approval to allow home repair services to continue for eligible Fulton County homeowners.

Project Implications: Granting approval will allow Community Development to continue to repair homes for Fulton County constituents, meet HUD CDBG timeliness and HUD's Consolidated Plan and Annual Action Plan requirements.

Community Issues/Concerns: The Department has not identified any community issues or concerns regarding this request.

Department Issues/Concerns: The Department has not identified any departmental issues or concerns regarding this request.

Contract Modification

Current Contract History	BOC Item	Date	Dollar Amount
Original Award Amount	25-0354	5/7/2025	$860,341.54
90 Day Extension	102-364 (e)	1/1/2026	$25,000.00
Renewal No. 1			$1,002,791.54
Total Revised Amount			$1,888,133.08

Contract & Compliance Information *(Provide Contractor and Subcontractor details.)*

Contract Value: **$1,002,791.54**

Prime Vendor: **Meals on Wheels**
Prime Status: **Non-Profit**
Location: **Atlanta, GA**
County: **Fulton County**
Prime Value: **$1,002,791.54 or 100.00%**

Total Contracting Value: $1,002,791.54 or 100.00%
Total Certified Value: Non-Profit

Exhibits Attached

Exhibit 1: Performance Evaluation
Exhibit 2: Contract Renewal Evaluation
Exhibit 3: Renewal Agreement No. 1

Contact Information *(Type Name, Title, Agency and Phone)*

Stan Wilson, Community Development Director, 470-526-9655

Contract Attached

No

Previous Contracts

Yes

Total Contract Value

Original Approved Amount:	$860,341.54
Previous Adjustments:	$25,000.00
This Request:	$1,002,791.54
TOTAL:	$1,888,133.08

Fiscal Impact / Funding Source

Funding Line 1:

100-121-18HR-V109: General Fund, Community Development, Housing Rehab $662,401.00

Funding Line 2:

865-121-8621-V109-GY21-85D; Community Development Block Grant, Housing Rehab $76.04

Funding Line 3:

865-121-8621-V109-GY22-85D; Community Development Block Grant, Housing Rehab $162.57

Funding Line 4:

865-121-8621-V109-GY23-85D; Community Development Block Grant, Housing Rehab $78,731.64

Agenda Item No.: 26-0096 **Meeting Date:** 2/18/2026

Funding Line 5:

865-121-8621-V109-GY24-85D; Community Development Block Grant, Housing Rehab $9,406.29

Funding Line 6:

865-121-8621-V109-GY25-85D; Community Development Block Grant, Housing Rehab $252,014.00

Key Contract T	
Start Date: 4/1/2026	**End Date:** 12/31/2026
Cost Adjustment:	**Renewal/Extension Terms**: O renewal option remains

Overall Performance Rating: 85

Would you select/recommend this vendor again?
Yes

Report Period Start: **12/15/2025**

Report Period End: **1/4/2026**

Performance Evaluation Details

ID	E3
Project	Fulton County Housing Rehabilitation Program
Project Number	25RFP1347583B-EC
Supplier	Meals On Wheels Atlanta
Supplier Project Contact	Lee-Anne Andanje (preferred language: English)
Performance Program	Professional Services
Evaluation Period	12/15/2025 to 01/04/2026
Effective Date	01/21/2026
Evaluation Type	Formal
Interview Date	Not Specified
Expectations Meeting Date	Not Specified
Status	Completed
Publication Date	01/21/2026 11:25 AM EST
Completion Date	01/21/2026 11:25 AM EST
Evaluation Score	85

Related Documents

There are no documents associated with this Performance Evaluation

OVERALL RATING GUIDE - PROFESSIONAL SERVICES

Evaluation Score Range
Outstanding = 90-100%
Excellent = 80-89%
Satisfactory = 70-79%
Needs Improvement = 50-69%
Unsatisfactory = -50%

PROJECT MANAGEMENT **17/20**

Rating

Excellent: Project Management that exceeds in some areas. Understanding of project objectives, risks and Contract requirements was above average and required little direction from the User Department.

Comments On going engagement with Vendor for partnership and program requirements.

SCHEDULE **17/20**

Rating

Excellent: Delivered ahead of original completion date with some effort by Consultant to meet or exceed project milestone dates, or on original schedule with increased scope. At times, proactive approach to monitoring and forecasting of project schedule.

Comments On going engagement with Vendor for partnership and program requirements.

QUALITY OF DESIGN, REPORTS AND DELIVERABLES **17/20**

Rating

Excellent: Deliverables exceed requirements in some areas and remainder of items delivered are high quality.

Comments On going engagement with Vendor for partnership and program requirements.

COMMUNICATIONS AND CO-OPERATION **17/20**

Rating

Excellent: Co-operative and timely response to the User Department concerns.

Comments On going engagement with Vendor for partnership and program requirements.

OVERSIGHT OF CONTRACTOR COMPLIANCE WITH CONTRACT DOCUMENTS **17/20**

Rating

Excellent: Proactive approach to oversight of Contract compliance. Compliance issues are resolved in a timely manner to the User Department's satisfaction and exceeds expectations in some areas.

Comments	On going engagement with Vendor for partnership and program requirements.

GENERAL COMMENTS

Comments	On going engagement with Vendor for partnership and program requirements

Contract Renewal Evaluation Form

Date:	**December 29, 2025**
Department:	HOUSING AND COMMUNITY DEVELOPMENT
Contract Number:	**25RFP1347583B-EC**
Contract Title:	**Housing Rehabilitative Services**

Instructions:

It is extremely important that every contract be rigidly scrutinized to determine if the contract provides the County with value. Each renewal shall be reviewed and answers provided to determine whether services should be maintained, services/scope reduced, services brought in-house or if the contract should be terminated. Please submit a completed copy of this form with all renewal requests.

1. **Describe what efforts were made to reduce the scope and cost of this contract.**

   The scope and cost amount of contract is under the demand for services, and the home repairs needed is determined by the individual home inspections.

2. **Describe the analysis you made to determine if the current prices for this good or service is reflective of the current market. Check all applicable statements and provide documentation:**

   Not applicable. Please see explanation.

   ☐ **Internet search of pricing for same product or service:**

Date of search:	Click here to enter a date.
Price found:	Click here to enter text.
Different features / Conditions:	Click here to enter text.
Percent difference between internet price and renewal price:	Click here to enter text.

Explanation / Notes:

Housing Rehabilitation Program construction cost is determined according to each project scope of work and is aligned with current cost reasonableness for each item. Housing Rehab Program cost for administration shall not exceed federal program requirements as mandated by Housing and Urban Development (HUD).

☐ **Market Survey of other jurisdictions:** Not applicable. Please see explanation below.

Date contacted:	Click here to enter a date.
Jurisdiction Name / Contact name:	Click here to enter text.
Date of last purchase:	Click here to enter a date.
Price paid:	Click here to enter text.
Inflation rate:	Click here to enter text.
Adjusted price:	Click here to enter text.
Percent difference between past purchase price and renewal price:	Click here to enter text.
Are they aware of any new vendors?	☐ **Yes** ☐ **No**
Are they aware of a reduction in pricing in this industry?	☐ **Yes** ☐ **No**
How does pricing compare to Fulton County's award contract?	Click here to enter text.

Explanation / Notes:

The Department of Community Development leadership is a part of a Single-Family Working Group consisting of twenty-two distinct programs providing home repair services in Metro Atlanta. The group reviews the cost of home repairs, energy cost burden, barriers and opportunities to leverage resources. It should be noted that Fulton County's home repair program is administered by a nonprofit organization.

☐ **Other (Describe in detail the analysis conducted and the outcome):**

The waitlist for home repair services exceeds 3,000 homeowners. Neighborhoods with homes requiring repairs have an older housing stock, homeowners are paying more than 6% of their income on energy bills and most homes have code violations. 46% of homeowners are "legacy owners" – lived in their homes for 10+ years. Most programs in the network serve low & moderate-income owners (less than or equal to 80% AMI.

3. **What was the actual expenditure (from the AMS system) spent for this contract for previous fiscal year?**

   $860,100.80

4. **Does the renewal option include an adjustment for inflation?** ☐ **Yes** ☐ **No**
   (Information can be obtained from CPI index)

Was it part of the initial contract? ☐ **Yes** ☐ **No**

Not applicable. Please see explanation below.

Date of last purchase:	Click here to enter a date.
Price paid:	Click here to enter text.
Inflation rate:	Click here to enter text.
Adjusted price:	Click here to enter text.
Percent difference between past purchase price and renewal price:	Click here to enter text.

Explanation / Notes:

Overall, the Housing Rehabilitation Program construction costs is determined according to each project scope of work and is aligned with current cost reasonableness for each item according to the current price index. In addition, the Housing Rehab Program cost for administration shall not exceed federal program requirements as mandated by Housing and Urban Development (HUD).

5. **Is this a seasonal item or service?** ☐ **Yes** ☒ **No**

6. **Has an analysis been conducted to determine if this service can be performed in-house?** ☐ **Yes** ☐ **No** **If yes, attach the analysis.** Not applicable.

7. **What would be the impact on your department if this contract was not approved?**

   If this contract is not approved, the Community Development Department will not be able to meet the home repair needs of Fulton County constituents (primarily seniors), HUD CDBG spending and Consolidated Plan requirements will not be met.

Kim Benjamin	December 29, 2025
Prepared by	**Date**
Stanley Wilson	January 5, 2026
Department Head	**Date**

CONTRACT RENEWAL AGREEMENT

DEPARTMENT: Community Development

BID/RFP# NUMBER: 25RFP1347583B-EC

BID/RFP# TITLE: Housing Rehabilitative Services

ORIGINAL APPROVAL DATE: May 7, 2025

RENEWAL EFFECTIVE DATES: February 18, 2026 through December 31, 2026

RENEWAL OPTION #: 1 OF 2

NUMBER OF RENEWAL OPTIONS: 1

RENEWAL AMOUNT: $1,002,791.00

COMPANY'S NAME: Meals On Wheels Atlanta, Inc.

ADDRESS:1705 Commerce Drive NW

CITY: Atlanta

STATE: GA

ZIP: 30318

This Renewal Agreement No. 1 approved by the Fulton County Board of Commissioners on **BOC DATE:_____ BOC NUMBER: _____**].

RENEWAL OF CERTIFICATE OF INSURANCE: The Contractor is required to maintain insurance during the entire term of this Agreement, including contract renewal options. The Contractor must furnish the County a renewal Certificate of Insurance showing the required coverage as specified in the Contract Agreement. A current COI must be provided before the commencement of work on this project. The cancellation of any policy of insurance required by this Agreement shall meet the requirements of notice under the laws of the State of Georgia as presently set forth in the Georgia Code.

SIGNATURES: SEE NEXT PAGE

SIGNATURES:

Contractor/Vendor agrees to accept the renewal option and abide by the terms and conditions set forth in the contract and specifications as referenced herein:

FULTON COUNTY, GEORGIA	**MEALS ON WHEELS OF ATLANTA, INC.**
Robert L. Pitts, Chairman **Fulton County Board of Commissioners**	**Charlene Crusoe-Ingram** **Chief Executive Officer**
ATTEST:	
Tonya R. Grier **Clerk to the Commission**	
(Affix County Seal)	
AUTHORIZATION OF RENEWAL:	
Stanley Wilson, Director **Department of Community Development**	

ITEM#: _____ RM: _____	**ITEM#: _____ 2ND RM: _____**
FIRST REGULAR MEETING	**SECOND REGULAR MEETING**

CERTIFICATE OF INSURANCE

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0097 **Meeting Date:** 2/18/2026

Department
Public Works

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Request approval and adoption of revisions and updates to the Fulton County Standard Details, Specifications, and Pump Station Manual with regards to water and wastewater infrastructure. The proposed updates establish the new standard details, specifications, and guidelines that the development community will be required to follow. Effective upon BOC approval.

Requirement for Board Action *(Cite specific Board policy, statute or code requirement)*
Board action is required pursuant to Article 9, § 2, Par. 1(a) of the Georgia Constitution, which states in relevant part that, "[t]he governing authority of each county shall have legislative power to adopt clearly reasonable ordinances, resolutions, or regulations relating to its property, affairs, and local government for which no provision has been made by general law and which is not inconsistent with this Constitution or any local law applicable thereto."

Strategic Priority Area related to this item *(If yes, note strategic priority area below)*
Health and Human Services

Commission Districts Affected
All Districts ☐
District 1 ☒
District 2 ☒
District 3 ☒
District 4 ☐
District 5 ☒
District 6 ☒

Is this a purchasing item?
No

Summary & Background: Fulton County water/wastewater details are technical drawings that provide information as to how infrastructure is to be constructed, installed, and function as part of the overall system. These drawings are necessary to convey Fulton County's expectations to the development community with the idea of ensuring consistent quality control, repeatable construction techniques, and uniformity within constructed infrastructure. Specifications describe allowable materials and detail performance/testing requirements.

The current Public Works Department water and wastewater standard specifications, construction details do not incorporate modern design practices and advanced construction techniques. In addition, the current standards & specifications do not have established requirements and guidelines for low pressure sanitary sewer systems and pump stations. Therefore, the Public Works Department has created new standard specifications and details to reflect best management practices and industry standards that reflect modern changes as to how distribution and collection network facilities are designed and constructed.

To gather feedback and additional insight, the Department held public hearings on Thursday, November 19, 2024 in South Fulton at the Wolf Creek Library located at 3100 Enon Road and on November 21, 2024 at the North Fulton Customer Services Center located in Alpharetta at 11575 Maxwell Road. The public and members of the development community were also encouraged to provide feedback online via the Fulton County website.

Scope of Work: The Fulton County Standard Details and Specifications have been updated to reflect current construction industry practices and specific methods/means associated with the Fulton County Water and Wastewater Systems. The update includes modifications to the water and wastewater details and the addition of several new aspects. Some of the more relevant changes are highlighted below:
* Updated specification numbering system to reflect current industry best practices.
* New details and specifications that reflect new acceptable material used and construction methods.
* A new Pump Station Manual that includes new requirements, including an amended buffer area requirement.
* New low pressure sanitary sewer systems specifications for areas that cannot be served by traditional gravity sewer systems.
* Expanded high-density polyethylene material usage as pipes and manholes along with applicable details and specifications.

A description of the attachments to this Item are as follows:
Water and Sewer Details - Detailed engineering drawings and layouts illustrating proposed water distribution and wastewater collection systems, including pipe alignments, sizes, and connection points.
Specifications - Technical specifications outlining material standards, installation requirements, and quality control measures for all water and sewer components.
New Pump Station Manual - Operational and maintenance manual for new proposed pump stations, including design parameters, equipment specifications, safety protocols, and performance guidelines.
Low-Pressure System Overview - Design and operational details for the low-pressure sewer system, including grinder pump configurations, service connections, and system performance criteria.

These new details and specifications will be provided to the development community on projects submitted after BOC approval for their immediate use.

Community Impact: The modifications that are presented in this action will help ensure the proper design/installation of facilities serving the County's water and wastewater customers.

Department Recommendation: The Public Works Department recommends approval of this Item.

Project Implications: Failure to approve this item would require the Department to continue using outdated details and specifications. It would also prevent the Department from implementing an updated low pressure systems and newly established pump station manual standards.

-

Community Issues/Concerns: The modifications as proposed will help ensure water and wastewater services provided by the County are in accordance with current best management practices and development standards. Community issues/concerns were solicited and addressed through a series of public hearings and

virtual meetings.

Department Issues/Concerns: The Public Works Department does not have any concerns or issues with this item as presented.

Exhibits Attached

Exhibit 1: Water and Sewer Details

Exhibit 2: Technical Specifications

Exhibit 3: New Pump Station Manual

Exhibit 4: Low-Pressure System Overview

Fiscal Impact / Funding Source

Funding Line 1:

N/A

DWG. NO.	DESCRIPTION
100	INDEX AND GENERAL NOTES
101	UTILITY LOCATION TYPICAL CROSS-SECTION
102	CONDUIT LOCATION FOR UNDERGROUND UTILITIES COMBINATION SEWER EASEMENT
103	ALLOWABLE TRENCH WIDTHS WATER MAINS
105	STRUCTURE ADJUSTMENT
106	MANDREL DETAIL FOR PVC PIPE INSTALLATION
107	ROADWAY CROSSING BORE AND CASE DETAIL
109	PAVEMENT CUT REPAIRS/STANDARD UTILITY CUT TYPE A, B & C
110	CONCRETE ENCASEMENT
113	PRECAST CONCRETE MANHOLE DETAILS
114A	STANDARD SEWER MANHOLE HDPE MANHOLES - NON-TRAFFIC
114B	STANDARD SEWER MANHOLE HDPE MANHOLES - TRAFFIC
114C	STANDARD SEWER MANHOLE FIBERGLASS MANHOLES
114D	STANDARD SEWER MANHOLE PVC/PRECAST CONCRETE HYBRID MANHOLES
114E	STANDARD SEWER MANHOLE TEE BASE MANHOLES
114F	STANDARD SEWER MANHOLE PRECAST MANHOLES
115	STANDARD SEWER MANHOLES INSIDE AND OUTSIDE VERTICAL DROPS
116	FORCE MAIN DISCHARGE MANHOLE DETAILS
117	PIPE SEWER DATA DUCTILE IRON, CONCRETE, AND HDPE PIPE INSTALLATION
118	SEWER PIPE DITCH CROSSING
119	TYPICAL PIPE HANGER AND SUPPORT DETAILS
120	PIPE JOINT DEFLECTION AND BOLT USAGE
122	TAPPING SLEEVE AND VALVE INSTALLATION DETAILS
124	STUB OUT AND EXTENSION DETAILS
125	THRUST RESTRAINT CONCRETE COLLAR
126	THRUST RESTRAINT TIE ROD CHART
127	THRUST RESTRAINT TIE ROD INSTALLATION
128	THRUST RESTRAINTS STRAP AND ROD DETAILS
129	CASING/PIPE SUPPORT INSTALLATION
130	PIPE JOINING USE OF SOLID SLEEVE
131	DRIVEWAY CUT REPAIRS CONCRETE, GRAVEL AND ASPHALT
132A	STANDARD THRUST BLOCKS DETAILS
132B	STANDARD THRUST BLOCKS DETAILS
133	MAIN EXTENSION BLOCKING DETAILS AND SUBDIVISION INTERSECTION DETAILS
134	SIDEWALK, CURB, AND GUTTER REPAIRS
135	ROADWAY CROSSING BACK TAP DETAIL

GENERAL NOTES

1. HDPE AND PVC PIPES TO BE USED WITH WASTEWATER APPLICATIONS ONLY.
2. DUCTILE IRON PIPES MAY BE USED FOR WASEWATER APPLICATIONS ONLY WITH SPECIFIC APPROVAL BY FCPW.
3. MINIMUM THICKNESS FOR HDPE PIPES SHALL BE DR 17 DUCTILE IRON PIPE SIZE (DIPS).
4. FOR SEWER INSTALLATIONS WITH NO LIVE LOAD AND NOT ALONG STREAMS BANKS, THE STANDARD PIPE SHALL BE DR 26 PVC OR HDPE DR 17 (DIPS) FOR PIPE SIZES 8-INCH THROUGH 48-INCH WITH MAXIMUM BURY DEPTH OF 20 FEET.
5. FOR SEWER INSTALLATIONS WITH HS20/25 LIVE LOADS, OR WITH BURY DEPTH GREATER THAN 20 FEET AND NOT ALONG STREAM BANKS, THE STANDARD PIPE SHALL BE DR 18 PVC (DIPS) OR HDPE DR 17 (DIPS) FOR PIPE SIZES 8-INCH THROUGH 30-INCH.
6. FOR SEWER INSTALLATIONS WITH NO LIVE LOADS AND LOCATED ALONG STREAM BANKS, THE STANDARD PIPE SHALL BE DR 17 HDPE DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 48-INCH AND MAXIMUM BURY DEPTH OF 20 FEET.
7. FOR FORCE MAINS, REGARDLESS OF BURY DEPTH, LIVE LOAD REQUIREMENTS AND NOT ALONG RIVER BANKS, THE STANDARD PIPE SHALL BE HDPE DR 11 (DIPS) FOR PIPE SIZES 8-INCH THROUGH 30-INCH.
8. ALL SEWER LINES, WATER, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.
9. ALL FORCE MAINS SHALL BE BUTT WELDED HDPE EXCEPT AT CREEK CROSSINGS AND BORINGS, DIP MAY BE USED ONLY ON AN EXCEPTIONAL BASIS AND APPROVED BY FCPW.
10. CREEK CROSSINGS AND BORINGS SHALL BE RESTRAINED JOINT DIP (SEE DETAIL 118).
11. ALL CONSTRUCTION METHODS AND MATERIALS AND MAJOR GLANDS TO BE USED IN FULTON COUNTY MUST BE MADE OF HDPE AND COMPLY WITH AWWA C906 MATERIAL DESIGNATION CODE PE4710, GLANDS THAT DO NOT MEET THE SPECIFICATIONS WILL NOT BE ACCEPTED.
12. RESTRAINT JOINTS WILL BE USED ON ALL HDPE TEES AND BENDS, THRUST BLOCKING DOES NOT PROVIDE ACCEPTABLE RESTRAINT AND IS PROHIBITED.
13. WATER MAINS TO USE DUCTILE IRON PIPES ONLY.
14. WATER SERVICE LINES TO BE TYPE K COPPER.

DIAMETRIC DEFLECTION OF HDPE PIPES					
DIMENSION RATIO	HEIGHT OF COVER*				
	5	10	15	20	25
	PERCENT DEFLECTION**				
HDPE PIPE					
DR 11	1.74	2.04	2.57	3.09	3.61
DR 17	1.90	2.27	2.90	3.54	4.17

* ADDITIONAL APPROVAL BY FCPW SHALL BE REQUIRED FOR HEIGHTS OF COVER EXCEEDING 25 FEET AND BACK-UP DIAMETRIC DEFLECTION ANALYSIS SHALL BE SUBMITTED FOR REVIEW BY FCPW.

** INCLUDES +1% SAFETY MARGIN.

NOTES:

1. DIAMETRIC DEFLECTIONS ARE CALCULATED WITH THE FOLLOWING FORMULA:

   PERCENT DEFLECTION = $k(T_L W_E + W_L + W_S)/(PS + 0.061E')$

   WHERE:

   PS (PIPE STIFFNESS FACTOR) = $2E/3(DR-1)^3$
   DR = DIMENSION RATIO
   k = BEDDING CONSTANT
   T_L = TIME LAG FACTOR
   W_E = EARTH LOAD PRESSURE = wH/144
   w = WEIGHT OF SOIL
   H = HEIGHT OF COVER
   W_L = H20 LIVE LOADS
   W_S = SURCHARGE PRESSURE
   E = MODULUS OF ELASTICITY OF PIPE MATERIAL
   E' = MODULUS OF SOIL REACTION

2. DEFLECTIONS COMPUTED USING A UNIT WEIGHT OF BACKFILL AT 120 LBS / CFT AND ASSUMED NO INTERNAL PRESSURE OR, EXCEPT FOR 5 FEET COVER HEIGHT, LIVE LOADS.
3. PIPE EMBEDMENT USED IN CALCULATIONS IS CLASS 1, 2, 3, OR 4, AS DEFINED IN ASTM D2321 WITH APPROPRIATE COMPACTION TO ACHIEVE AN E'=1000 PSI.

FULTON COUNTY STANDARD DETAIL 100

INDEX AND GENERAL NOTES

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

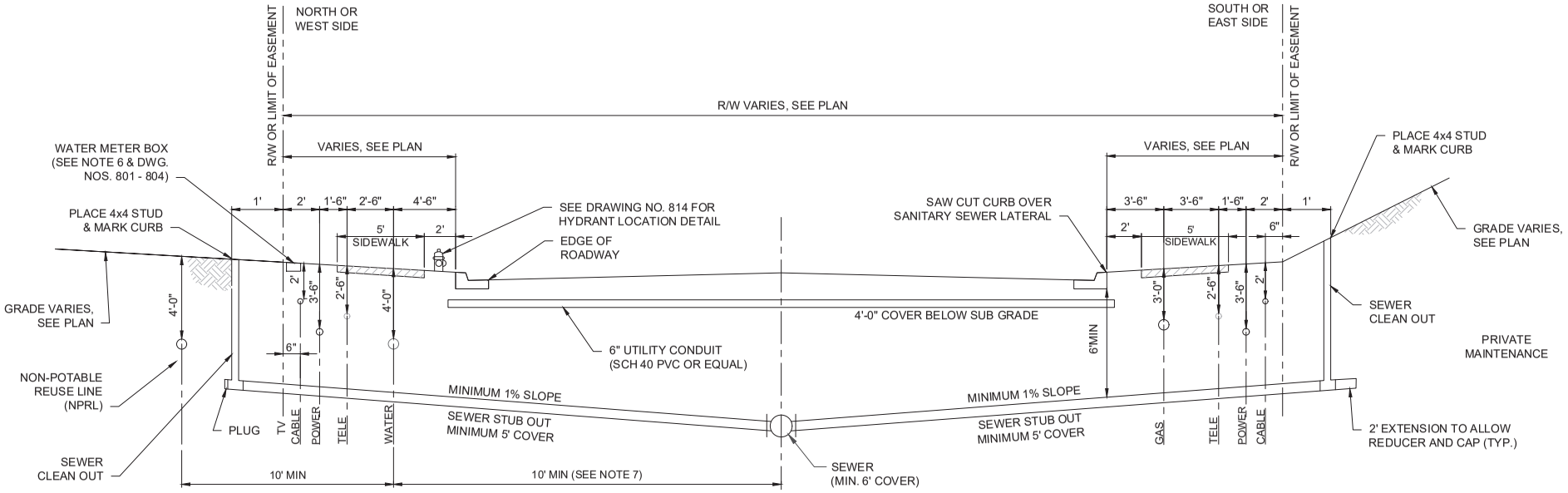
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100-S.dwg December 10, 2025 - 10:16am

NOTES:

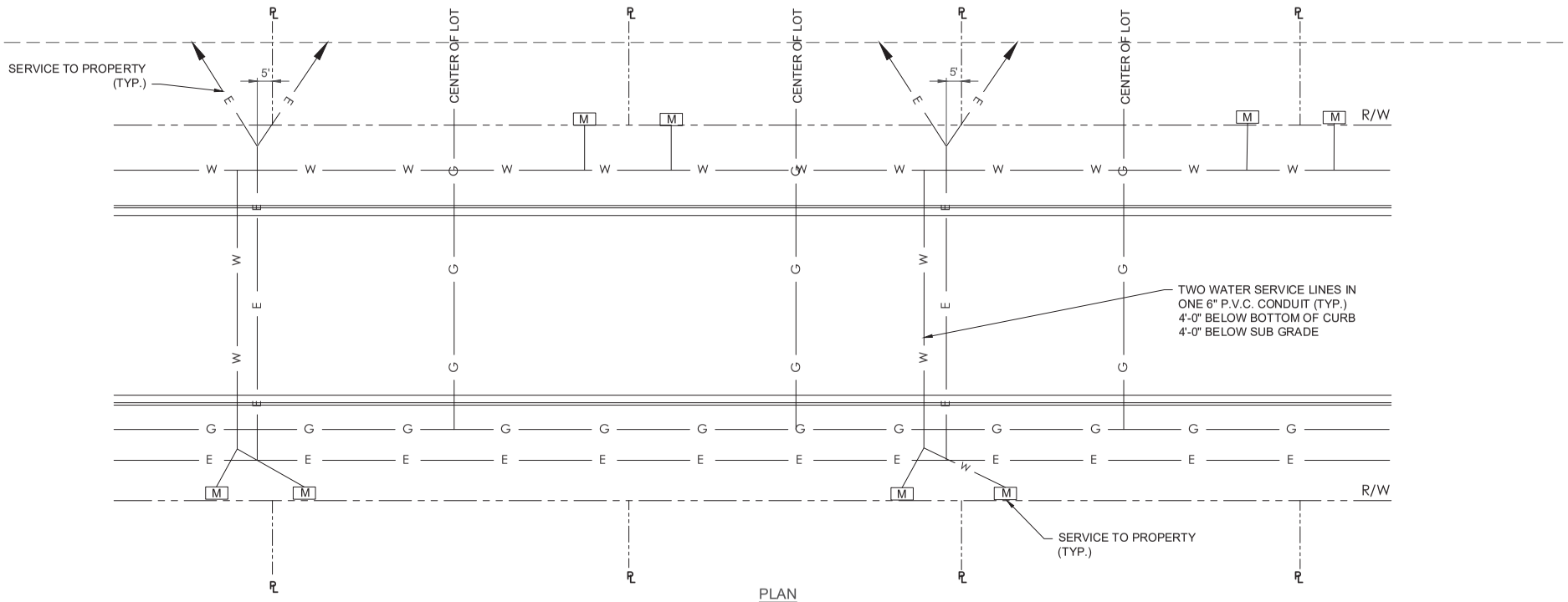
1. UNDER MULTIPLE UTILITY INSTALLATIONS OR RELOCATIONS, THE DEEPEST UTILITY SHALL BE INSTALLED AND TESTED FIRST TO AVOID INTERFERENCE WITH SERVICE LATERALS OR LINES.
2. UNLESS OTHERWISE DIRECTED BY FULTON COUNTY, INSTALLATION OF SEWER FORCE MAIN AND WATER MAIN SHALL BE INSTALLED TO THE LOWER ELEVATION INDICATED.
3. EXCEPT FOR WATER AND SEWER MAINS, ALL UTILITIES SHOWN ARE FOR ILLUSTRATION ONLY.
4. WHERE GRADE IS ELEVATED ABOVE ROAD, THEN THE DEPTH OF COVER SHALL BE MEASURED FROM EDGE OF PAVEMENT.
5. WATER MAIN SHALL BE LOCATED 4.5 FEET FROM BACK OF CURB IN NEW DEVELOPMENTS.
6. METER PLACEMENT SHALL BE INSIDE R/W FOR NON-DOT ROADS, OUTSIDE R/W FOR DOT ROADS OR AS REQUIRED BY LOCAL AUTHORITY W/JURISDICTION.
7. MINIMUM WATER/SEWER SEPARATION TO BE 10 FEET MINIMUM. EXCEPTIONS WILL ONLY BE ALLOWED UNDER FCPW'S SPECIFICATION EXPLICIT APPROVAL AND DIRECTIONS.
8. HDPE PIPES TO BE USED WITH WASTEWATER APPLICATIONS ONLY.
9. DUCTILE IRON PIPES MAY BE USED FOR WASTEWATER APPLICATIONS ONLY WITH SPECIFIC APPROVAL BY THE FCPW.
10. MINIMUM THICKNESS FOR HDPE PIPES SHALL BE DR 17.
11. FOR SEWER INSTALLATIONS WITH NO LIVE LOAD AND NOT ALONG STREAM BANKS, THE STANDARD PIPE SHALL BE DR 26 PVC OR HDPE DR 17 IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZE 8-INCH THROUGH 48-INCH WITH A MAXIMUM BURY DEPTH OF 20 FEET.
12. FOR SEWER INSTALLATIONS WITH HS20/25 LIVE LOADS, OR WITH BURY DEPTH GREATER THAN 20 FEET AND NOT ALONG STREAM BANKS, THE STANDARD PIPE SHALL BE DR 18 PVC OR HDPE DR 17 IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 30-INCH.
13. FOR FORCE MAINS, REGARDLESS OF BURY DEPTH, LIVE LOAD REQUIREMENTS AND NOT ALONG RIVERBANKS, THE STANDARD PIPE SHALL BE HDPE DR 11 IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 30-INCH.
14. FOR SEWER INSTALLATIONS WITH NO LIVE LOADS AND LOCATED ALONG STREAM BANKS, THE STANDARD PIPE SHALL BE DR 17 HDPE IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 48-INCH AND MAXIMUM BURY DEPTH OF 20 FEET.
15. ALL SEWER LINES, WATER LINES, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.



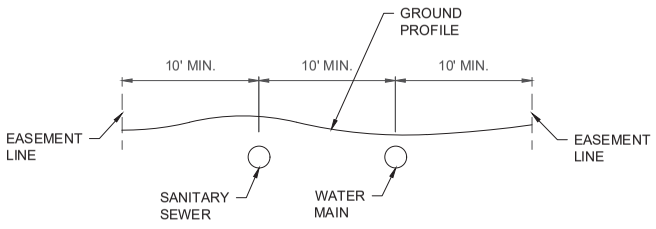
SECTION

FULTON COUNTY STANDARD DETAIL 101 UTILITY LOCATION TYPICAL CROSS-SECTION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 101

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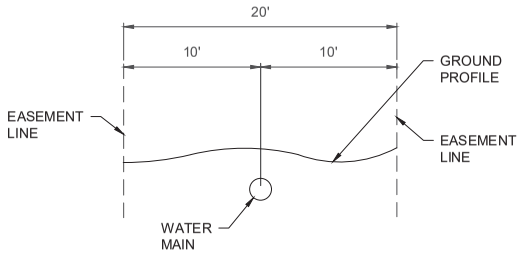


PLAN
NTS



PROFILE
NTS

TYPICAL COMBINATION PERMANENT EASEMENT
SANITARY SEWER AND WATER LINES



PROFILE
NTS

TYPICAL WATER LINE PERMANENT EASEMENT

LEGEND

E	ELECTRIC LINE
G	GAS LINE
W	WATER LINE
	RIGHT OF WAY (R/W) LINE
	PARCEL LINE
M	WATER METER
	EASEMENT LINE

NOTE

1. METER PLACMENT SHALL BE INSIDE R/W FOR NON-DOT ROADS, OUTSIDE R/W FOR ROADS OR AS REQUIRED BY LOCAL AUTHORITIES W/ JURISDICTION.
2. REFER TO 100-S, #1-8

FULTON COUNTY STANDARD DETAIL 102

CONDUIT LOCATION FOR UNDERGROUND UTILITIES COMBINATION SEWER EASEMENT

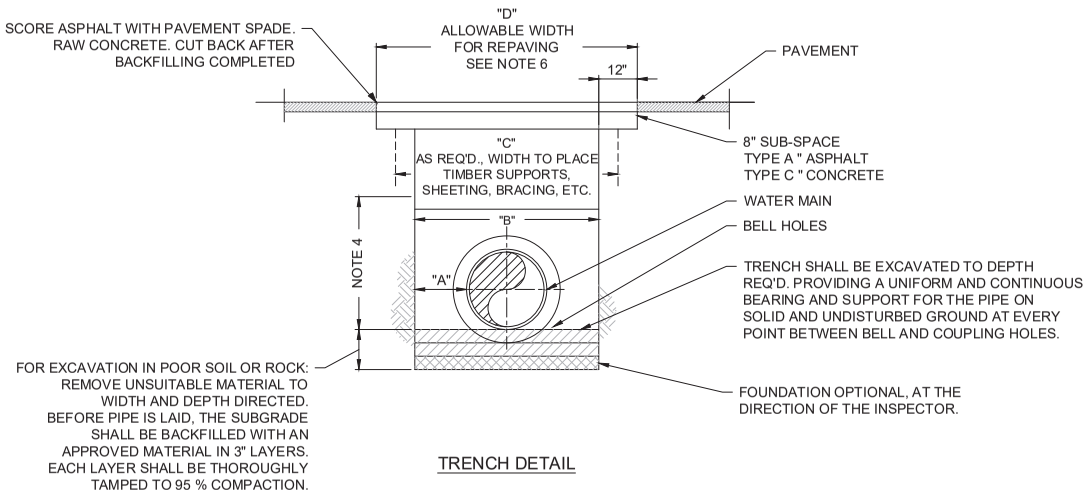
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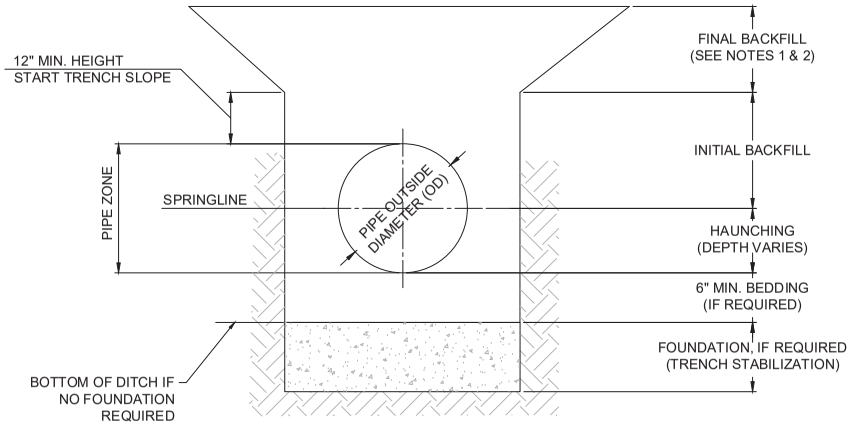
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DRAWING NO. 102

102-S.dwg December 10, 2025 - 10:16am



TRENCH DETAIL



TRENCH TERMINOLOGY

NOTES:

1. COMPACTION: BACKFILLS SHALL BE BUILT-UP IN LAYERS AND EACH LAYER SHALL BE THOROUGHLY COMPACTED BEFORE BEGINNING ANOTHER LAYER. LAYERS SHALL BE NO MORE THAN 6" IN DEPTH. PUDDLING WILL NOT BE PERMITTED, NOR WILL FROZEN OR WET MATERIAL BE PLACED IN TRENCHES.
2. COMPACTION STANDARDS: ALL BACKFILL MATERIALS USED SHALL CONTAIN A SUFFICIENT AMOUNT OF MOISTURE FOR PROPER COMPACTION AND THESE MATERIALS SHALL BE COMPACTED AT NOT LESS THAN 95% OF THEIR OPTIMUM COMPACTION FOR ANY SPECIFIC SOIL CLASSIFICATION AS DETERMINED BY THE MODIFIED PROCTOR TEST ASTM D698.
3. COMPACTION TESTS: COMPACTION TESTS MAY BE REQUIRED IN EXISTING OR PROPOSED STREETS, SIDEWALKS, DRIVES AND OTHER EXISTING OR PROPOSED PAVED AREAS AT VARYING DEPTHS AND AT INTERVALS AS DETERMINED BY THE ENGINEER WITH A MINIMUM OF ONE TEST PER JOB, AND A MAXIMUM OF ONE REQUIRED TEST FOR EACH 400' OR LESS OF WATER MAIN CONSTRUCTION, UNLESS SOIL CONDITIONS OR CONSTRUCTION PRACTICES, IN THE OPINION OF THE ENGINEER, WARRANT THE NEED FOR ADDITIONAL TESTS.
4. NO BOULDERS OR LOOSE ROCKS PERMITTED IN THE BACKFILL AT THE BOTTOM OF PIPE TRENCH TO 2'-0" ABOVE PIPE.
5. ALL DESIGNS BASED ON FULLY COMPACTED BACKFILL AND UNIFORMLY SUPPORTED PIPE.
6. FOR PAVEMENT CUT REPAIRS SEE DRAWING 109.
7. FOR CONSTRUCTION WITHIN AHJ (AUTHORITY HAVING JURISDICTION) OTHER THAN FULTON COUNTY, BACKFILL AND COMPACTION STANDARDS SHALL BE IN ACCORDANCE WITH THE PERMITTING AGENCY OR AGENCIES.

TABLE 103-1
ALLOWABLE TRENCH WIDTHS

PIPE SIZE (NOM)	"A" SIDE CLEARANCE (IN.)		"B" DITCH WIDTH (IN.)				"C" SHORING WIDTH (ADDITIONAL-INCH)	"D" CUT REPAIR WIDTH (FT.)			
	SOIL	ROCK	SOIL		ROCK			SOIL		ROCK	
			MJ	SJ	MJ	SJ		MJ	SJ	MJ	SJ
3/4"-2"	2	6	NA	8	NA	14	AS APPROVED	NA	3.00	NA	3.17
4"	9	12	27	25	33	31	AS APPROVED	4.25	4.08	4.75	4.58
6"	9	12	28	28	34	33	AS APPROVED	4.33	4.33	4.83	4.75
8"	9	12	32	30	38	35	AS APPROVED	4.67	4.50	5.17	4.92
10"	9	12	34	32	40	37	AS APPROVED	4.83	4.67	5.33	5.08
12"	9	12	36	34	42	39	AS APPROVED	5.00	4.83	5.50	5.25
14"	9	14	39	36	49	46	AS APPROVED	5.25	5.00	6.08	5.83
16"	9	14	42	38	52	48	AS APPROVED	5.50	5.17	6.33	6.00
20"	9	14	45	42	55	52	AS APPROVED	5.75	5.50	6.58	6.33
24"	9	14	50	48	60	57	AS APPROVED	6.17	6.00	7.00	6.75
30"	9	18	58	54	76	63	AS APPROVED	6.83	6.50	8.33	7.25
36"	9	18	64	61	82	69	AS APPROVED	7.33	7.08	8.83	7.75
42"	9	18	72	67	90	77	AS APPROVED	8.00	7.58	9.50	8.42
48"	9	18	78	73	96	90	AS APPROVED	8.50	8.08	10.00	9.75

FULTON COUNTY STANDARD DETAIL 103

ALLOWABLE TRENCH WIDTHS
WATER MAINS

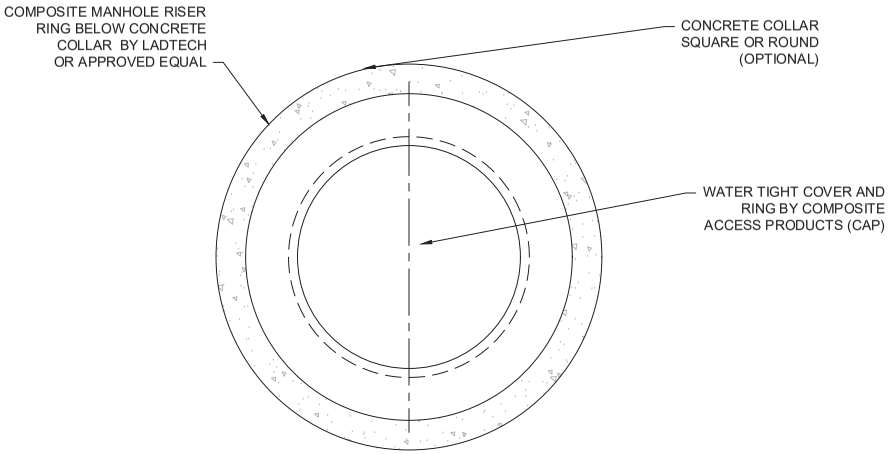
DATE	REVISIONS	DATE	REVISIONS

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DATE: 01-21-2026

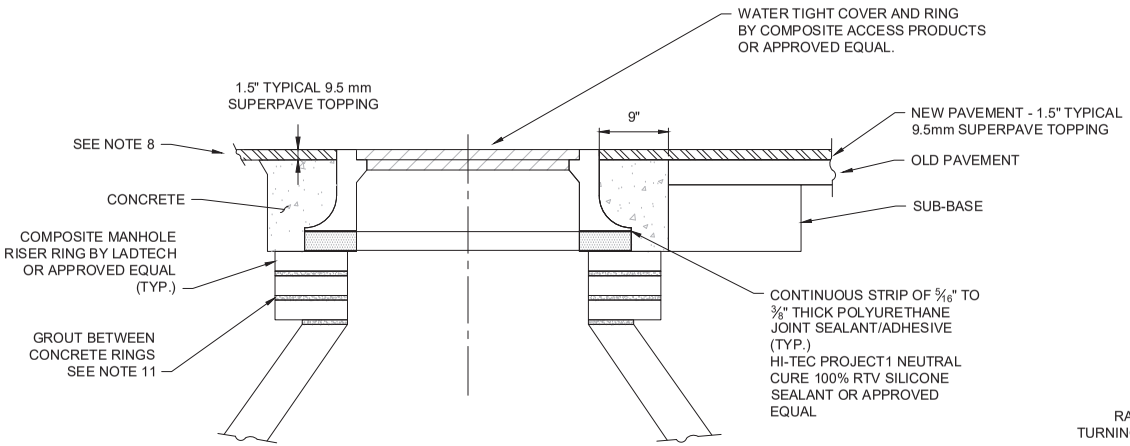
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103

103-S.dwg December 10, 2025 - 10:16am



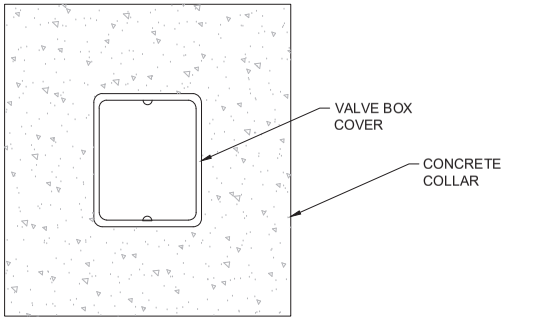
TOP VIEW OF RISERS
N.T.S.



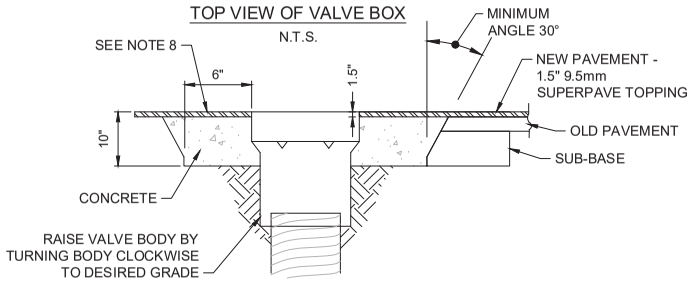
MANHOLE DETAIL
N.T.S.

NOTES:

1. STRUCTURES SHALL NOT BE ADJUSTED FOR A PERIOD OF 24 HOURS AFTER RESURFACING IS COMPLETED IN THAT AREA.
2. ASPHALT SHALL BE SAWCUT TO MAKE A SMOOTH, EVEN EDGE.
3. STRUCTURE COVER SHALL BE ADJUSTED TO FIT FLUSH WITH STREET SURFACE.
4. ALL CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 4000 PSI.
5. CONCRETE WILL BE USED TO BACKFILL THE ENTIRE WORKING AREA.
6. FINISHING CONCRETE SHALL BE DONE BY USE OF A TROWEL OR FLOAT.
7. CLEAN ALL ASPHALT OFF SEWER MANHOLES AT TIME OF PAVING TO ALLOW ACCESS TO SYSTEM AT ALL TIMES.
8. THE STATE, COUNTY AND/OR CITY HAS THE OPTION OF EXTENDING THE CONCRETE TO THE FINISHED GRADE INSTEAD OF PAVING WITH ASPHALT. PLEASE VERIFY WITH THE INSPECTOR.
9. TOP VIEW OF MANHOLE OPTIONAL SQUARE OR ROUND CONCRETE COLLAR.
10. COMPOSITE RING, COVER & RISER RING SHALL BE THE STANDARD.
11. PRECAST CONCRETE RISER RING MAY BE USED ONLY WITH FCPW'S EXPLICIT EXCEPTIONAL APPROVAL.



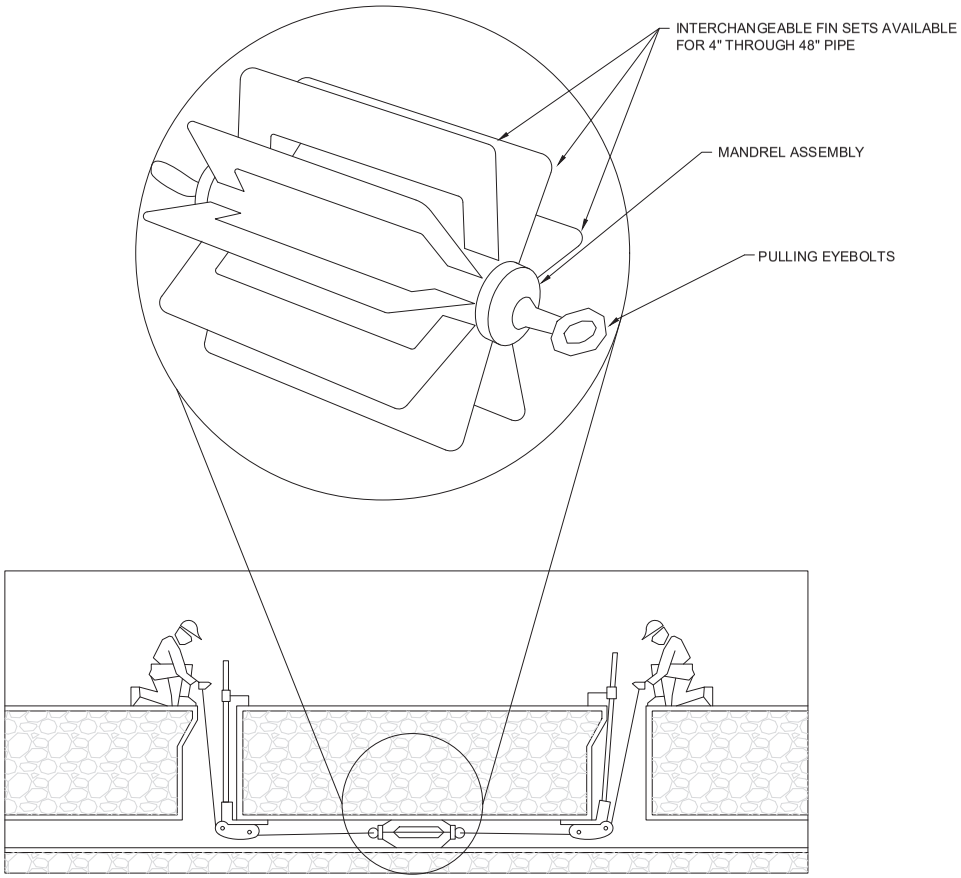
TOP VIEW OF VALVE BOX
N.T.S.



VALVE
N.T.S.

FULTON COUNTY STANDARD DETAIL 105 STRUCTURE ADJUSTMENT		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 105

105-S.dwg December 10, 2025 - 10:16am



NOTES:

1. AFTER INSTALLATION, A DEFLECTION TEST IS REQUIRED NO SOONER THAN 24 HOURS OF TRENCH BACKFILLING. INITIAL DEFLECTION SHALL BE LIMITED TO 3% OF THE UN-DEFLECTED DIAMETER.
2. PIPE SHALL BE HDPE DR 17 (MIN.) WITH BUTT WELDED JOINTS OR PVC DR 25 (MIN.) WITH CONFINED ELASTOMERIC SEALED BELL & SPIGOT JOINTS. PIPE LENGTHS SHALL BE MANUFACTURER'S STANDARD.
3. MANDREL TO BE MADE FROM AIRCRAFT-QUALITY ALUMINUM OR APPROVED EQUAL.
4. EACH FIN SET IS TO BE STAMPED WITH THE PIPE DIAMETER AND PERCENT DEFLECTION.
5. MANDREL LENGTH TO BE 10 INCHES; MANDREL WEIGHT TO BE 4 LBS.
6. MANDREL TO BE PROVIDED BY CONTRACTOR IT MUST BE MEASURED AND APPROVED FIRST BY FULTON COUNTY INSPECTOR.
7. A SECOND DEFLECTION TEST MAY BE REQUIRED IF DETERMINED TO BE NECESSARY BY THE INSPECTOR.

TABLE 105-1
BASE INSIDE DIAMETER AND 3%, 5%, AND 7.5% MANDREL DIMENSIONS

NOMINAL SIZE (INCHES)	AVERAGE SIZE DIAMETER (INCHES)	BASE INSIDE DIAMETER (INCHES)	3% DEFLECTION	5% DEFLECTION	7.5 % DEFLECTION
6	5.893	5.742	5.569	5.454	5.31
8	7.891	7.665	7.435	7.281	7.09
10	9.864	9.563	9.276	9.084	8.84
12	11.737	11.361	11.020	10.792	10.51
15	14.374	13.898	13.481	13.023	12.86

FULTON COUNTY STANDARD DETAIL 106

MANDREL DETAIL FOR
PVC PIPE INSTALLATION

DATE	REVISIONS	DATE	REVISIONS

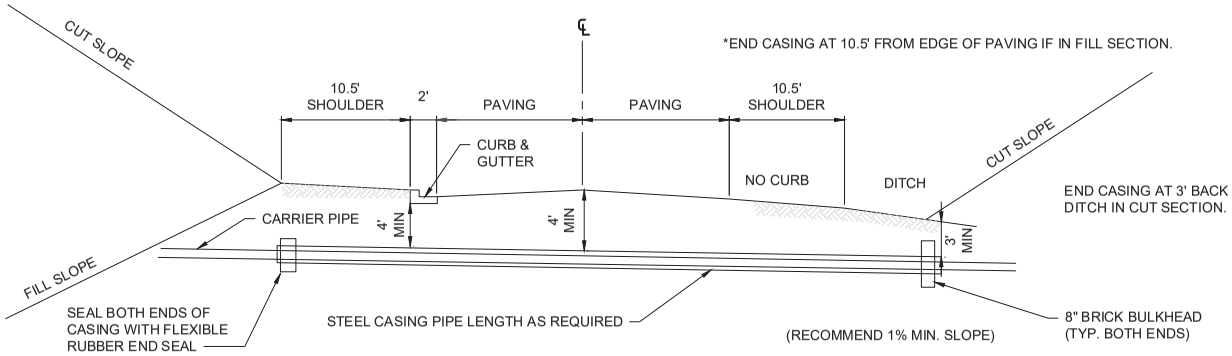
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
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DRAWING NO.
106

106-S.dwg December 10, 2025 - 10:16am



SECTION
NTS

PIPE CASING: THE STEEL CASING PIPE SHALL BE MANUFACTURED FROM STEEL CONFORMING TO ASTM: A 139, GRADE B. SIZE AND THICKNESS SHALL BE AS FOLLOWS:		
TABLE 107-1 UNDER RAILROADS		
PIPE DIAMETER INCHES (I.D)	CASING DIAMETER INCHES (I.D.) MIN.	CASING WALL THICKNESS INCHES
6	16	0.250
8	18	0.375
10	20	0.375
12	22	0.375
14	28	0.375
16	30	0.406
18	32	0.406
20	36	0.469
24	42	0.469
30	48	0.500

NOTES:

1. CASING TO BE STEEL PIPE (ROUND) WITH 45° BEVELED EDGES.
2. ALL CUTS TO BE SQUARED TO END.
3. JOIN ALL PIPE WITH DOUBLE BEAD BUTT WELDS.
4. AUGER HEAD DIAMETER CANNOT EXCEED DIAMETER OF CASING BY MORE THAN 2 INCHES.
5. BORING AND CASING SHALL BE INSTALLED SIMULTANEOUSLY.
6. ANYTHING 6" OR LARGER REQUIRES BORE AND CASE.
7. CASING PIPE SHALL HAVE A PROTECTIVE COATING CONSISTING OF AN EPOXY HAVING A MINIMUM DRY FILM THICKNESS OF SIXTEEN (16) MILS. SURFACE PREPARATION SHALL BE SSPC-SP-10, AND EPOXY SHALL HAVE A MINIMUM SOLIDS CONTENT OF SIXTY-FIVE (65) PERCENT BY VOLUME AND SHALL BE AIRLESS SPRAY APPLIED. MINIMUM DRYING TIME SHALL BE SEVEN DAYS. EPOXY SHALL BE TNEEC, CARBOLINE, OR VALSPAR.
8. PIT TO BE A MINIMUM OF 10' FROM EDGE OF PAVEMENT IN GDOT RIGHT-OF-WAY.
9. THREE STAINLESS STEEL CASING SPACERS ARE REQUIRED PER JOINT.
10. CASING PIPE SHALL BE STEEL.
11. FIELD LOCKING GASKETS REQUIRED INSIDE OF CASING.
12. ALL BORING MUST BE APPROVED AND A PERMIT OBTAINED FROM PUBLIC WORKS (404) 612-7400 AND AUTHORITIES HAVING JURISDICTION AS REQUIRED.

* SEE DRAWING NO. 129 FOR RAILROAD, INTERSTATE HIGHWAY AND SPACER DETAILS.

TABLE 107-2 UNDER HIGHWAYS			
PIPE DIAMETER INCHES (I.D)	BELL OD	CASING DIAMETER INCHES (I.D) MIN.	WALL THICKNESS INCHES
6	9.19	16	0.250
8	11.33	18	0.250
10	13.56	20	0.250
12	15.74	22	0.375
14	21.43	28	0.375
16	23.7	30	0.375
18	25.82	32	0.375
20	29.88	36	0.375
24	36.34	42	0.500
30	38.30	48	0.500

FULTON COUNTY STANDARD DETAIL 107

ROADWAY/RAILROAD CROSSING
BORE AND CASE DETAIL

DATE	REVISIONS	DATE	REVISIONS

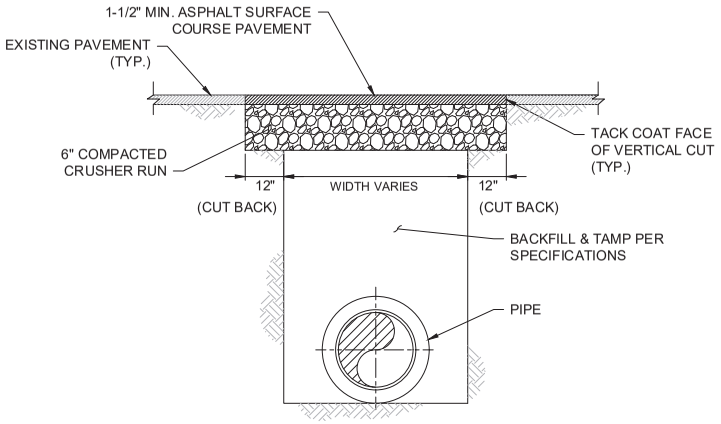
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
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DRAWING NO.
107

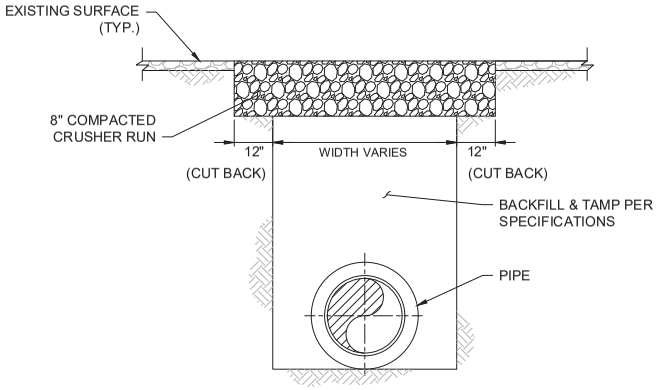
107-1S.dwg December 10, 2025 - 10:16am



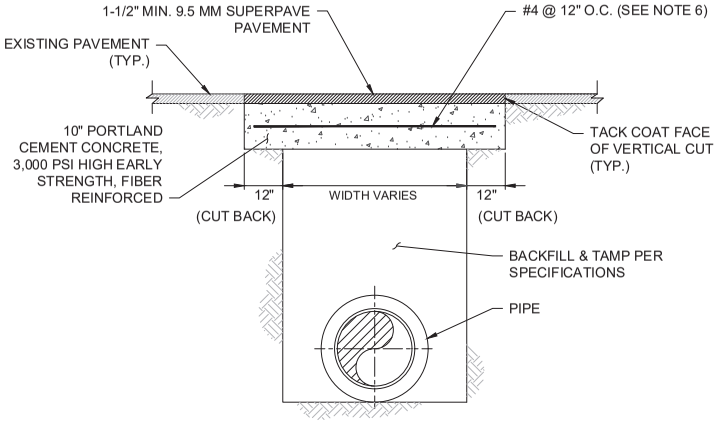
TYPE "A" CUT REPAIR DETAIL
T&G OR ASPHALT RDS
(DRIVEWAYS, A-30)

NOTES:

1. ALL MATERIALS AND METHODS OF INSTALLATION SHALL COMPLY WITH LATEST EDITION OF GDOT'S, "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
2. FOR TYPE "C", THE CONTRACTOR SHALL COVER THE POURED CONCRETE WITH STEEL PLATES A MINIMUM OF 24 HOURS TO ALLOW ADEQUATE SET-UP.
3. CONTRACTOR'S TRAFFIC CONTROL PLAN MUST BE APPROVED BY THE AUTHORITY HAVING JURISDICTION BEFORE WORK BEGINS.
4. FINAL APPROVAL OF CONTRACTOR'S PAVEMENT CUT REPAIRS RESIDES WITH THE AUTHORITY HAVING JURISDICTION. CONTRACTOR SHALL MEET ALL REQUIREMENTS OF SAID AUTHORITY.
5. FOR TRENCH AND CUT WIDTHS, SEE DWG. NO. 103.
6. PROVIDE #4 REBARS @ 12-INCH O.C. WHEN PIPE SIZE IS GREATER THAN 16-INCH OR TRENCH WIDTH IS GREATER THAN 3 FEET.



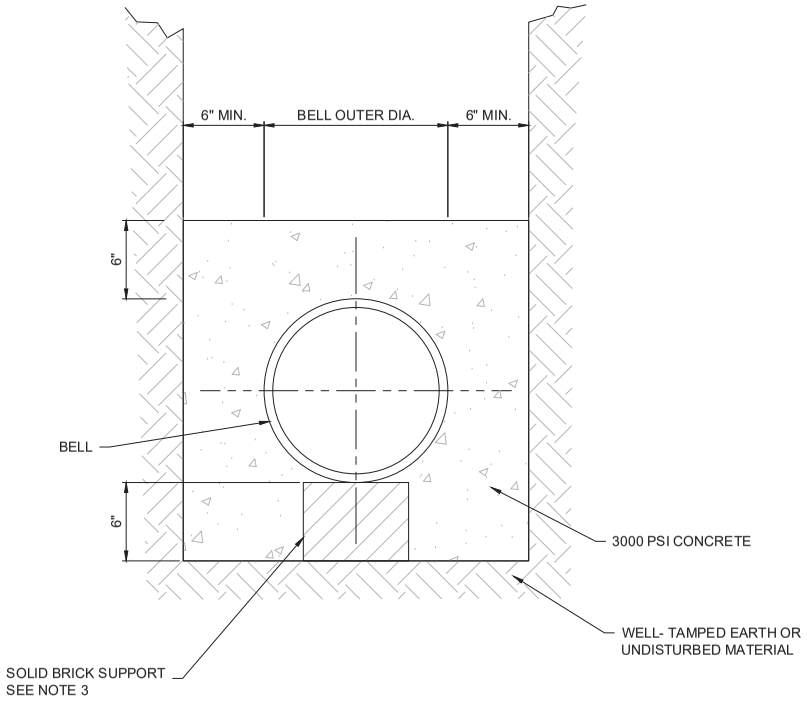
TYPE "B" CUT REPAIR DETAIL
DIRT OR GRAVEL RDS
(DRIVEWAYS, A-30)



TYPE "C" CUT REPAIR DETAIL
GEORGIA DOT AND FULTON CO.

FULTON COUNTY STANDARD DETAIL 109 PAVEMENT CUT REPAIRS/STANDARD UTILITY CUT TYPE A, B & C		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 109

109-S.dwg December 10, 2025 - 10:16am



CONCRETE ENCASEMENT

NTS

NOTES:

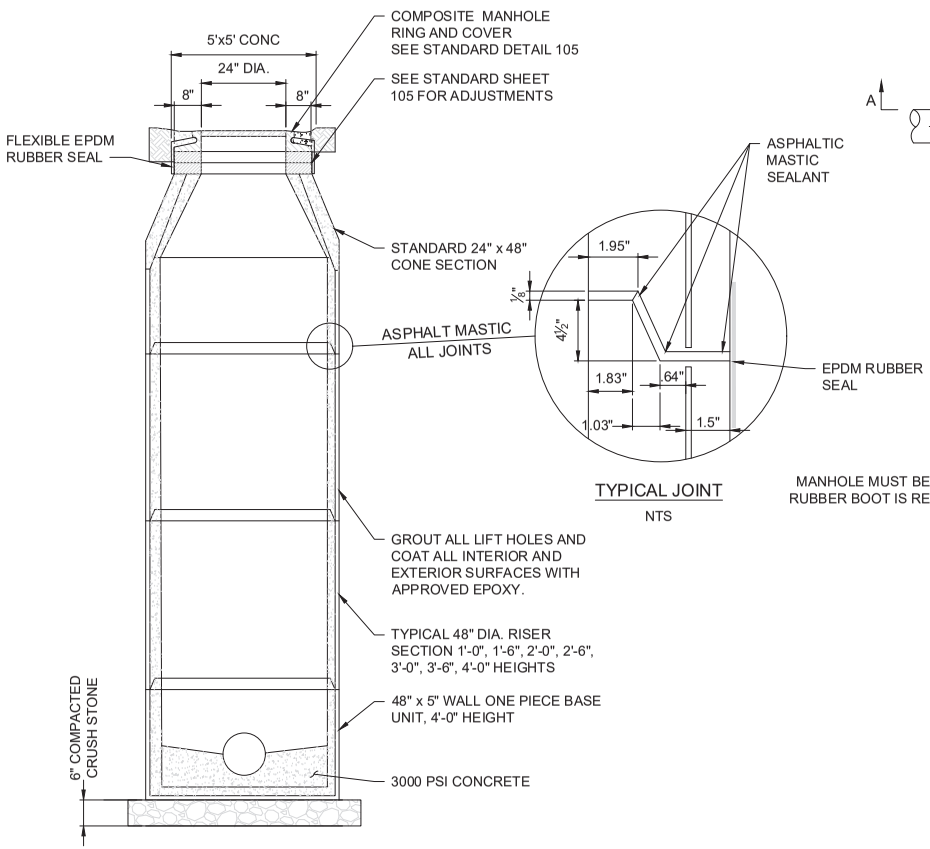
1. CONCRETE ENCASEMENT SHALL BE USED WHEN COVER IS LESS THAN 4 FEET, AND WHERE CONDITIONS DIRECTED BY THE FULTON COUNTY ENGINEER
2. ENCASEMENT TO BE PLACED AGAINST UNDISTURBED NATURAL GROUND OR FILL COMPACTED TO 90% RELATIVE COMPACTION, UNLESS OTHERWISE SPECIFIED.
3. PROVIDE 3 SUPPORTS FOR EACH SECTION OF DIP, OR @ 5'-0" INTERVALS FOR HDPE AND PVC PIPES.

FULTON COUNTY STANDARD DETAIL 110 CONCRETE ENCASEMENT		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 110

110-S.dwg December 10, 2025 - 10:17am

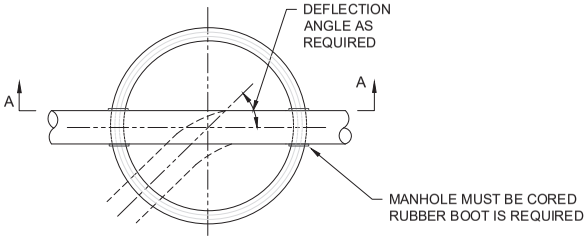
NOTES:

1. HOLES TO BE PRECAST; IF PRECAST HOLES ARE NOT AVAILABLE, MANHOLE MUST BE CORED AND RUBBER BOOT IS REQUIRED.
2. MAXIMUM HOLE SIZE = PIPE O.D. + 4"
3. USE CONCENTRIC CONIC SECTIONS IN RIGHT-OF-WAY.
4. OUTFALL MANHOLES MUST HAVE CAST IN PLACE RINGS.
5. ON ALL SECTIONS BELOW THE WATER TABLE, 8" EXTERNAL SEAL WRAP WILL BE REQUIRED.

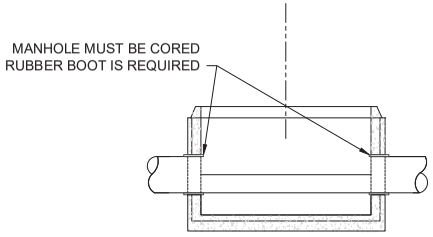


TYPICAL INSTALLATION
NTS

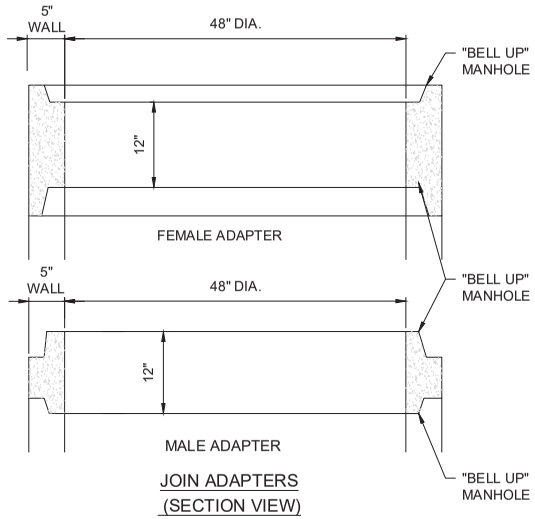
TYPICAL JOINT
NTS



PLAN VIEW
ONE PIECE BASE UNIT
NTS



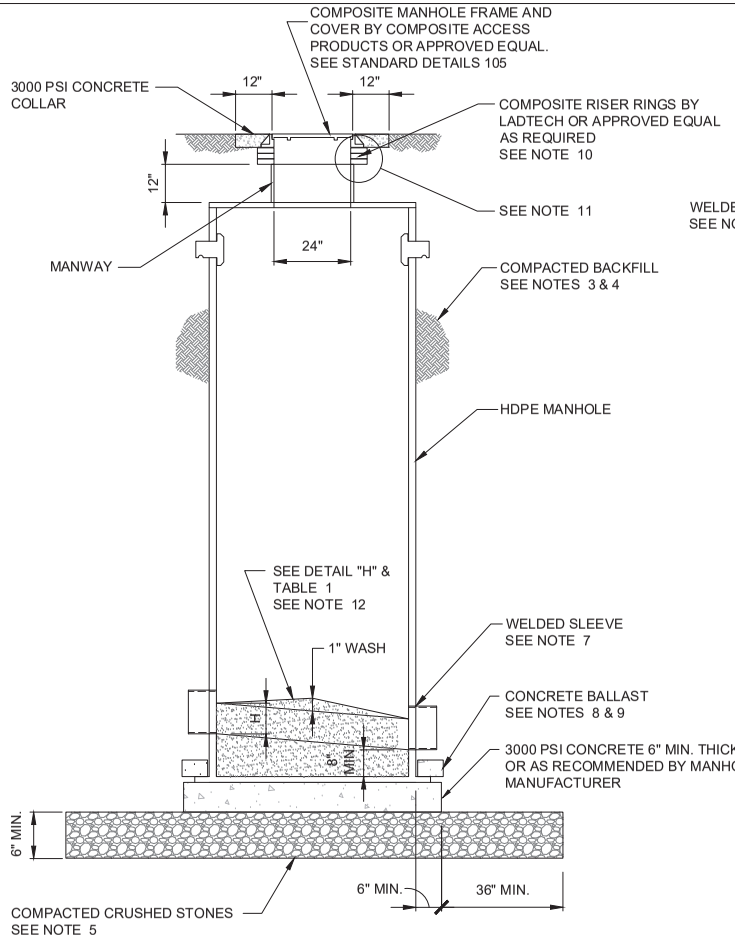
SECTION "A-A"
THRU ONE PIECE BASE UNIT
NTS



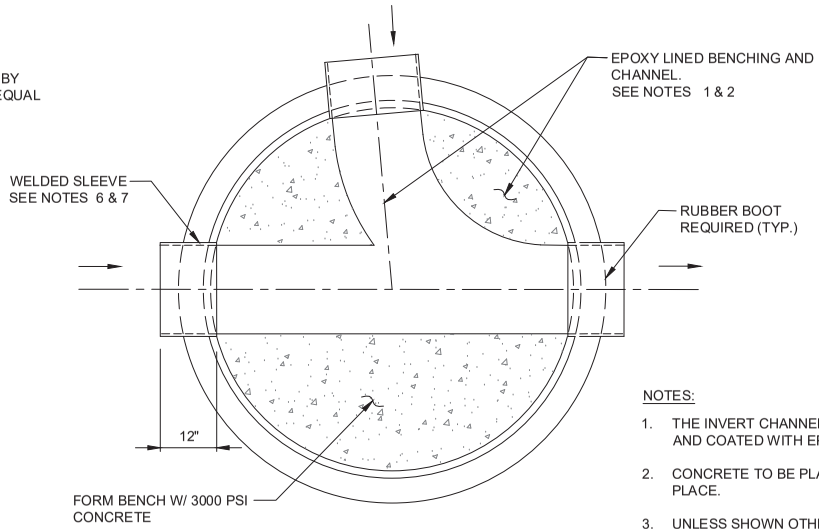
JOIN ADAPTERS
(SECTION VIEW)
NTS

FULTON COUNTY STANDARD DETAIL 113 PRECAST CONCRETE MANHOLE DETAILS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 113

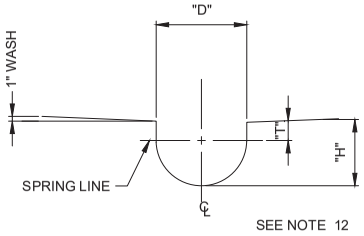
113-S.dwg December 10, 2025 - 10:17am



SECTIONAL VIEW
N.T.S.



BASE PLAN VIEW
N.T.S.



DETAIL "H"
NTS

TABLE 1		
"D"	"T"	"H"
INSIDE DIA. PIPE (IN.)	VERTICAL TANGENT (IN.)	HEIGHT OF WATER TABLE (IN.)
8	2 1/2	6 1/2
10	3	8
12	3 1/2	9 1/2
15	4 1/2	12
18	5 1/2	14 1/2
21	6 1/2	17
24	7 1/2	19 1/2
27	8	21 1/2
30	9	24
33	10	26 1/2
36	11	29

NOTES:

1. THE INVERT CHANNELS AND BENCH SHALL BE FORMED USING 3,000 PSI CONCRETE AND COATED WITH EPOXY LINER.
2. CONCRETE TO BE PLACED IN MANHOLE AFTER THE MANHOLE HAS BEEN SET IN PLACE.
3. UNLESS SHOWN OTHERWISE ON DRAWINGS AND APPROVED BY FCPW, SAND CRUSHED STONE, OR PEA GEAVEL SHALL BE USED FOR BACKFILL AROUND THE MANHOLE FOR A MINIMUM DISTANCE OF 3.5 FEET FROM THE OUTSIDE SURFACE AND EXTENDING THE FULL HEIGHT OF THE MANHOLE.
4. BACKFILL SHALL BE PLACED IN LAYERS OF NOT MORE THAN 12 LOOSE MEASURE INCHES AND COMPACTED TO A MINIMUM OF 90% STANDARD PROCTOR DENSITY OR AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION.
5. COMPACT TO 95% STANDARD PROCTOR DENSITY UNLESS OTHEWISE APPROVED BY FCPW.
6. ALTERNATE MEANS OF PIPE PENETRATIONS AND CONNECTIONS MAY BE USED AS RECOMMENDED BY MANHOLE MANUFACTURER AND APPROVED BY FCPW.
7. ALL HDPE TO HDPE SURFACES MUST BE FULL PENETRATION EXTRUSION WELDS UNLESS OTHERWISE SPECIFIED.
8. PROVIDE AN ANCHOR CONNECTION RING TO BE USED IN CONNECTION WITH A CONCRETE BALLAST.
9. CONCRETE BALLAST REQUREMENTS SHALL BE AS DETERMINED BY DESIGN ENGINEER AND AS APPROVED BY FCPW.
10. RISER RINGS SHALL HAVE A CLEAR OPENING EQUAL OR LESS THAN THE OPENING OF THE FRAME.
11. APPLY A 3/8-INCH BEAD OF BUTYL RUBBER SEALANT BETWEEN THE FOLLOWING CONTACTING SURFACES:
    - MANHOLE FRAME AND RISER RINGS
    - RISER RINGS
    - RISER RING AND HDPE MANWAY
12. "H" & "T" DIMENSIONS APPLY ONLY AT THE UPSTREAM INSIDE EDGE OF MANHOLE.
13. ALL HDPE MANHOLES TO HAVE A MINIMUM THICKNESS OF SDR DIPS 17.

FULTON COUNTY STANDARD DETAIL 114A

STANDARD SEWER MANHOLE
HDPE MANHOLES - NON-TRAFFIC

DATE	REVISIONS	DATE	REVISIONS

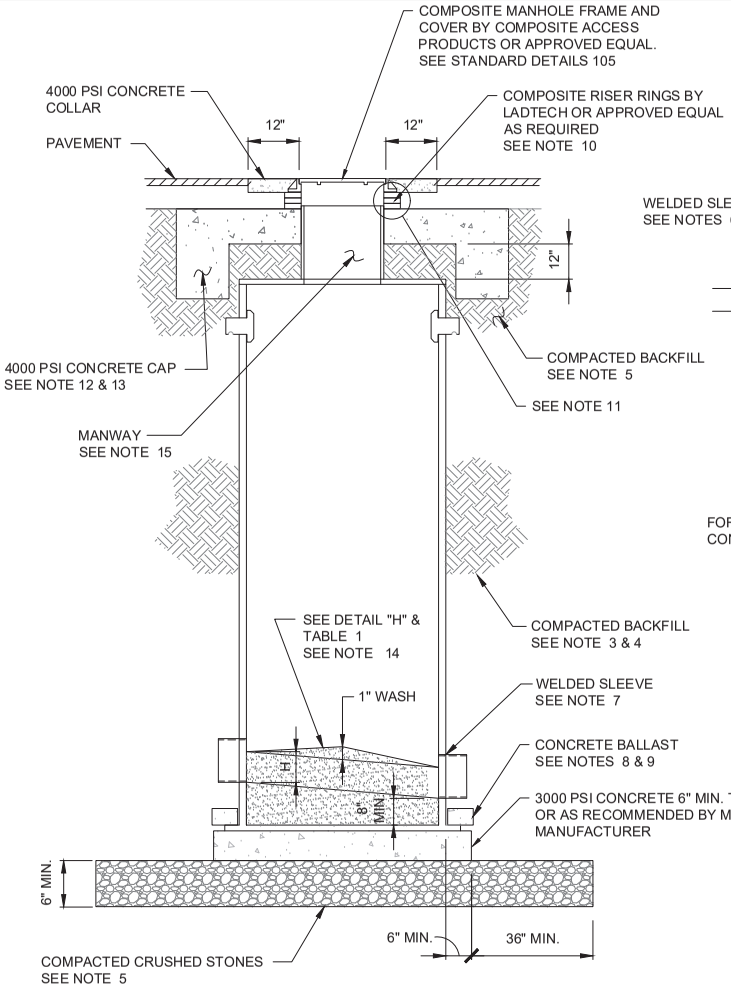
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APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

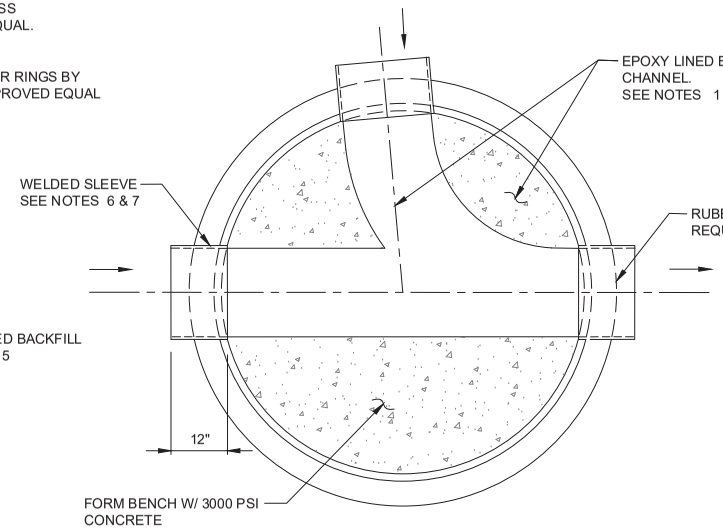
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DRAWING NO.
114A

114A.dwg December 10, 2025 - 10:17am

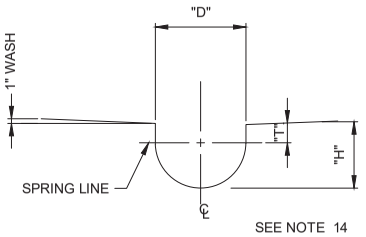


SECTIONAL VIEW
N.T.S.



BASE PLAN VIEW
N.T.S.

TABLE 1		
"D"	"T"	"H"
INSIDE DIA. PIPE (IN.)	VERTICAL TANGENT (IN.)	HEIGHT OF WATER TABLE (IN.)
8	2 1/2	6 1/2
10	3	8
12	3 1/2	9 1/2
15	4 1/2	12
18	5 1/2	14 1/2
21	6 1/2	17
24	7 1/2	19 1/2
27	8	21 1/2
30	9	24
33	10	26 1/2
36	11	29



DETAIL "H"
NTS

NOTES:

1. THE INVERT CHANNELS AND BENCH SHALL BE FORMED USING 3,000 PSI CONCRETE AND COATED WITH EPOXY LINER.
2. CONCRETE TO BE PLACED IN MANHOLE AFTER THE MANHOLE HAS BEEN SET IN PLACE.
3. UNLESS SHOWN OTHERWISE ON DRAWINGS AND APPROVED BY FCPW, SAND CRUSHED STONE, OR PEA GEAVEL SHALL BE USED FOR BACKFILL AROUND THE MANHOLE FOR A MINIMUM DISTANCE OF 3.5 FEET FROM THE OUTSIDE SURFACE AND EXTENDING THE FULL HEIGHT OF THE MANHOLE.
4. BACKFILL SHALL BE PLACED IN LAYERS OF NOT MORE THAN 12 LOOSE MEASURE INCHES AND COMPACTED TO A MINIMUM OF 90% STANDARD PROCTOR DENSITY OR AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION.
5. COMPACT TO 95% STANDARD PROCTOR DENSITY UNLESS OTHEWISE APPROVED BY FCPW.
6. ALTERNATE MEANS OF PIPE PENETRATIONS AND CONNECTIONS MAY BE USED AS RECOMMENDED BY MANHOLE MANUFACTURER AND APPROVED BY FCPW.
7. ALL HDPE TO HDPE SURFACES MUST BE FULL PENETRATION EXTRUSION WELDS UNLESS OTHERWISE SPECIFIED.
8. PROVIDE AN ANCHOR CONNECTION RING TO BE USED IN CONNECTION WITH A CONCRETE BALLAST.
9. CONCRETE BALLAST REQUREMENTS SHALL BE AS DETERMINED BY DESIGN ENGINEER AND AS APPROVED BY FCPW.
10. RISER RINGS SHALL HAVE A CLEAR OPENING EQUAL OR LESS THAN THE OPENING OF THE FRAME.
11. APPLY A 3/8-INCH BEAD OF BUTYL RUBBER SEALANT BETWEEN THE FOLLOWING CONTACTING SURFACES:
    - MANHOLE FRAME AND RISER RINGS
    - RISER RINGS
    - RISER RING AND HDPE MANWAY
12. CONCRETE CAP SHALL BE DESIGNED TO DISPERSE LOAD INTO THE SOIL AND AVOID DIRECTLY ONTO THE MANHOLE.
13. DESIGN OF THE CONCRETE CAP SHALL BE AS DETERMINED BY THE ENGINEER.
14. "H" & "T" DIMENSION APPLY ONLY AT THE UPSTREAM EDGE OF MANHOLE.
15. HEIGHT OF MANWAY TO BE DETERMINED BY CONCRETE CAP DESIGN.
16. ALL HDPE MANHOLES TO HAVE A MINIMUM THICKNESS OF SDR DIPS 17.

FULTON COUNTY STANDARD DETAIL 114B

STANDARD SEWER MANHOLE HDPE MANHOLES - TRAFFIC

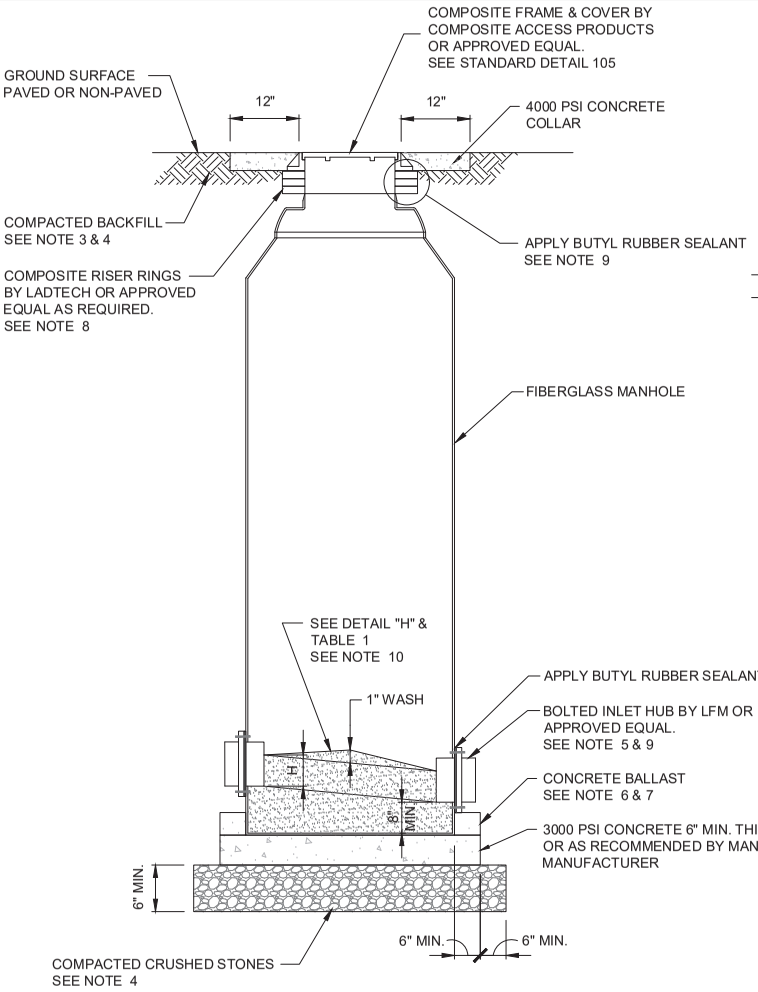
DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

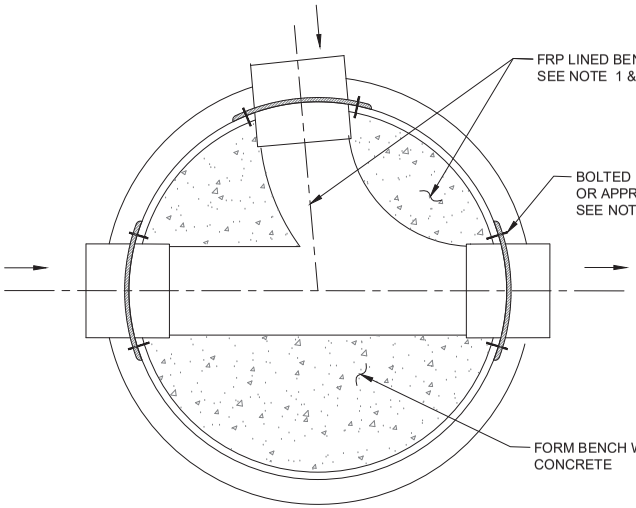
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114B

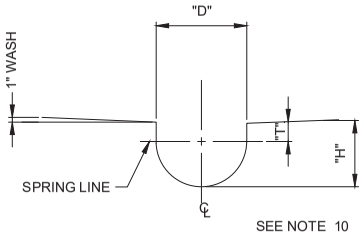
114B.dwg December 10, 2025 - 10:17am



SECTIONAL VIEW
N.T.S.



BASE PLAN VIEW
N.T.S.



DETAIL "H"
NTS

TABLE 1		
"D"	"T"	"H"
INSIDE DIA. PIPE (IN.)	VERTICAL TANGENT (IN.)	HEIGHT OF WATER TABLE (IN.)
8	2 1/2	6 1/2
10	3	8
12	3 1/2	9 1/2
15	4 1/2	12
18	5 1/2	14 1/2
21	6 1/2	17
24	7 1/2	19 1/2
27	8	21 1/2
30	9	24
33	10	26 1/2
36	11	29

NOTES:

1. THE INVERT CHANNELS AND BENCH SHALL BE FORMED USING 3,000 PSI CONCRETE AND COMPLETELY ENCLOSED IN A MINIMUM 1/4-INCH LAYER OF FIBERGLASS CHOP.
2. THE FIBERGLASS ENCLOSURE FOR THE INVERT AND BENCH AREA SHALL BE PROVIDED AND INSTALLED IN THE MANHOLE BY THE MANUFACTURER.
3. UNLESS SHOWN OTHERWISE ON THE DRAWINGS AND APPROVED BY FCPW, SAND, CRUSHED STONE, OR PEA GRAVEL SHALL BE USED FOR BACKFILL AROUND THE MANHOLE FOR A MINIMUM DISTANCE OF ONE FOOT FROM THE OUTSIDE SURFACE AND EXTENDING FROM THE BOTTOM OF THE EXCAVATION TO THE TOP OF THE REDUCER SECTION.
4. BACKFILL SHALL BE PLACED IN LAYERS OF NOT MORE THAN 12 LOOSE MEASURE INCHES AND COMPACTED TO 95% STANDARD PROCTOR DENSITY, UNLESS OTHERWISE APPROVED BY FCPW.
5. ALTERNATE MEANS OF PIPE PENETRATIONS AND CONNECTIONS MAY BE USED AS RECOMMENDED BY MANHOLE MANUFACTURER AND APPROVED BY FCPW.
6. PROVIDE AN ANCHOR CONNECTION RING TO BE USED IN CONJUNCTION WITH A CONCRETE BALLAST
7. CONCRETE BALLAST REQUREMENTS SHALL BE AS DETERMINED BY DESIGN ENGINEER AND AS APPROVED BY FCPW.
8. RISER RINGS SHALL HAVE A CLEAR OPENING EQUAL OR LESS THAN THE OPENING OF THE FRAME.
9. APPLY A 3/8-INCH BEAD OF BUTYL RUBBER SEALANT BETWEEN THE FOLLOWING CONTACTING SURFACES:
   - MANHOLE FRAME AND RISER RINGS
   - RISER RINGS
   - RISER RING AND FIBERGLASS CONE SECTION LIP
   - INLET HUB AND MANHOLE EXTERIOR
10. "H" & "T" DIMENSIONS APPLY ONLY AT THE UPSTREAM, INSIDE EDGE OF MANHOLE.
11. MANHOLE SHALL BE DESIGNED FOR LOAD RATING OF 40,000 LBS.

FULTON COUNTY STANDARD DETAIL 114C

STANDARD SEWER MANHOLE FIBERGLASS MANHOLES

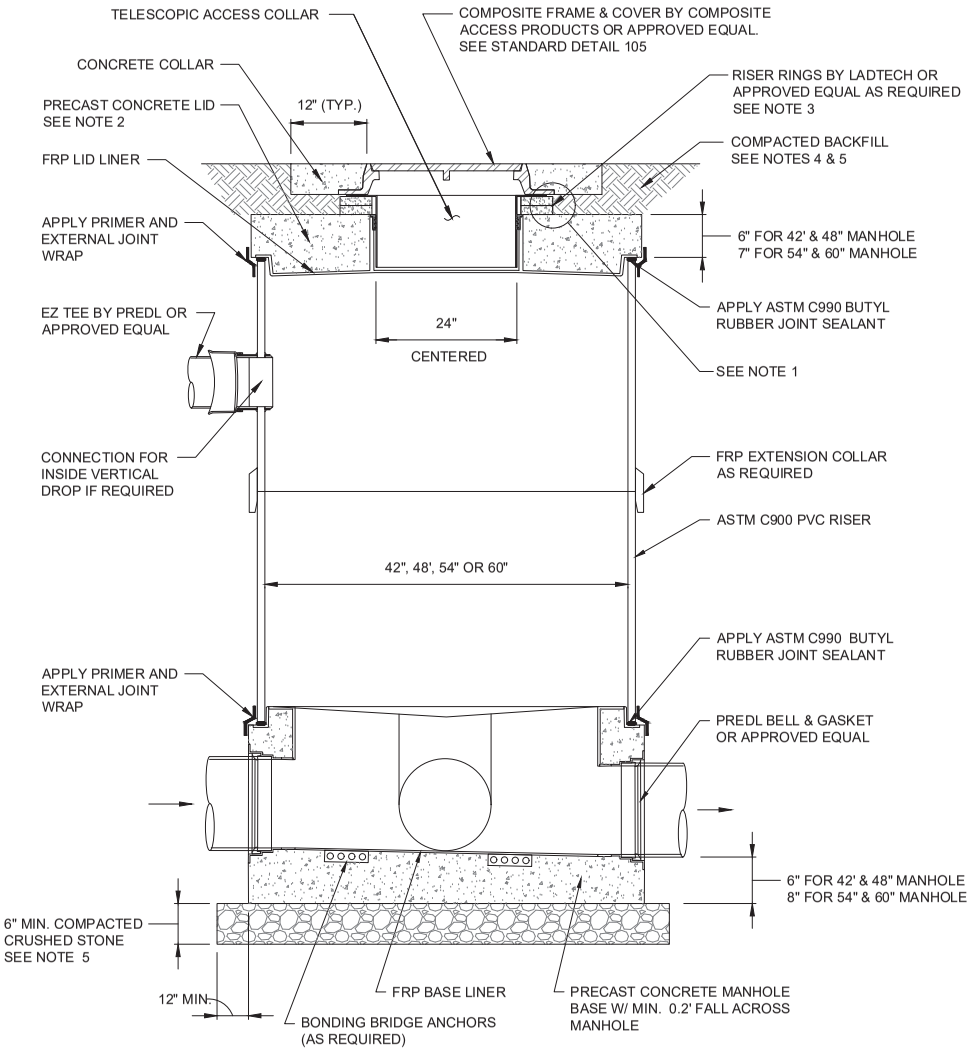
DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

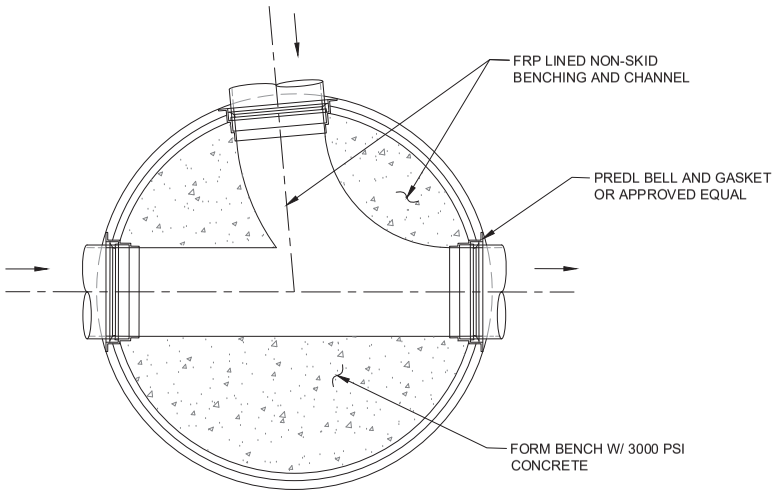
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DRAWING NO.
114C

114C.dwg December 10, 2025 - 10:17am



SECTION VIEW
N.T.S.



BASE PLAN VIEW
N.T.S.

NOTES:

1. APPLY A 3/8-INCH BEAD OF BUTYL RUBBER SEALANT BETWEEN THE FOLLOWING CONTACTING SURFACE:
   - PRECAST CONCRETE LID AND RISER RINGS
   - RISER RINGS
   - RISER RINGS AND TELESCOPIC ACCESS COLLAR
   - TELESCOPIC ACCESS COLLAR AND MANHOLE FRAME
2. PRECAST CONCRETE LID SHALL BE H20 RATED PER ASTM C478.
3. RISER RINGS SHALL HAVE A CLEAR OPENING EQUAL OR LESS THAN THE OPENING OF THE FRAME.
4. UNLESS SHOWN OTHERWISE ON DRAWINGS AND APPROVED BY FCPW, SAND, CRUSHED STONE OR PEA GRAVEL SHALL BE USED FOR BACKFILL AROUND THE MANHOLE FOR A MINMUM DISTANCE OF ONE FOOT FROM THE OUTSIDE SURFACE AND EXTENDING FROM THE BOTTOM OF THE EXCAVATION TO THE TOP OF THE PRECAST CONCRETE LID.
5. BACKFILL SHALL BE PLACE IN LAYERS OF NOT MORE THAN 12 LOOSE MEASURE INCHES AND COMPACTED TO 95% STANDARD PROCTOR DENSITY, UNLESS APPROVED BY FCPW.

FULTON COUNTY STANDARD DETAIL 114D

STANDARD SEWER MANHOLE
PVC/PRECAST CONCRETE HYBRID MANHOLES

DATE	REVISIONS	DATE	REVISIONS

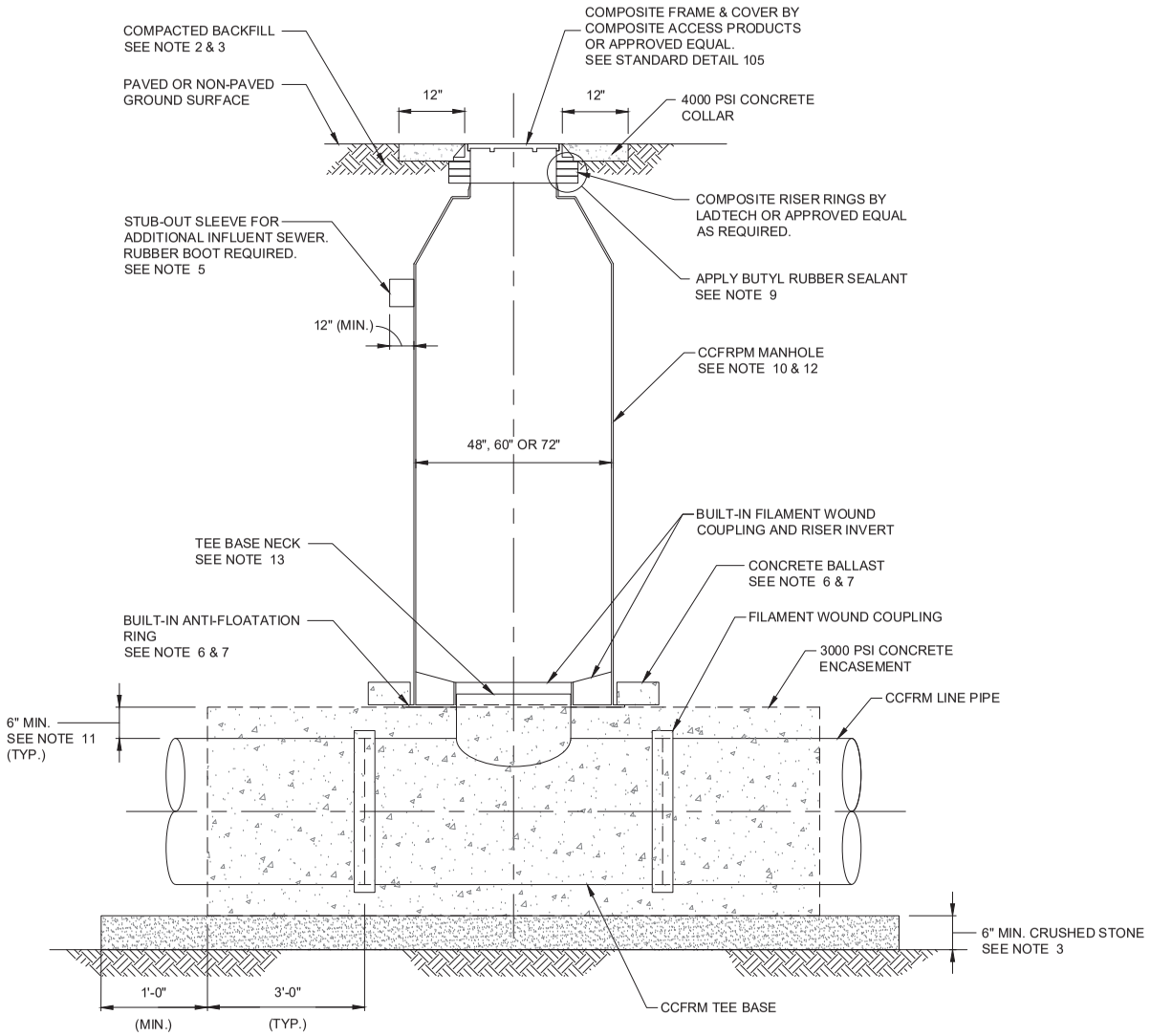
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

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DRAWING NO.
114D

114D.dwg December 10, 2025 - 10:17am



SECTIONAL VIEW
N.T.S.

NOTES:

1. THE MANHOLE BOTTOM SHALL HAVE AN INVERT AND FWC COUPLING BUILT-IN TO ACCEPT THE TEE BASE NECK AND FORM A WATER TIGHT CONNECTION.
2. UNLESS SHOWN OTHERWISE ON THE DRAWINGS AND APPROVED BY FCPW, SAND, CRUSHED STONE, OR PEA GRAVEL SHALL BE USED FOR BACKFILL AROUND THE MANHOLE FOR A MINIMUM DISTANCE OF ONE FOOT FROM THE OUTSIDE SURFACE AND EXTENDING FROM THE BOTTOM OF THE EXCAVATION TO THE TOP OF THE REDUCER SECTION.
3. BACKFILL SHALL BE PLACED IN LAYERS OF NOT MORE THAN 12 LOOSE MEASURE INCHES AND COMPACTED TO 95% STANDARD PROCTOR DENSITY, UNLESS OTHERWISE APPROVED BY FCPW.
4. PROVIDE VERTICAL INSIDE DROP INLET AS REQUIRED. SEE STANDARD DETAIL 115.
5. ALTERNATE MEANS OF PIPE PENETRATIONS AND CONNECTIONS MAY BE USED AS RECOMMENDED BY MANHOLE MANUFACTURER AND APPROVED BY FCPW.
6. PROVIDE AN ANTI-FLOATATION RING TO BE USED IN CONJUNCTION WITH A CONCRETE BALLAST.
7. CONCRETE BALLAST REQUREMENTS SHALL BE AS DETERMINED BY DESIGN ENGINEER AND AS APPROVED BY FCPW.
8. RISER RINGS SHALL HAVE A CLEAR OPENING EQUAL OR LESS THAN THE OPENING OF THE FRAME.
9. APPLY A 3/8-INCH BEAD OF BUTYL RUBBER SEALANT BETWEEN THE FOLLOWING CONTACTING SURFACES:
   - MANHOLE FRAME AND RISER RINGS
   - RISER RINGS
   - RISER RING AND FIBERGLASS CONE SECTION LIP
10. CENTRIFUGALLEY CAST FIBERGLASS REINFORCED POLYMER MORTAR (CCFRPM) MANHOLE SHALL HAVE A LIVE LOAD RATING OF 40,000 LBS.
11. ACTUAL DIMENSION OF CONCRETE ENCASEMENT MAY VARY AND SHALL BE DETERMINED BY DESIGN ENGINEER.
12. CCFRPM TEE BASE MANHOLE SHALL BE BY HOBAS OR APPROVED EQUAL.
13. SIZE OF TEE NECK SHALL BE AS BETERMINED BY DESIGN ENGINEER.

FULTON COUNTY STANDARD DETAIL 114E

STANDARD SEWER MANHOLE
TEE BASE MANHOLES

DATE	REVISIONS	DATE	REVISIONS

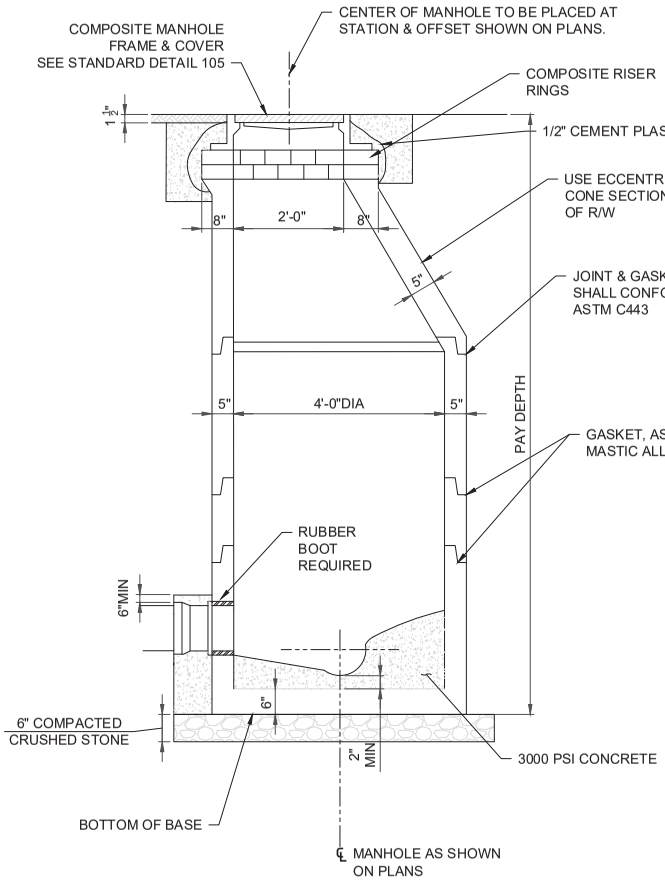
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

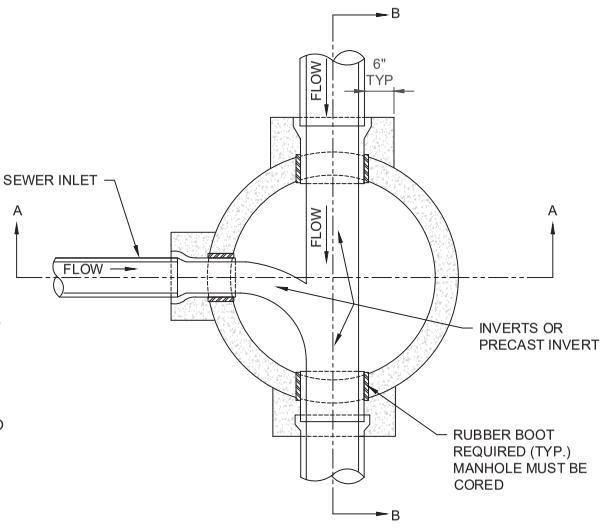
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114E

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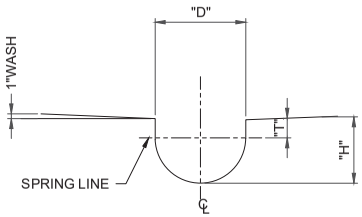


SECTION A-A
NTS



SECTION PLAN
STANDARD PRECAST
4'-0" DIAMETER MANHOLE
NTS

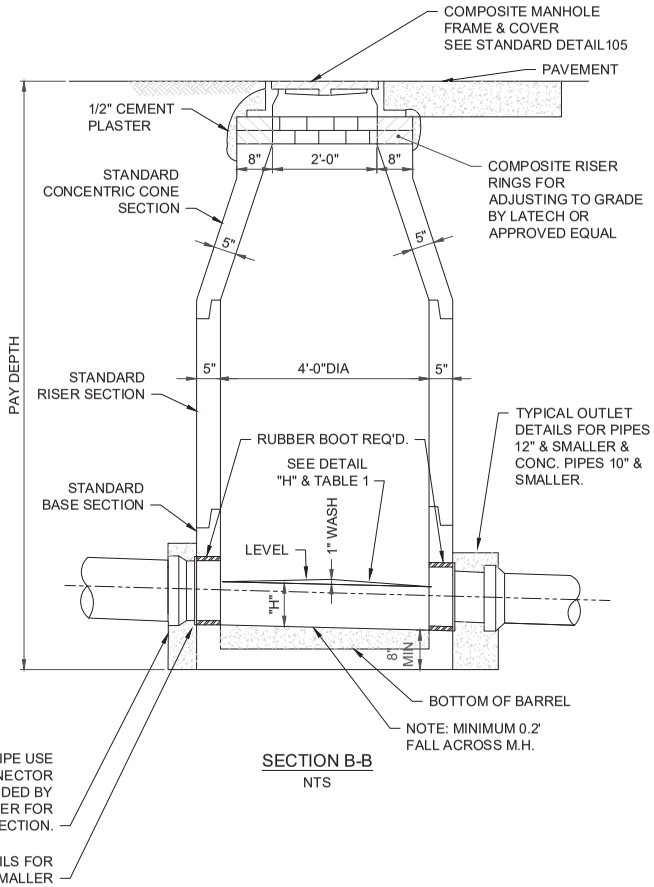
TABLE 1		
"D"	"T"	"H"
INSIDE DIA. PIPE (IN.)	VERTICAL TANGENT (IN.)	HEIGHT OF WATER TABLE (IN.)
8	2 1/2	6 1/2
10	3	8
12	3 1/2	9 1/2
15	4 1/2	12
18	5 1/2	14 1/2
21	6 1/2	17
24	7 1/2	19 1/2
27	8	21 1/2
30	9	24
33	10	26 1/2
36	11	29



DETAIL "H"
NOTE: "H" & "T" DIMENSIONS APPLY ONLY AT THE UPSTREAM, INSIDE EDGE OF M.H.
NTS

NOTES:

1. FOR OUTFALL LINES, MANHOLE TOP TO BE 18" TO 24" ABOVE SURROUNDING GROUND SURFACE.
2. ALL MANHOLES WITHIN TEN FEET OF PUBLIC RIGHT OF WAY SHALL BE TOPPED WITH A HEAVY DUTY TRAFFIC BEARING RING & COVER MOUNTED FLUSH TO EXISTING GRADE. LOADING SPECS. MAY BE REQUIRED FROM THE MANUFACTURER (RING & COVER).**
3. OPENING FOR PIPE IN M.H. TO BE NO GREATER THAN 4" GREATER IN DIAMETER THAN PIPE.
4. ECCENTRIC CONES MAY ONLY BE USED OUTSIDE OF ROW.
5. POLYMER REINFORCED CONCRETE MANHOLES MAY BE USED AS AN ALTERNATIVE. VERIFY USE WITH FULTON COUNTY ENGINEER.



SECTION B-B
NTS

NOTE: FOR PVC PIPE USE FLEXIBLE BODY CONNECTOR AS RECOMMENDED BY MANUFACTURER FOR MANHOLE CONNECTION.

TYPICAL INLET DETAILS FOR PIPES 12" AND SMALLER

FULTON COUNTY STANDARD DETAIL 114F

STANDARD SEWER MANHOLES
PRECAST MANHOLES

DATE	REVISIONS	DATE	REVISIONS

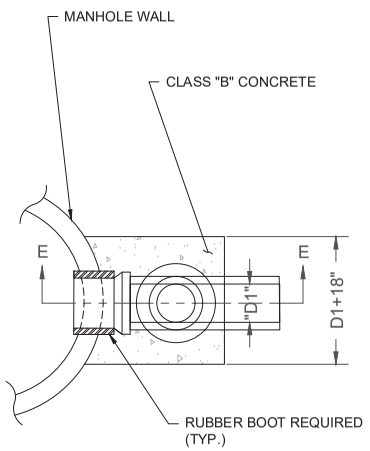
DGS/DRN/CHKD: MB/EB/ML
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DATE: 01-21-2026

FULTON COUNTY

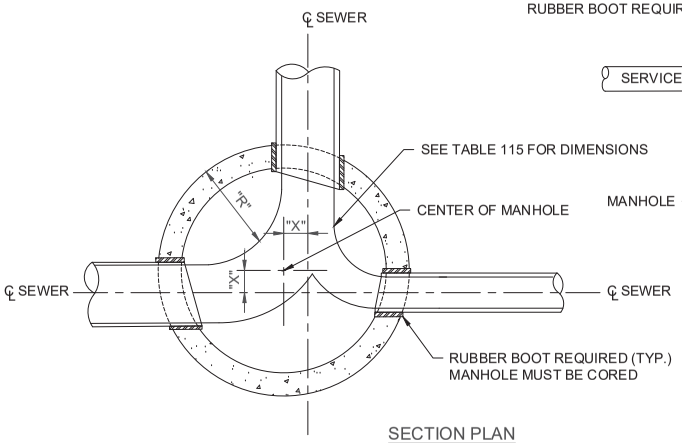
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DRAWING NO.
114F

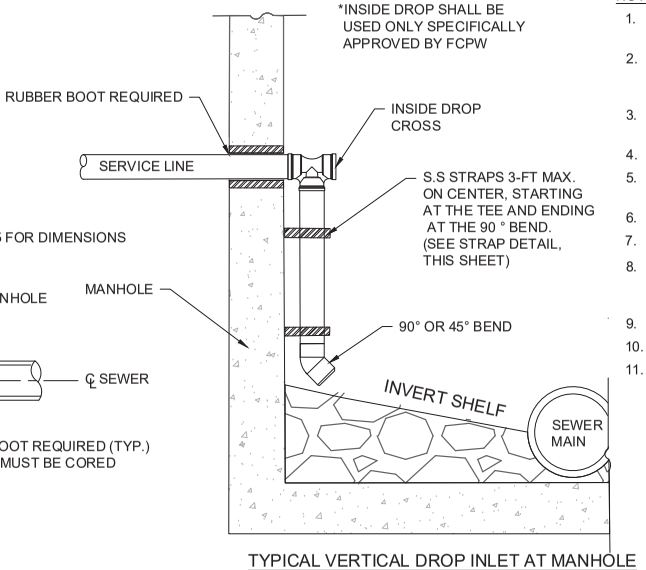
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PART PLAN



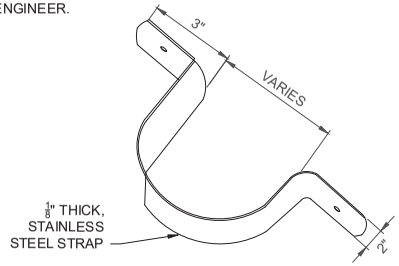
SECTION PLAN



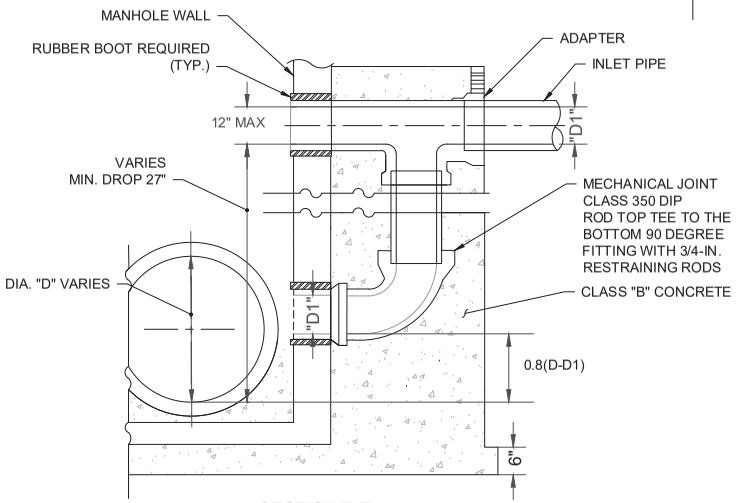
TYPICAL VERTICAL DROP INLET AT MANHOLE
(INSIDE DROP)*
NTS

NOTES:

1. IN WET CONDITIONS, ATTACH PIPE INSIDE OF MANHOLE. CONTACT PUBLIC WORKS.
2. CONTRACTOR MAY PROPOSE VERTICAL DROP ALTERNATIVES IN THE FIELD WITH THE INSPECTOR. INSPECTOR WILL APPROVE ALTERNATIVES.
3. PIPING CONFIGURATION TO BE USED ON ALL DROPS OVER 20 INCHES.
4. DROPS TO BE CONSTRUCTED OF SCHEDULE 80 PVC PIPE.
5. SERVICE LINE MAY NOT ENTER MANHOLE THROUGH CONE SECTION OR ANY JOINT.
6. THIS DETAIL SHALL NOT USED FOR FORCE MAINS
7. ALL MANHOLE CONNECTIONS SHALL BE CORED
8. USE $\frac{1}{2}$ INCH DIAMETER EXPANSION TYPE STAINLESS STEEL CINCH BOLTS WITH STAINLESS STEEL WASHER AND NUTS TO ATTACH STRAPS.
9. MINIMUM OF TWO STRAPS REQUIRED.
10. MINIMUM SIZE OF MANHOLE W/ INSIDE DROP SHALL BE 60-INCH.
11. CONCRETE BALLAST REQUIREMENT SHALL BE AS DETERMINED BY DESIGN ENGINEER.



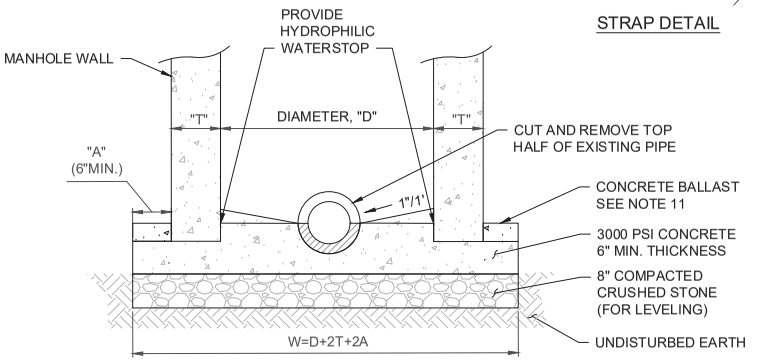
STRAP DETAIL



SECTION E-E

TYPICAL VERTICAL DROP INLET AT MANHOLE
(OUTSIDE DROP)
NTS

TABLE 115 STANDARD PRECAST MANHOLES SCHEDULE OF GOVERNING DIMENSIONS				
PIPE SIZE (IN.)	ANGLE (DEGREES)	M.H. DIA. (FT.)	"R" (IN.)	"X" (IN.)
8 thru 12	0 to 90	4	12	0
15	0 to 60	4	15	0
15	60 to 90	4	15	6
18	0 to 60	4	18	0
18	60 to 90	4	16	8
21	0 to 60	4	21	0
21	60 to 90	5	21	9
24	0 to 60	4	24	0
24	60 to 90	5	18	9
27	0 to 60	5	27	0
27	60 to 90	6	24	12
30	0 to 60	5	30	0
30	60 to 90	6	21	8
36	0 to 90	PRE-BED PIPE, M.H. BASE & ELBOW UNIT		



TYPICAL DETAIL AT MANHOLE CONSTRUCTED
OVER EXISTING PIPE
NTS

FULTON COUNTY STANDARD DETAIL 115

STANDARD SEWER MANHOLES
INSIDE AND OUTSIDE VERTICAL DROPS

DATE	REVISIONS	DATE	REVISIONS

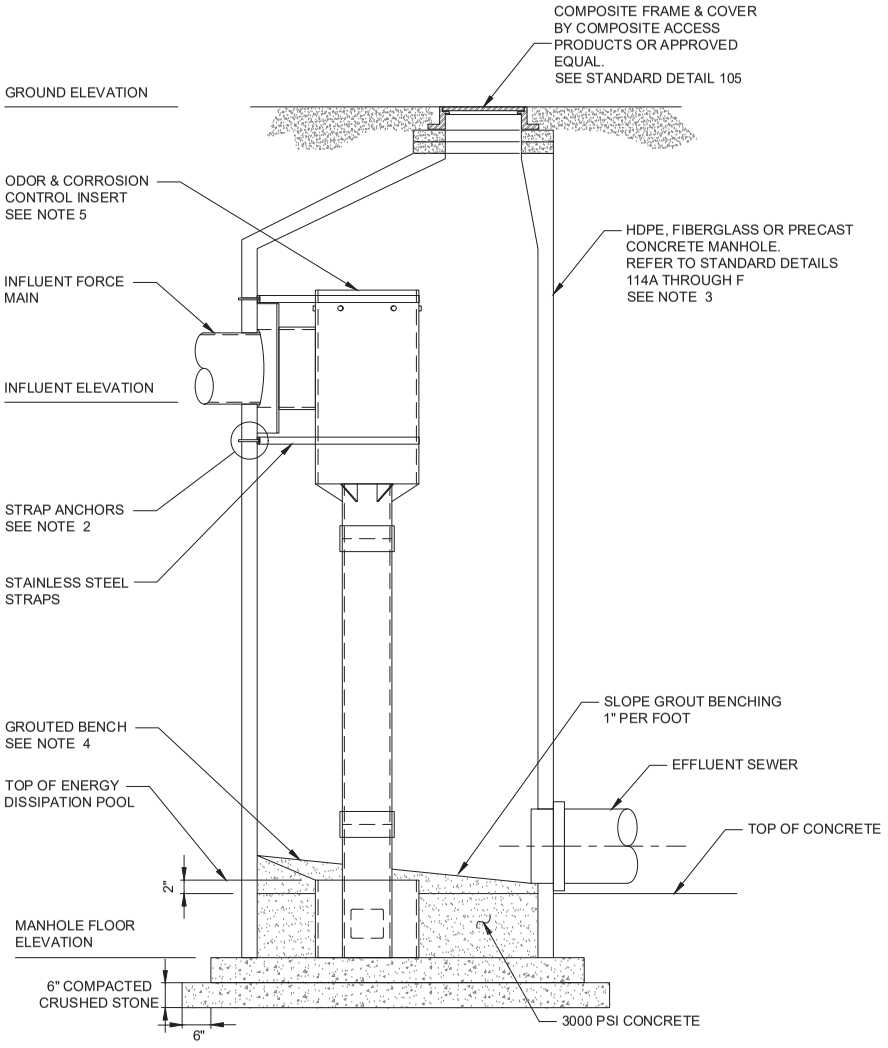
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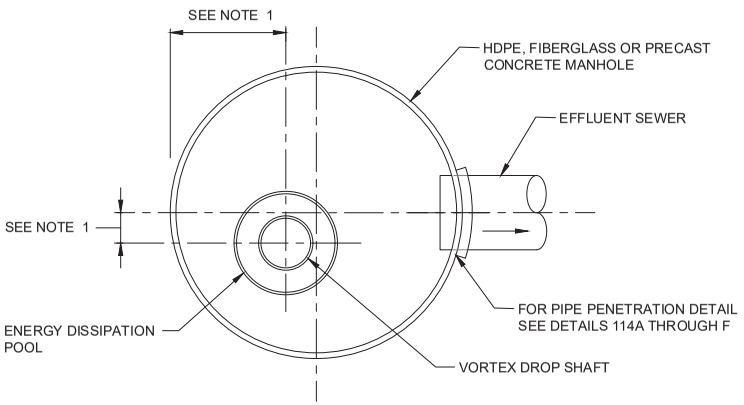
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SECTIONAL VIEW

N.T.S.



BASE PLAN VIEW

N.T.S.

NOTES:

1. DIMENSION TO BE DETERMINED BY EQUIPMENT FURNISHED.
2. VORTEX MANUFACTURER TO COORDINATE WITH MANHOLE MANUFACTURER & FURNISH ANCHORS COMPATIBLE WITH MANHOLE MATERIALS.
3. HDPE OR FIBERGLASS MANHOLES ARE PREFERRED. PRECAST CONCRETE MANHOLES MAY BE USED ONLY WITH FCPW APPROVAL AND SHALL BE PROVIDED WITH EPOXY COATING.
4. GROUTED BENCH SURFACES SHALL BE COATED WITH EPOXY.
5. ODOR AND CORROSION CONTROL INSERT SHALL BE VORTEX FLOW BY IPEX OR APPROVED EQUAL.
6. MANHOLE SHALL BE PROVIDED WITH AN ODOR REMOVAL SYSTEM DESIGNED BY THE ENGINEER.
7. ODOR REMOVAL SYSTEM SHALL BE PURAFIL OR EQUAL AS APPROVED BY FCPW.
8. MINIMUM MANHOLE DIAMETER SHALL BE 60-INCHES.

FULTON COUNTY STANDARD DETAIL 116

FORCE MAIN DISCHARGE MANHOLE DETAILS

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML

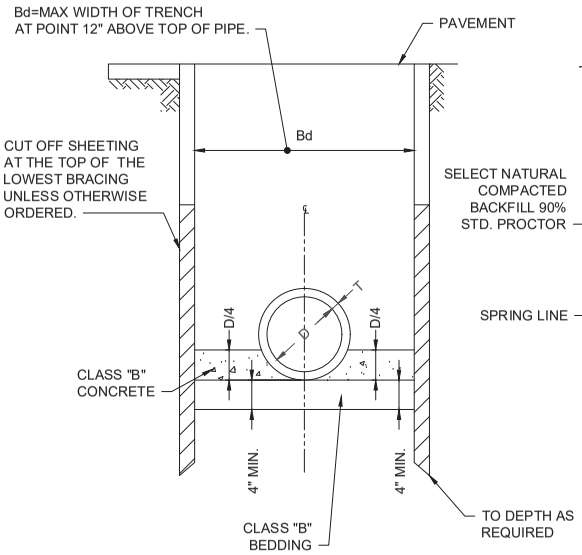
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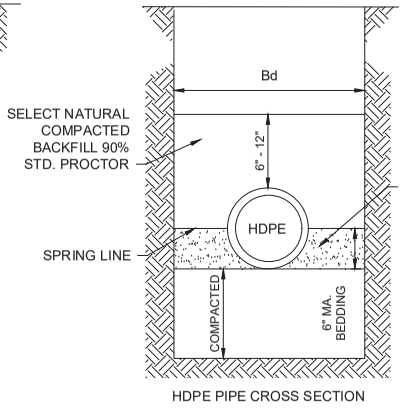
DATE: 01-21-2026

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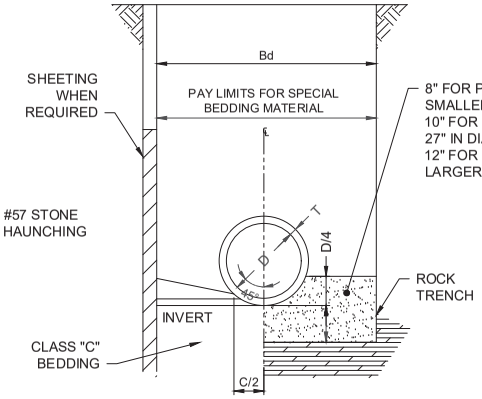
DRAWING NO. 116

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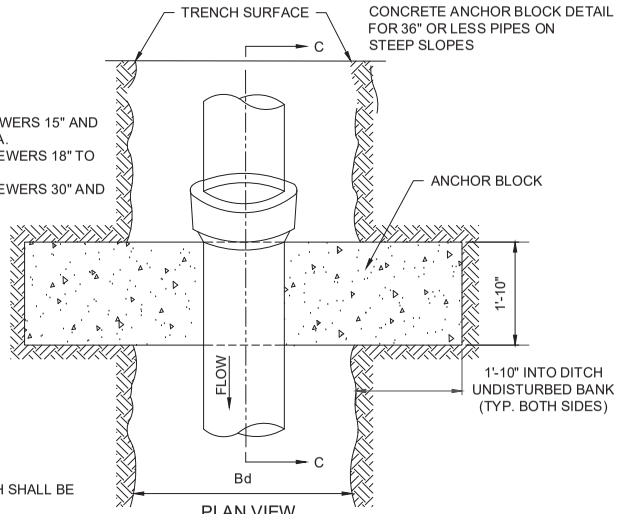
HDPE PIPE CROSS SECTION



TYPICAL TRENCH DETAILS

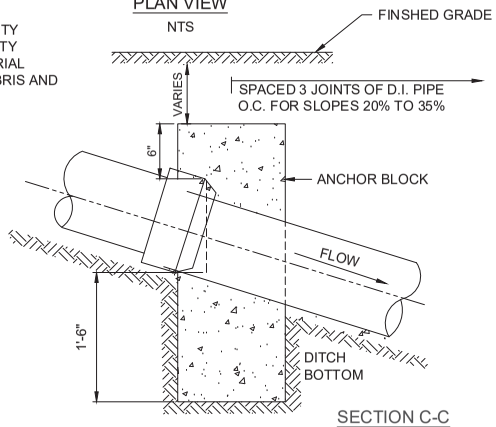
NTS

NOTE:
1. ALL O.S.H.A REGULATIONS MUST BE COMPLIED WITH.
2. AT DEPTHS EQUAL OR GREATER THAN 5'-0", THE WIDTH SHALL BE BASED ON APPROVED TRENCH BOX WIDTH.
3. COMPACTION NOTE:
   THE BACKFILL OF ALL TRENCHES TO BE COMPACTED TO A DENSITY OF 90% STANDARD PROCTOR OR AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION OVER PERMIT ISSUANCE. BACKFILL MATERIAL SHALL BE FREE FROM ROOTS, STUMPS, OR OTHER FOREIGN DEBRIS AND SHALL BE PLACED AT OR NEAR OPTIMUM MOISTURE.
4. REFER TO DETAIL 103 FOR ADDITIONAL INFORMATION.



PLAN VIEW

NTS



SECTION C-C

NTS

TABLE 117-1

A.S.T.M. A746 DUCTILE IRON GRAVITY SEWER PIPE							A.S.T.M.C76- REINF. CONC. PIPE					A.S.T.M. C14- EX. STR. CONC. SEWER PIPE				A.S.T.M. - D2321 DR 17 HDPE PIPE				
PSI	D. IN	T. IN	Bd FT		C FT	*CRADLE	T. IN	Bd FT		C FT	*CRADLE	T. IN	Bd FT	C FT	*CRADLE	T. IN	Bd FT			
350	6	0.38	2.33		0.41	0.034										0.390	2.33			
350	8	0.42	2.67		0.53	0.36						7 / 8	2.15	0.6	0.041	0.507	2.67			
350	10	0.48	2.83		0.65	0.0.43						1	2.33	0.7	0.047	0.632	2.83			
350	12	0.52	3.00		0.78	0.049	2	2.83				1-3/8	2.83	0.87	0.055	0.750	3.00			
250	15						2-1/4	3.13		0.95	0.06	1-5/8	3.13	1.08	0.066					
250	18	0.73	3.67		1.15	0.072	2-1/2	3.42		1.15	0.073	2	3.42	1.3	0.086	1.059	3.67			
200	21						2-3/4	3.71		1.35	0.088	2-1/4	3.71	1.5	0.105					
200	24	0.85	4.17		1.52	0.18	3	4.00		1.55	0.109	2-5/8	4.00	1.72	0.128	1.412	4.17			
150	27						3-1/4	4.29		1.75	0.131									
150	30	0.99	4.83		1.88	0.149	3-1/2	4.58		1.95	0.153					1.765	4.83			
150	33						3-3/4	4.88		2.2	0.184									
150	36	1.19	5.33		2.27	0.198	4	5.17		2.4	0.215									
150	42	1.32	6.00		2.63	0.253	4-1/2	5.88		2.6	0.288									
150	48	1.44	6.50		3	0.314	5	6.33		3	0.36									
150	54						5-1/2	6.92		3.5	0.44									
150	60						6	7.50		3.75	0.54									
100	66						6-1/2	8.08		4.25	0.63									
100	72						7	8.67		4.65	0.74									

NOTE: PAYMENT QUANTITY IN CU. YDS./LIN/FT. OF TRENCH FOR CLASS "B" CONC. IN CASE OF CLASS "A" BEDDING & FOR CRUSHED STONE BEDDING MATERIAL IN CASE OF CLASS "B" BEDDING, ADJUST QUANTITY OF CRADLE MATERIAL BASED ON Bd WIDTH IF DEPTH OF CRADLE EXCEEDS D/4.

FULTON COUNTY STANDARD DETAIL 117
PIPE SEWER DATA
DUCTILE IRON, CONCRETE AND HDPE PIPE INSTALLATION

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML

APPROVED: TM

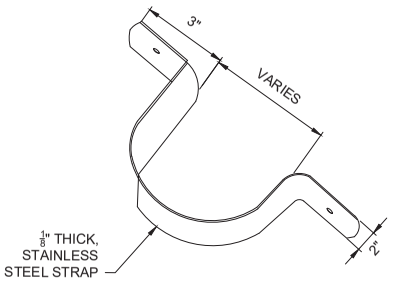
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TABLE 118-1			
ALLOWABLE SPANS FOR STEEL CASING PIPE			
CARRIER PIPE, RJ DIP DIAMETER (IN)	CASING PIPE, STEEL DIAMETER (IN)	MIN. CASING PIPE WALL THICKNESS (IN)	ALLOWABLE SPAN (FT)
6	14	0.3750	40
8	16	0.3750	45
10	18	0.3750	50
12	20	0.3750	50
14	24	0.3750	55
16	26	0.3750	55
18	30	0.3750	60
20	32	0.3750	60
24	36	0.4375	65
30	42	0.4375	65
36	48	0.5000	65
40	56	0.5000	65

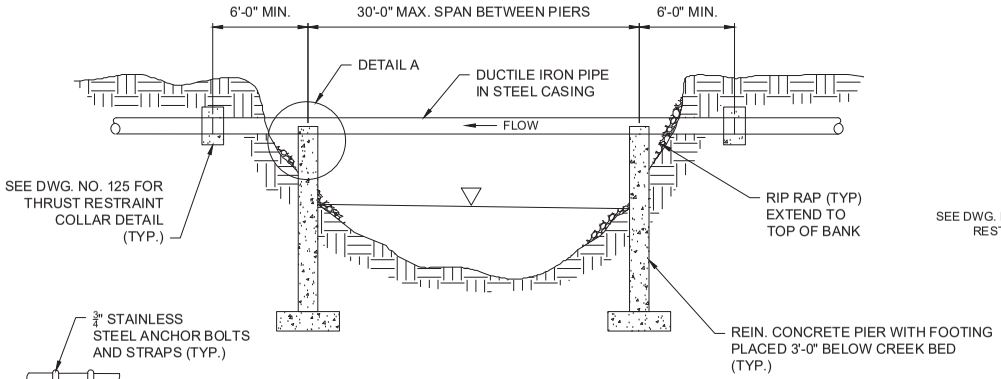


STRAP DETAIL

NTS

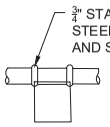
NOTES:

1. STEEL PIPE COATED INSIDE AND COATED AND WRAPPED OUTSIDE MAY BE USED.
2. WHERE SEWER PIPES RUN PARALLEL WITH CREEKS OR STREAMS, HDPE PIPE SHALL BE USED. RIP RAP IS REQUIRED WITHIN 10 FEET OF SEWER EASEMENT. ALL SEWER OUTFALLS MUST BE LEFT ACCESSIBLE TO COUNTY SERVICE TRUCKS. GATES (12 FEET) WILL BE REQUIRED ON FENCES ACROSS SEWER LINES.
3. CONCRETE STRENGTH TEST MAY BE REQUIRED FOR ALL POURED IN PLACE CONCRETE.
4. REFER TO FULTON COUNTY STANDARD 401 FOR RIP RAP SPECIFICATIONS.
5. WHENEVER POSSIBLE, NO PIERS SHALL BE PLACED IN NORMAL FLOW OF CREEK.
6. ALL AERIAL CROSSINGS MUST BE APPROVED IN WRITING BY FULTON COUNTY.
7. ANY SPAN EXCEEDING 30 FEET REQUIRES SUBMITTAL OF DESIGN CALCULATIONS.
8. ALL AERIAL CROSSINGS MUST AT MINIMUM HAVE STEEL CASING PIPE.
9. ALL PIER FOUNDATIONS SHALL CONFORM TO THE RECOMMENDATIONS OF A PROFESSIONAL ENGINEER LICENSED IN THE STATE GEORGIA.
10. AERIAL CROSSING SHALL BE APPROVED BY LOCAL AUTHORITY HAVING JURISDICTION PRIOR TO ACCEPTANCE BY FULTON COUNTY.
11. NO PLASTIC PIPE ALLOWED FOR AERIAL CROSSINGS.
12. STEEL CASING PIPE SHALL BE SPIRAL WELDED OR SMOOTH WALL SEEM LESS WITH A MINIMUM YIELD STRENGTH OF 36,000 PSI
13. EXPANSION JOINT BETWEEN PIERS SHALL BE INSTALLED IF REQUIRED BY DESIGN ENGINEER.
14. REFER TO DETAIL 100 FOR ADDITIONAL INFORMATION.



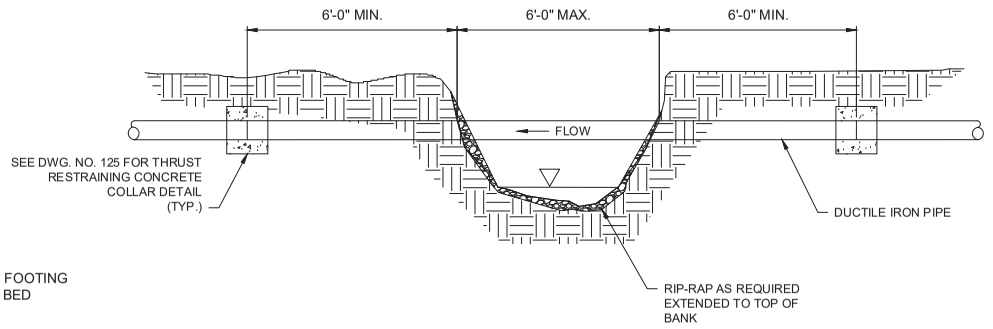
TYPICAL AERIAL STEEL OR D.I.P. PIPE CROSSING

NTS



DETAIL A

NTS



TYPICAL NON-PIER AERIAL D.I.P. SEWER LINE

NTS

FULTON COUNTY STANDARD DETAIL 118 SEWER PIPE DITCH CROSSING		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 118

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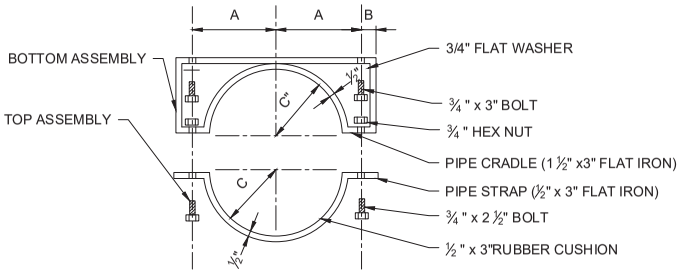
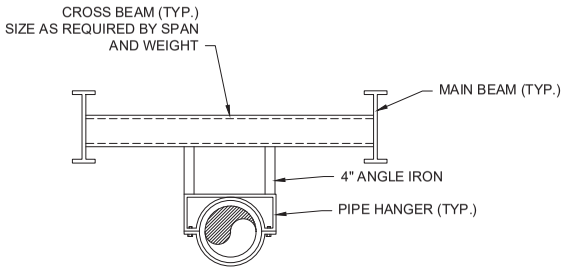
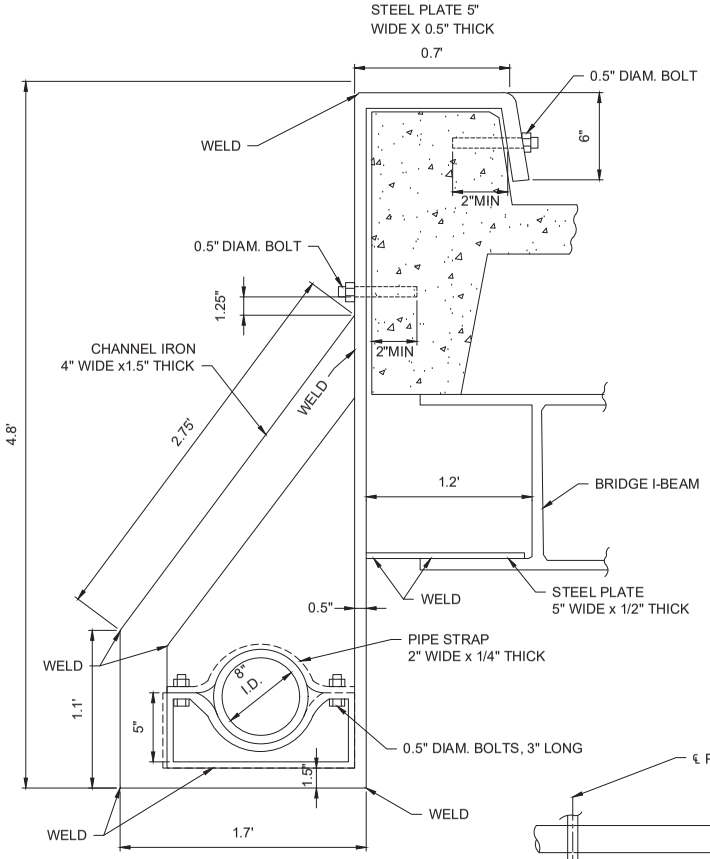


TABLE 119-1 PIPE HANGER DIMENSIONS			
PIPE DIA. (IN.)	"A" (IN.)	"B" (IN.)	"C" (RADIUS) (IN.)
8	6.53	2.00	4.53
12	8.60	2.00	6.60
16	10.70	2.00	6.70



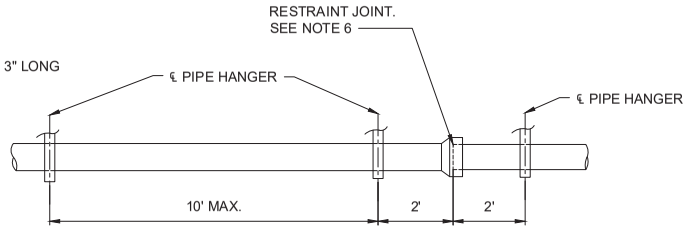
TYPICAL WATER MAIN SUPPORT DETAILS
NTS



PIPE HANGER SECTION
(FOR 8" DIAMETER PIPE)
NTS

NOTES:

1. PROVIDE TWO SUPPORTS PER JOINT, TWO FEET FROM JOINT
2. ENGINEER SHALL DESIGN SUPPORT DETAILS FOR WATER MAINS LARGER THAN 8" IN DIAMETER
3. STEEL SHALL BE A-36
4. WELDING SHALL BE E-70XX. ALL WELDS SHALL BE $\frac{3}{16}$" FILET WELDS. UNLESS NOTED OTHERWISE. ALL BUTT WELDS SHALL BE $\frac{1}{4}$" FULL PENETRATION WELDS.
5. ALTERNATE DESIGN MAY BE SUBMITTED BY THE ENGINEER FOR APPROVAL BY FULTON COUNTY PUBLIC WORKS DEPARTMENT
6. RESTRAINT JOINTS EQUAL TO AMERICAN "FLEX-RING" OR "LOK-RING", U.S. PIPE "TR FLEX" OR "HP LOK", CLOW "SUPER-LOCK", OR GRIFFIN "SNAP-LOK", SHALL BE USED ON ALL SUSPENDED PIPES PLUS TWO JOINTS OR 30' MINIMUM ON EITHER SIDE.
7. PRIMER SHALL BE NO. 1-8 RED PRIMER AND CONFIRM TO GEORGIA D.O.T. ARTICLE 870.2.01 PRIMER SHALL BE APPLIED TO A MINIMUM THICKNESS OF 4 MILS.
8. PAINT SHALL BE NO. 3-B GREEN, BRUSHING, ROLLER, AIRLESS TYPE AND CONFORM TO GEORGIA D.O.T. ARTICLE 870.2.01 PAINT SHALL BE APPLIED TO A MINIMUM THICKNESS OF 10 MILS.
9. TWO BOTTOM ASSEMBLIES USED TOGETHER MAY BE REQUIRED FOR SOME INSTALLATIONS.



PLAN FOR PIPE HANGER SPACING
NTS

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FULTON COUNTY STANDARD DETAIL 119

TYPICAL PIPE HANGER AND SUPPORT DETAILS

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
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DATE: 01-21-2026

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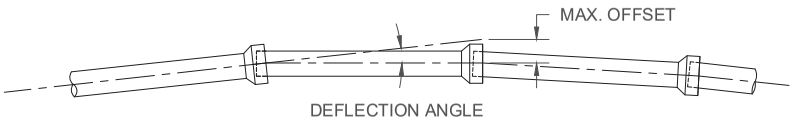
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119

NOTES:

1. WHEN A PIPE IS DEFLECTED, THE PIPE SHALL FIRST BE ASSEMBLED IN A STRAIGHT LINE, BOTH HORIZONTALLY AND VERTICALLY BEFORE THE DEFLECTION IS MADE.
2. FOR MECHANICAL JOINT PIPE, THE BOLTS SHALL BE PARTIALLY TIGHTENED BEFORE THE LENGTH OF PIPE IS DEFLECTED. ANY SUPPORTED PIPE, SHALL BE SO SUPPORTED THAT THERE IS ZERO DEFLECTION EXCEPT WHERE EITHER A HORIZONTAL OR VERTICAL CURVE ON A BRIDGE OR OTHER STRUCTURE IS INVOLVED.
3. THRUST RESTRAINTS MAY BE REQUIRED ON THE DEFLECTED JOINTS.

TABLE 120-1
MAXIMUM PERMISSIBLE JOINT DEFLECTIONS

NOMINAL PIPE SIZE (IN.)	PUSH-ON JOINT (18 FT. JOINTS)		MECHANICAL JOINT (18 FT. JOINTS)	
	DEFLECTION ANGLE (DEG.)	MAX. OFFSET (IN.)	DEFLECTION ANGLE (DEG.)	MAX. OFFSET (IN.)
3	5	19	8	31
4	5	19	8	31
6	5	19	7	27
8	5	19	5	20
10	5	19	5	20
12	5	19	5	20
14	3	11	3.5	13.5
16	3	11	3.5	13.5
20	3	11	3	11
24	3	11	2	9
30	3	11	---	---
36	3	11	---	---
42	3	11	---	---
48	3	---	---	---



DUCTILE IRON PIPE DEFLECTION DETAIL
NTS

TABLE 120-2
MECHANICAL JOINT BOLT USAGE CHART

NOMINAL PIPE DIAMETER (IN.)	BELL DEPTH (IN.)	BOLTS				APPROX. JOINT ACCESSORY WEIGHT (LBS.)
		DIAMETER (IN.)	LENGTH (IN.)	NUMBER PER JOINT	REC. TORQUE (FT.-LBS.)	
4	2.5	0.75	3.5	4	75-90	10
6	2.5	0.75	3.5	6	75-90	16
8	2.5	0.75	4	6	75-90	25
10	2.5	0.75	4	8	75-90	30
12	2.5	0.75	4	8	75-90	40
14	3.5	0.75	4.5	10	75-90	45
16	3.5	0.75	4.5	12	75-90	55
18	3.5	0.75	4.5	12	75-90	65
20	3.5	0.75	4.5	14	75-90	85
24	3.5	0.75	5	16	75-90	105
30	4	1	6	20	100-120	220
36	4	1	6	24	100-120	285
42	4	1.25	6.5	28	120-150	400
48	4	1.25	6.5	32	120-150	475

FULTON COUNTY STANDARD DETAIL 120

PIPE JOINT DEFLECTION AND BOLT USAGE

DATE	REVISIONS	DATE	REVISIONS

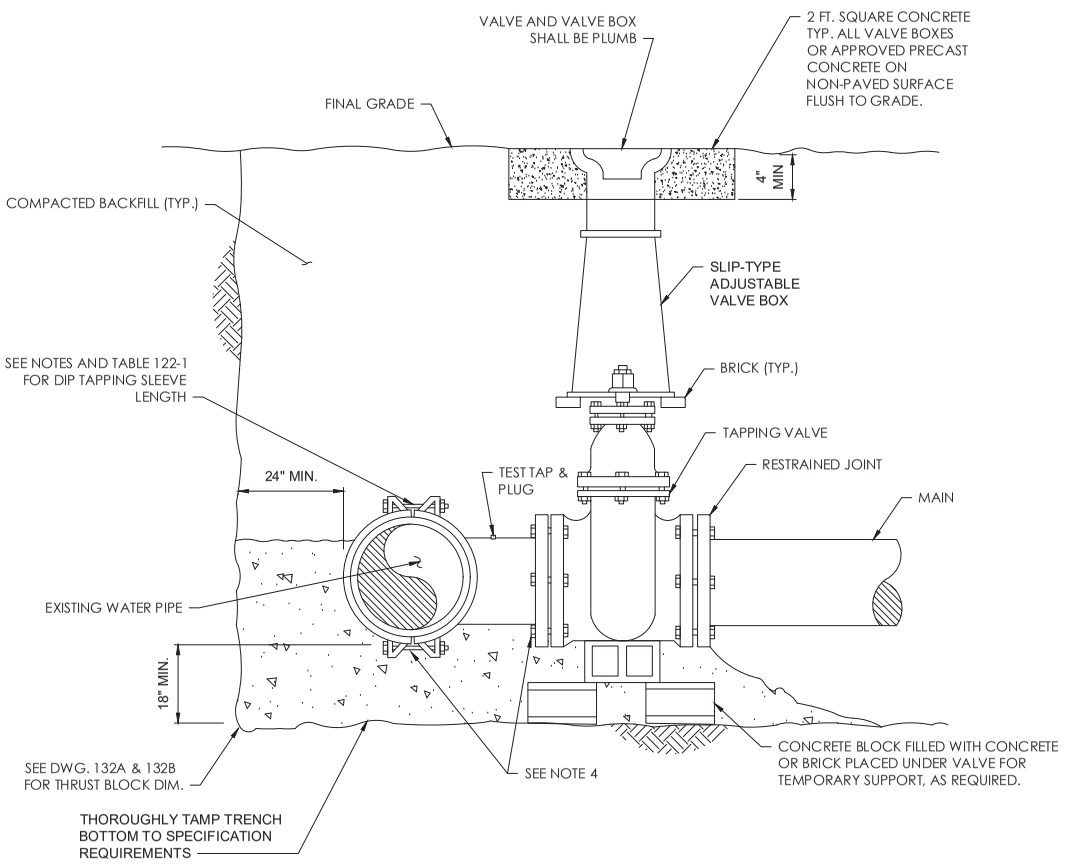
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NOTES:

1. ALL TAPPING SLEEVES AND VALVES SHALL BE HYDROSTATICALLY TESTED PRIOR TO TAP.
2. TEMPORARILY SUPPORT TAPPING SLEEVE AND VALVE PRIOR TO HYDROSTATIC TESTING; UPON ACCEPTANCE OF TEST, POUR INDICATED PERMANENT CONCRETE BLOCK AND SUPPORT PAD.
3. MAKE TAP, LINE EXTENSION AND BACKFILL.
4. COVER GLANDS AND BOLTS WITH HEAVY POLYETHYLENE SHEETING TO KEEP CONCRETE FROM BONDING. TYPICAL WHENEVER BOLTS OR GLANDS MAY BE "WRAPPED-UP" IN CONCRETE.
5. COAT TAPPING SLEEVE AND BOLTS WITH AN APPROVED BITUMASTIC COATING BEFORE POURING CONCRETE. TYPICAL FOR ALL STEEL INCLUDING RODS, COUPLINGS, STRAPS, AND OTHER BURIED STEEL. SEE NOTE 4, DETAIL 127 FOR COATING.
6. WORKMEN INSTALLING TAPPING SLEEVE AND VALVE SHALL FOLLOW MANUFACTURER'S INSTALLATION PROCEDURES AND THE REQUIREMENTS OF FULTON COUNTY ENGINEER'S OFFICE.

TABLE 122-1
MAXIMUM TAPPING SLEEVE LENGTH

MAIN & TAP (IN. NOMINAL)	LENGTH ALONG RUN (IN.)
6x2, 6x3, 6x4, 6x6	18
8x2, 8x3, 8x4, 8x6	19
8x8	21
10x2, 10x3, 10x4, 10x6	19
10x8, 10x10	23
12x2, 12x3, 12x5, 12x6	19
12x8	21
12x10, 12x12	25

FULTON COUNTY STANDARD DETAIL 122

TAPPING SLEEVE AND VALVE INSTALLATION DETAILS

DATE	REVISIONS	DATE	REVISIONS

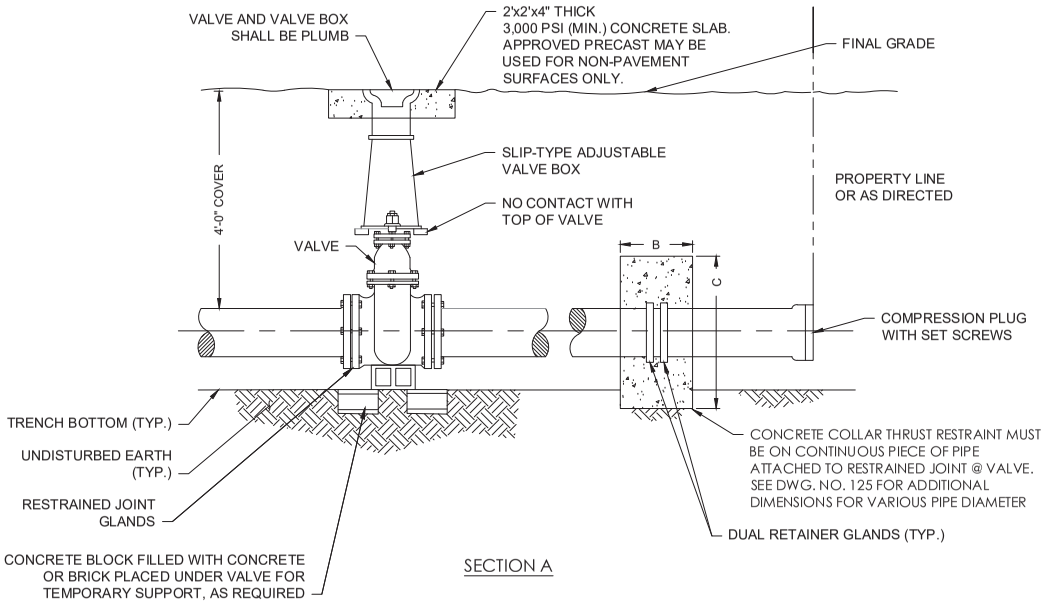
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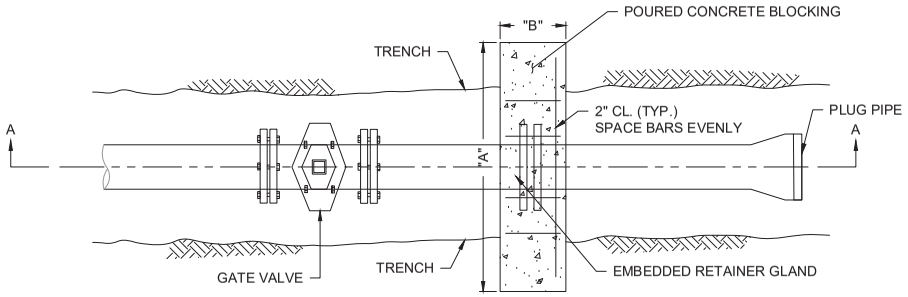
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DRAWING NO.
122

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SECTION A



PLAN VIEW
NTS

MAIN EXTENSION BLOCKING DETAIL
NTS

NOTES:

1. STUB OUT MUST BE HYDROSTATICALLY TESTED WITH REST OF WATER MAIN.
2. IN LIEU OF SLIP-JOINT AND COMPRESSION PLUG, M.J. JOINTS MAY BE USED WITH M.J. PLUGS.
3. REFER TO DWG. NO. 127 FOR RODDING RESTRAINTS.
4. ANCHOR BLOCKING DETAIL TO BE USED AT THE END OF ANY COUNTY ROAD WHERE WATER LINE MAY BE EXTENDED AT A FUTURE DATE.
5. ALL CONCRETE TO BE 3000 PSI.
6. ALL STEEL TO BE 60,000 PSI.
7. TERMINATION DETAIL FOR LARGER DIAMETER PIPE SHALL BE DETERMINED FOR EACH PROJECT.

TABLE 124-1
MAIN EXTENSION BLOCKING DIMENSIONS

PIPE SIZE (IN.)	"A" (IN.)	"B" (IN.)	"C" (IN.)	REQ'D STEEL (EA. WAY)
8	36	18	36	4 - #4
10	48	18	42	4 - #4
12	54	24	54	4 - #4
16	78	24	60	6 - #4

FULTON COUNTY STANDARD DETAIL 124

STUB OUT AND EXTENSION DETAILS

DATE	REVISIONS	DATE	REVISIONS

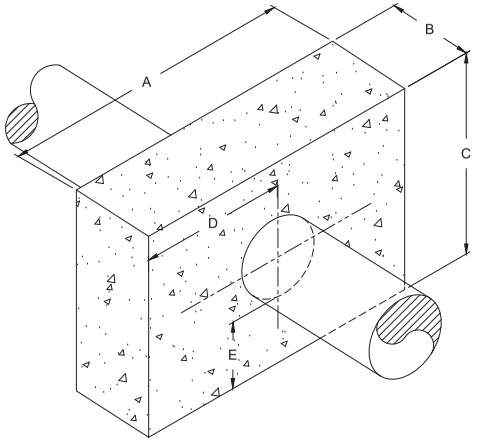
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APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

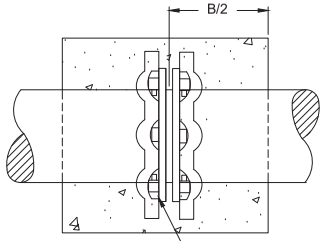
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DRAWING NO. 124

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TYPICAL DETAIL - ISOMETRIC VIEW
NTS



TORQUE SET SCREWS IN ACCORDANCE WITH RETAINER GLAND MANUFACTURER'S RECOMMENDATIONS. INSPECTOR MUST WITNESS INSTALLATION.

TYPICAL DETAIL - ELEVATION
NTS

NOTES:

1. ALL MAINS GREATER THAN 16-IN. NOMINAL DIAMETER SHALL BE INDIVIDUALLY CALCULATED BY THE FULTON COUNTY ENGINEERING DEPARTMENT.
2. SOIL CONDITIONS SHALL BE VERIFIED BY THE ENGINEER BEFORE THRUST RESTRAINT DESIGN IS IMPLEMENTED.
3. CONCRETE SHALL BE POURED AGAINST UNDISTURBED EARTH EXCEPT WHERE FORMWORK IS A MUST. FORMWORK MUST BE REMOVED AFTER CONCRETE IS CURED.
4. PIPE MUST BE DUCTILE IRON.

DESIGN DATA:

1. COLLAR DIMENSIONS ARE BASED ON A SOIL BEARING CAPACITY OF 2,000 POUNDS PER SQUARE FOOT, A RATED TEST PRESSURE OF 250 POUNDS PER SQUARE INCH (PSI), AND 3,000 PSI CLASS "A" CONCRETE.
2. UNDER ADVERSE CONSTRUCTION CONDITIONS, CONCRETE SHALL BE "HIGH EARLY" TYPE.

TABLE 125-1
MINIMUM DIMENSIONS FOR CONCRETE COLLAR ON DUCTILE IRON PIPE
TO BE USED WITH EMBEDDED DUCTILE IRON RETAINER GLAND

PIPE SIZE (IN.)	"A"	"B" (IN.)	"C"	"D"	"E"	VOLUME (CY)	CONCRETE WEIGHT (LBS)	THRUST (LBS)
4	2'-6"	12	2'-6"	1'-3"	1'-0"	0.23	919	4,524
6	2'-9"	12	2'-9"	1'-4½"	1'-1"	0.27	1,095	9,348
8	3'-0"	18	3'-0"	1'-6"	1'-2"	0.47	1,924	16,082
10	4'-0"	18	3'-6"	2'-0"	1'-4"	0.74	2,999	24,192
12	4'-6"	24	4'-6"	2'-3"	1'-9"	1.43	5,790	34,212
14	5'-6"	24	4'-6"	2'-9"	1'-8"	1.74	7,042	45,963
16	6'-6"	24	5'-0"	3'-3"	1'-10"	2.29	9,255	59,447

FULTON COUNTY STANDARD DETAIL 125

THRUST RESTRAINT CONCRETE COLLAR

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

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125

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TABLE 126-1 TIE ROD CHART				
FITTING	PIPE SIZE (IN.)	ROD DIAMETER (IN.)	NUMBER OF RODS	TOTAL THRUST (LBS)
TEES, PLUGS & VALVES	6	3/4	2/3	5,655
	8	3/4	2/3	10,055
	10	3/4	3	15,710
	12	3/4	4	22,620
	14	3/4	6	30,800
	16	3/4	4	40,215
	20	3/4	6	62,835
	24	3/4	8	90,480
	30	1	6	141,375
	36	1	6	203,595
11.25° BEND	6	3/4	2	1,110
	8	3/4	2	1,970
	10	3/4	2	3,080
	12	3/4	2	4,435
	14	3/4	2	6,035
	16	3/4	2	7,885
	20	3/4	2	12,320
	24	3/4	2	17,740
	30	1	2	27,720
	36	1	2	39,910
22.5° BEND	6	3/4	2	2,210
	8	3/4	2	3,925
	10	3/4	2	6,130
	12	3/4	2	8,825
	14	3/4	2	12,015
	16	3/4	2	15,690
	20	3/4	2	24,515
	24	3/4	2	35,305
	30	1	2	55,160
	36	1	2	79,435
45° BEND	6	3/4	2/3	4,430
	8	3/4	2/3	7,700
	10	3/4	2	12,025
	12	3/4	4	17,312
	14	3/4	4	23,565
	16	3/4	4	30,780
	20	3/4	4	48,090
	24	3/4	6	69,250
	30	1	4	108,205
	36	1	6	155,810

TABLE 126-1 TIE ROD CHART				
FITTING	PIPE SIZE (IN.)	ROD DIAMETER (IN.)	NUMBER OF RODS	TOTAL THRUST (LBS)
90° BEND	6	3/4	2/3	8,000
	8	3/4	3	14,220
	10	3/4	4	22,214
	12	3/4	6	32,000
	14	3/4	6	43,540
	16	3/4	4	56,870
	20	3/4	6	88,860
	24	3/4	8	127,960
	30	1	6	199,930
	36	1	6	287,900

NOTES:

1. ON PIPE SIZES 6-IN. TO 14-IN., ROD AND NUT WILL HAVE MIN. YIELD STRENGTH OF 50,000 PSI. ON PIPE SIZES 16-IN. TO 24-IN., ROD AND NUT WILL HAVE MIN. YIELD STRENGTH OF 100,000 PSI.
2. RODS SHALL HAVE 6 IN. OF THREAD ON EACH END.
3. ALL METAL TO BE CLEANED AND COATED WITH AN APPROVED PROTECTIVE COATING FOLLOWING INSTALLATION AND PRIOR TO BACKFILLING. SEE NOTE 4, DWG. NO. 127.

FULTON COUNTY STANDARD DETAIL 126

THRUST RESTRAINT TIE ROD CHART

DATE	REVISIONS	DATE	REVISIONS

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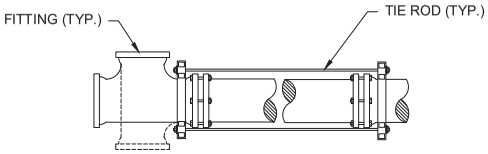
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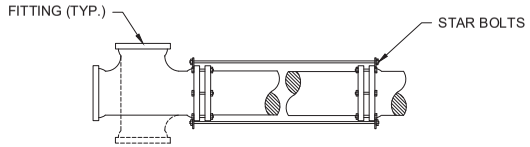
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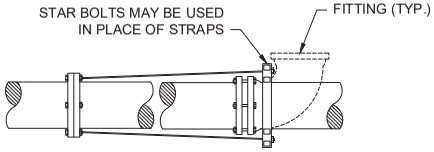
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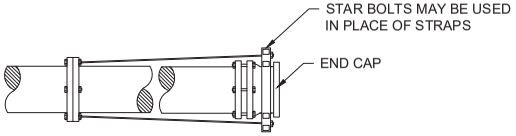
FITTING RESTRAINT - TYPE 1
STRAPS & RODS



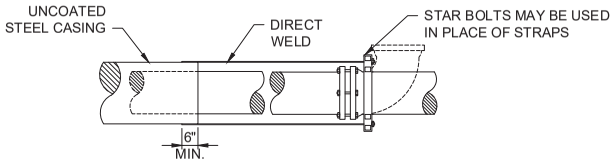
FITTING RESTRAINT - TYPE 2
STAR BOLTS & RODS



FITTING RESTRAINT - TYPE 3
FLANGE & MJ
FOR EXPOSED PIPES ONLY



FITTING RESTRAINT - TYPE 4
END CAP
FOR EXPOSED PIPES ONLY



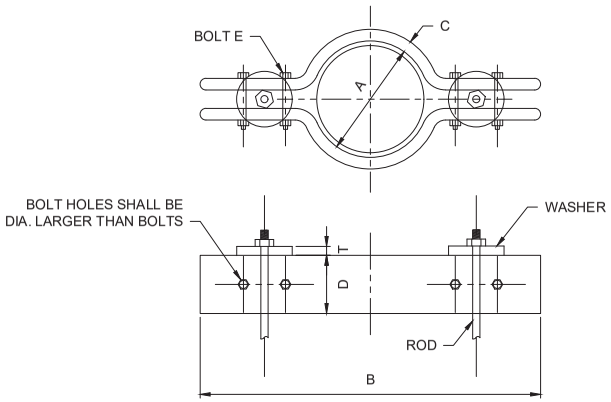
FITTING RESTRAINT - TYPE 5
DIRECT WELD TO STEEL CASING
(10" OR LESS MAINS ONLY)

NOTES:

1. SEE DWG. NO. 126 FOR NUMBER AND DIAMETER OF RODS REQUIRED.
2. SEE DWG. NO. 128 FOR STRAP AND ROD DETAILS.
3. BURIED PIPE SHALL BE BELL AND SPIGOT OR MECHANICAL JOINT. NO FLANGE JOINTS ALLOWED FOR BURIED PIPE.
4. AFTER INSTALLATION, TIE-RODS AND CLAMP ASSEMBLIES SHALL BE CLEANED AND THOROUGHLY COVERED WITH ROYSTON LABORATORIES INC. ROSKOTE MASTIC NO. A939 OR KOPPERS CO., INC. BITUMASTIC SUPERSERVICE BLACK OR APPROVED EQUIVALENT.
5. WHEN RESTRAINING FITTINGS TO STEEL CASING PIPE, TIE-RODS MUST BE WELDED DIRECTLY TO THE CASING - USE OF STAR BOLTS ARE PROHIBITED. CASING MUST BE FULLY WELDED THROUGHOUT ITS LENGTH AND BE A MINIMUM OF 30 FEET IN LENGTH. AREA TO BE WELDED MUST BE COMPLETELY BARE AND FREE OF ANY COATING MATERIAL.
6. FITTING SHOWN IS REPRESENTATIVE FOR ALL FITTINGS, VALVES, DEAD ENDS AND PLUGS.
7. RODS MUST HAVE A MINIMUM 6 INCHES OF THREAD ON EACH END.
8. ALL NUTS USED ON TIE RODS MUST HAVE A WASHER.
9. FOR RESTRAINING HPDE PIPE AT NON HDPE FITTINGS PROVIDE THE FOLLOWING:
   - MECHANICAL JOINT RESTRAINT - SERIES 2006PV BY EBBA IRON OR EQUAL.
   - MECHANICAL JOINT GLAND RESTRAINT - SERIES 15MJ00 BY EBBA IRON OR EQUAL.
   - PUSH-ON JOINT RESTRAINT - SERIES 15PF00 BY EBBA IRON OR EQUAL.
   - RESTRAINED FLANGE ADAPTOR (FOR EXPOSED PIPE ONLY) - SERIES 2100 BY EBBA IRON OR EQUAL.
10. FOR RESTRAINING PVC PIPE AT PIPE JOINTS AND FITTINGS PROVIDE THE FOLLOWING:
    - NON PVC MECHANICAL JOINT RESTRAINT - SERIES 2000PV BY EBBA IRON OR EQUAL.
    - NON PVC MECHANICAL JOINT GLAND RESTRAINT - SERIES 15MJ00 BY EBBA IRON OR EQUAL.
    - NON PVC PUSH-ON JOINT RESTRAINT - SERIES 15PF00 BY EBBA IRON OR EQUAL.
    - NON PVC RESTRAINED FLANGE ADAPTOR (FOR EXPOSED PIPE ONLY) - SERIES 2100 BY EBBA IRON OR EQUAL.
    - RESTRAINT HARNESS FOR PVC FITTINGS - SERIES 2500 BY EBBA IRON OR EQUAL.
    - RESTRAINT HARNESS FOR C900 PVC PIPES - SERIES 1900 BY EBBA IRON OR EQUAL.

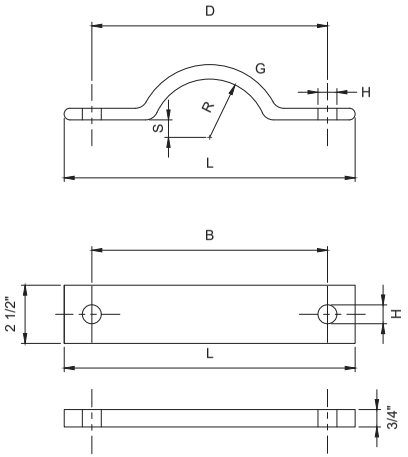
FULTON COUNTY STANDARD DETAIL 127 THRUST RESTRAINT TIE ROD INSTALLATION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 127

127-S.dwg December 10, 2025 - 10:18am



STEEL SOCKET CLAMP DETAIL

NTS



ANCHOR STRAP DETAIL

NTS

NOTES:

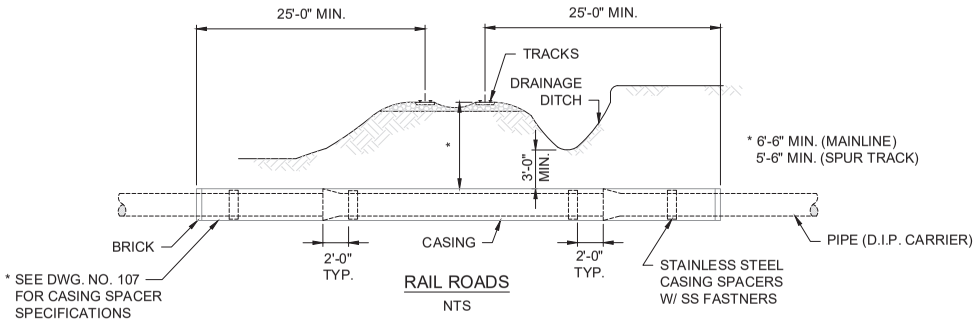
1. INSTALLATION AND MATERIAL OF RODS, CLAMPS, STRAPS, BOLTS AND WASHERS SHALL CONFORM TO THE NATIONAL FIRE CODE - NFFA NO. 24 (LATEST REVISION),
2. YOKES AND ANCHOR STRAPS FOR FITTINGS LARGER THAN 12" SHALL BE DESIGNED AND APPROVED FOR SPECIFIC INSTALLATION.
3. RODS TO BE HIGH TENSILE, NOT ROLLED STEEL WITH TENSILE STRENGTH OF 110,000 PSI AND A MIN. OF 95,000 YIELD STRENGTH.
4. NUTS TO HAVE HEAVY DUTY SEMI-FINISH WITH NATIONAL COURSE THREADS.
5. AFTER INSTALLATION, TIE RODS AND CLAMP ASSEMBLY SHALL BE THOROUGHLY COVERED WITH ROYSTON LABORATORIES, INC. ROSKOTE MASTIC NO. A939 OR KOPPERS CO., INC. BITUMASTIC SUPERSERVICE BLACK OR APPROVED EQUIVALENT.

TABLE 128-1
STEEL SOCKET CLAMP DIMENSIONS

SIZE (IN.)	"A" (IN.)	"B" (IN.)	"C" (IN.)	"D" (IN.)	"E" (IN.)	"T" (IN.)	ROD AND C WASH SIZE (IN.)
4	5	14 5/8	1/2	2	5/8 x 3 1/2	5/8	3/4
6	7 1/8	18 7/8	1/2	2	5/8 x 3 1/2	5/8	3/4
8	9 5/16	19 1/8	5/8	2 1/2	5/8 x 3 3/4	5/8	3/4
10	11 1/2	21 3/8	5/8	2 1/2	5/8 x 3 3/4	3/4	3/4
12	13 1/2	25 1/8	5/8	3	5/8 x 3 3/4	3/4	3/4
14	13 3/4	28 1/4	3/4	3	7/8 x 4 1/2	7/8	3/4
16	17 7/8	31 3/8	3/4	4	7/8 x 4 1/2	7/8	3/4
20	22 1/8	37 3/4	3/4	4 1/2	1 1/4 x 5	1 1/8	3/4
24	26 3/8	44 1/4	3/4	5	1 1/2 x 5 1/2	1 1/4	3/4

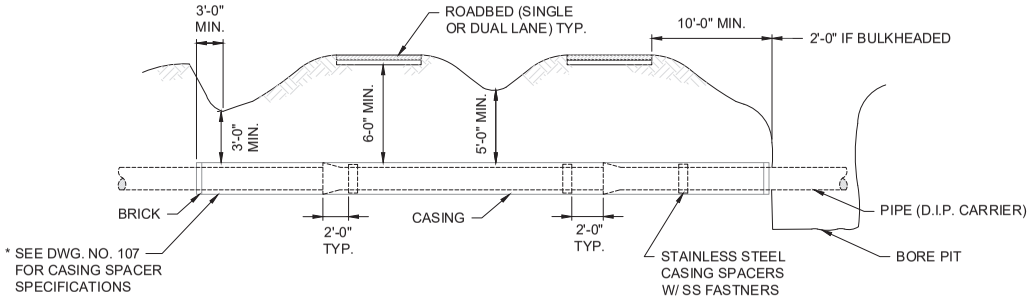
TABLE 128-2
ANCHOR STRAP DIMENSIONS

SIZE (IN.)	"B" (IN.)	"G" (IN.)	"H" (IN.)	"L" (IN.)	"R" (IN.)	"S" (IN.)
4	10 1/8	5/8 x 2 1/2	13/16	12 1/2	2 1/2	3/4
6	12 1/8	5/8 x 2 1/2	13/16	14 1/2	3 9/16	3/4
8	14 3/8	5/8 x 2 1/2	13/16	16 3/4	4 21/32	3/4
10	16 11/16	5/8 x 2 1/2	1 1/16	19 1/16	5 3/4	3/4
12	19 3/16	5/8 x 3	1 1/16	22 5/16	6 3/4	7/8



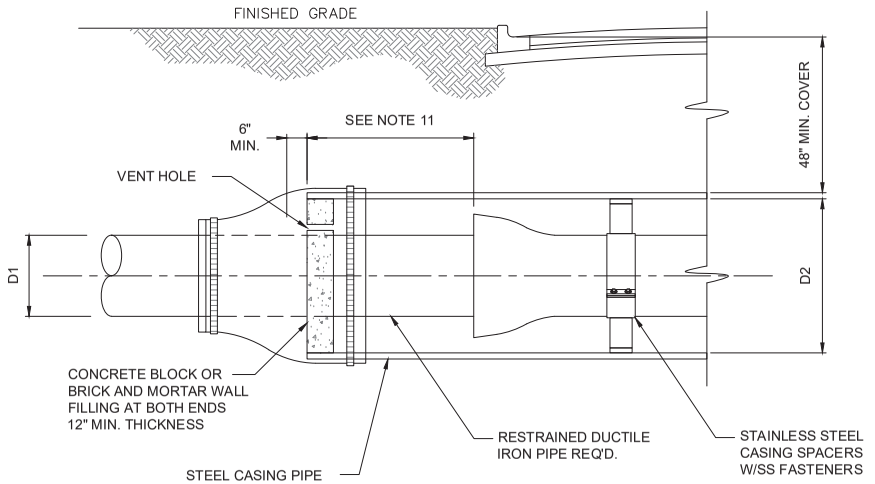
RAIL ROADS

NTS



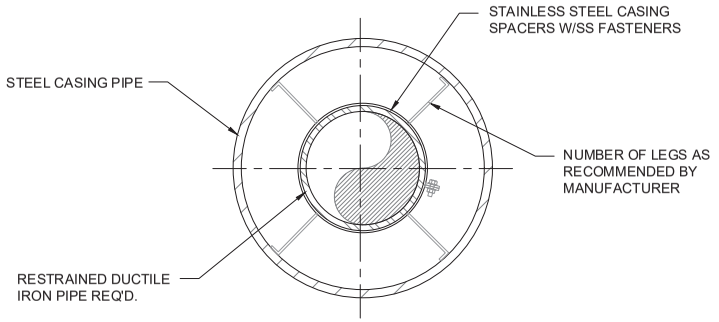
INTERSTATE/LIMITED ACCESS/STATE ROADS

NTS



ELEVATION

NTS



SECTION

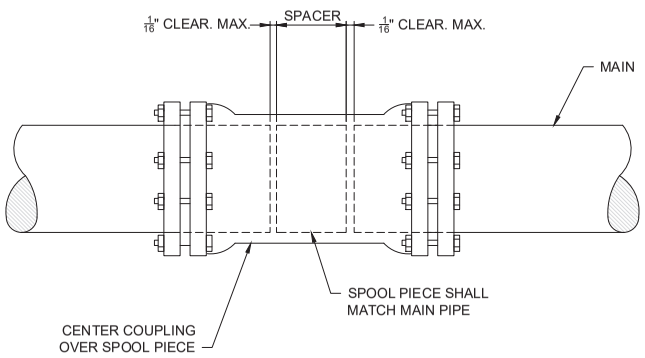
NTS

NOTES:

1. CASING TO BE STEEL PIPE (ROUND) WITH 45° BEVELED EDGES.
2. ALL CUTS TO BE SQUARED TO END.
3. JOIN ALL CASINGS WITH DOUBLE BEAD BUTT WELDS.
4. AUGER HEAD DIAMETER CANNOT EXCEED DIAMETER OF CASING BY MORE THAN 2".
5. BORING AND CASING SHALL BE INSTALLED SIMULTANEOUSLY.
6. CARRIER PIPES 6" OR LARGER REQUIRE BORE AND STEEL CASING.
7. CASING PIPE SHALL HAVE A PROTECTIVE COATING CONSISTING OF AN EPOXY HAVING A MINIMUM DRY FILM THICKNESS OF SIXTEEN (16) MILS. SURFACE PREPARATION SHALL BE SSPC-SP-10, AND EPOXY SHALL HAVE A MINIMUM SOLIDS CONTENT OF SIXTY-FIVE (65) PERCENT BY VOLUME AND SHAL BE AIRLESS SPRAY APPLIED. MINIMUM DRYING TIME SHALL BE SEVEN DAYS. EPOXY SHALL BE TNEEC, CARBOLINE, OR VALSPAR.
8. PIT TO BE NO CLOSER THAN 4' BEHIND CURB OR EDGE OF PAVEMENT. PIT TO BE A MINIMUM OF 10' FROM EDGE OF PAVEMENT IN GDOT RIGHT-OF-WAY.
9. TYPICAL PIT IS 32' LONG BY 10' WIDE
10. CASING SHALL BE MANUFACTURED FROM STEEL CONFORMING TO ASTM:A 139, GRADE B.
11. THREE STAINLESS STEEL CASING SPACERS ARE REQUIRED PER JOINT.
12. CARRIER PIPE SHALL BE DIP FOR WATER APPLICATIONS OR DIP AND HDPE FOR SEWER APPLICATIONS.
13. FIELD LOCKING GASKETS REQUIRED INSIDE OF CASING.
14. ALL BORING MUST BE APPROVED AND A PERMIT OBTAINED FROM FULTON COUNTY PUBLIC WORKS (404) 612-7400 AND AUTHORITY HAVING JURISDICTION AS REQUIRED.
15. REFER TO DETAIL 107 FOR CASING SPECIFICATIONS.

FULTON COUNTY STANDARD DETAIL 129 CASING/PIPE SUPPORT INSTALLATION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 129

129-S.DWG December 10, 2025 - 10:18am



SOLID PIPE SLEEVE DETAIL
NTS

NOTES:

1. IF THE CLEARANCE BETWEEN THE MAIN PIPE AND SPOOL PIECE IS GREATER THAN 1/8-INCH AT IT'S NARROWEST POINT, THEN A FULL CIRCLE SPACER OR "DUTCHMAN" MUST BE CUT AND PLACED IN THE GAP BEFORE THE SLEEVE IS USED TO CLOSE THE JOINT.
2. WIDTH OF THE SPACER SHALL BE AS NEEDED TO MEET MAXIMUM CLEARANCES SHOWN IN DETAIL.
3. EACH PIPE SPIGOT SHALL BE MARKED TO INDICATE THE POINT WHERE THE SLEEVE WILL BE PROPERLY CENTERED OVER THE POINT.
4. "FULL-CIRCLE" REPAIR CLAMPS ARE NOT APPROVED FOR JOINING PIPE. SUCH CLAMPS ARE SPECIFICALLY DESIGNED FOR REPAIRS ONLY.
5. IF A STEEL SLEEVE IS USED, PROPERLY COAT BEFORE BACKFILLING.

130-S.dwg December 10, 2025 - 10:19am

FULTON COUNTY STANDARD DETAIL 130

PIPE JOINING USE OF SOLID SLEEVE

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

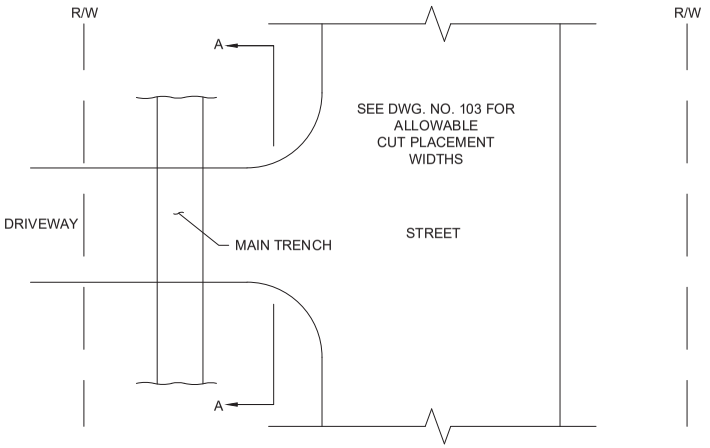
FULTON COUNTY

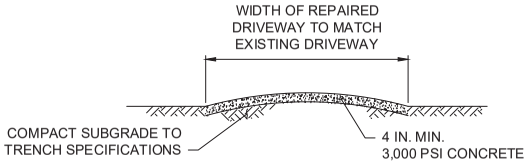
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
130

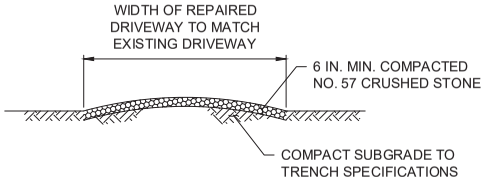
NOTES:

1. FINISHED SURFACE OF REPAIRED AREA TO BE FLUSH WITH ADJACENT EXISTING SURFACE.
2. EDGES OF CUT TO BE SAWN VERTICALLY.
3. EXPANSION JOINTS TO BE USED AS DIRECTED.
4. SEE DWG. 109 FOR STREET CUT REPAIRS.

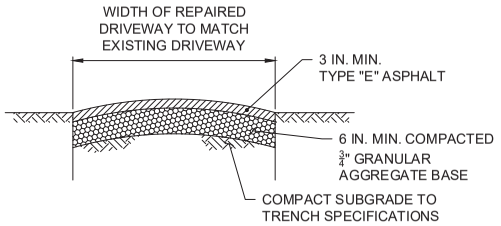




CONCRETE
SECTION A-A



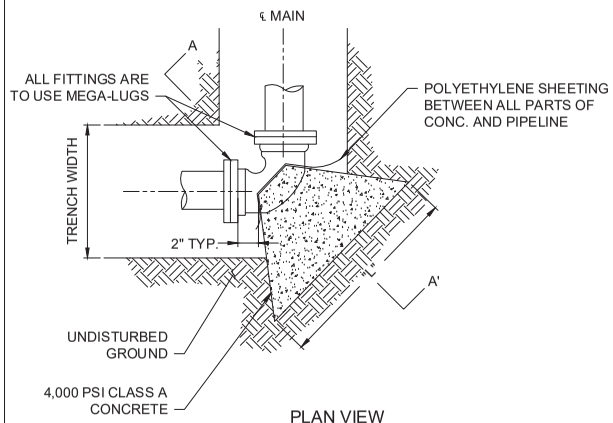
GRAVEL
SECTION A-A



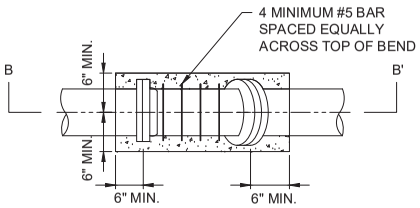
ASPHALT
SECTION A-A

FULTON COUNTY STANDARD DETAIL 131 DRIVEWAY CUT REPAIRS CONCRETE, GRAVEL AND ASPHALT		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 131

131-S.dwg December 10, 2025 - 10:19am



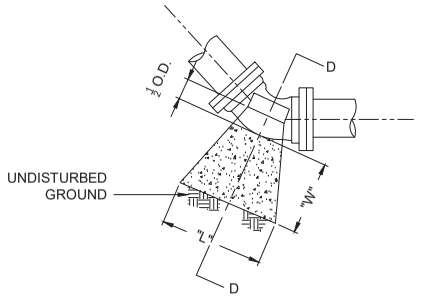
PLAN VIEW
NTS



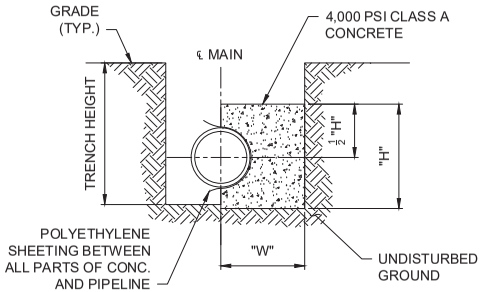
PLAN VIEW
NTS

NOTES:

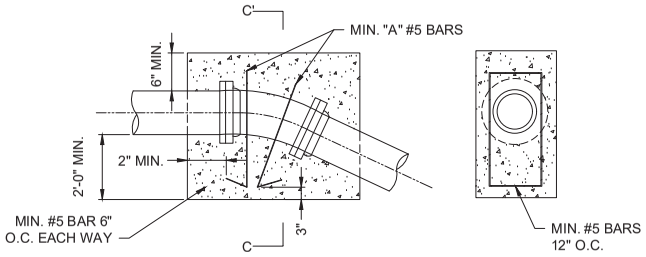
1. THRUST BLOCK DIMENSIONS ARE BASED ON 2,000 PSF SOIL BEARING PRESSURE AND 250 PSI TEST PRESSURE. ACTUAL INSIDE DIAMETER OF DUCTILE IRON PIPE CLASS 52 USED AS STANDARD.
2. SOIL CONDITIONS SHALL BE VERIFIED BY ENGINEER BEFORE THRUST BLOCK IS CONSTRUCTED. WHERE SOIL BEARING PRESSURE IS LESS THAN 2,000 PSF, THRUST BLOCK BEARING AREA SHALL BE INCREASED APPROPRIATELY.
3. ALL CONCRETE SHALL BE CLASS A, 4000 PSI.
4. SEE DWG. NO. 132B FOR THRUST BLOCK CONCRETE SPECIFICATIONS.



ELEVATION
NTS

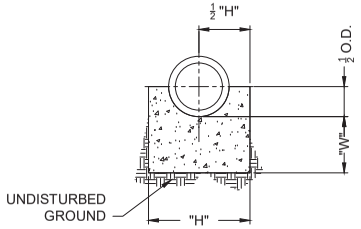


SECTION A-A'
NTS



SECTION B-B'
NTS

SECTION C-C'
NTS



SECTION D-D
NTS

HORIZONTAL THRUST DETAIL (1)
NTS

UPWARD THRUST DETAIL (2)
NTS

DOWNWARD THRUST DETAIL (3)
NTS

FULTON COUNTY STANDARD DETAIL 132A

STANDARD THRUST BLOCK DETAILS

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
132A

132A-S.DWG December 10, 2025 - 10:19am

NOTES:

1. THRUST BLOCK DIMENSIONS ARE BASED ON 2,000 PSF SOIL BEARING PRESSURE AND 250 PSI TEST PRESSURE. ACTUAL INSIDE DIAMETER OF DUCTILE IRON PIPE CLASS 52 USED AS STANDARD.
2. SOIL CONDITIONS SHALL BE VERIFIED BY ENGINEER BEFORE THRUST BLOCK IS CONSTRUCTED. WHERE SOIL BEARING PRESSURE IS LESS THAN 2,000 PSF, THRUST BLOCK BEARING AREA SHALL BE INCREASED APPROPRIATELY.
3. ALL CONCRETE SHALL BE CLASS A, 4000 PSI.
4. SEE DWG. NO. 132A FOR THRUST BLOCK CONCRETE DETAILS.

TABLE 132B-1
DIMENSIONS FOR CONCRETE BLOCKING - HORIZONTAL THRUST

BEND	PIPE SIZE (IN.)	"W" (FT.)	"L" (FT.)	"H" (FT.)	VOLUME (CY)
11 1/4°	6	1.0	2.0	1.0	0.04
	8	1.0	2.0	1.0	0.05
	12	1.0	2.0	2.0	0.1
	16	2.0	3.0	2.0	0.3
	20	2.0	3.0	3.0	0.5
22 1/2°	6	1.0	2.0	1.0	0.05
	8	1.0	2.0	2.0	0.1
	12	2.0	3.0	2.0	0.3
	16	2.0	4.0	3.0	0.6
	20	3.0	5.0	3.0	1.0
45°	6	1.5	2.0	1.5	0.11
	8	2.0	3.0	2.0	0.3
	12	2.0	4.0	3.0	0.7
	16	3.0	5.0	4.0	1.4
	20	4.0	6.0	5.0	2.6
90°	6	1.75	2.5	2.0	0.2
	8	2.0	3.0	3.0	0.4
	12	4.0	6.0	4.0	2.1
	16	4.0	7.0	5.0	3.1
	20	5.0	8.0	7.0	5.3
TEE BRANCHES, PLUGS & CAPS (ALL CIRCUM-STANCES)	6	1.5	2.0	1.75	0.13
	8	2.0	3.0	2.0	0.3
	12	2.0	4.0	4.0	0.8
	16	3.0	5.0	5.0	1.5
	20	4.0	7.0	6.0	3.9

TABLE 132B-2
CONCRETE REQUIRED TO RESIST UPWARD THRUST

BEND	PIPE SIZE (IN.)	VOLUME (CY)	"A" NO. OF VERT. BARS REQ'D.
11 1/4°	6	0.3	2
	8	0.5	2
	12	1.4	2
	16	2.4	3
	20	3.8	3
22 1/2°	6	0.7	2
	8	1.2	2
	12	2.7	2
	16	4.8	3
	20	7.4	3
45°	6	1.2	2
	8	2.2	2
	12	4.9	2
	16	8.8	3
	20	13.7	3
90°	6	1.8	2
	8	3.1	2
	12	7.0	3
	16	12.4	3
	20	19.4	4

TABLE 132B-3
DIMENSIONS FOR CONCRETE BLOCKING FOR BENDS - DOWNWARD THRUST

BEND	PIPE SIZE (IN.)	"W" (FT.)	"L" (FT.)	"H" (FT.)	VOLUME (CY)
11 1/4°	6	1.0	2.0	1.0	0.04
	8	1.0	2.0	1.0	0.05
	12	1.0	2.0	2.0	0.1
	16	2.0	3.0	2.0	0.3
	20	2.0	3.0	3.0	0.5
22 1/2°	6	1.0	2.0	1.0	0.05
	8	1.0	2.0	2.0	0.1
	12	2.0	3.0	2.0	0.3
	16	2.0	4.0	3.0	0.6
	20	3.0	5.0	3.0	1.0
45°	6	1.5	2.0	1.5	0.11
	8	2.0	3.0	2.0	0.3
	12	2.0	4.0	3.0	0.7
	16	3.0	5.0	4.0	1.4
	20	4.0	8.0	5.0	2.8
90°	6	1.75	2.5	2.0	0.2
	8	2.0	3.0	3.0	0.4
	12	4.0	6.0	4.0	2.1
	16	4.0	7.0	5.0	3.1
	20	5.0	8.0	7.0	5.3

FULTON COUNTY STANDARD DETAIL 132B

STANDARD THRUST BLOCK DETAILS

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

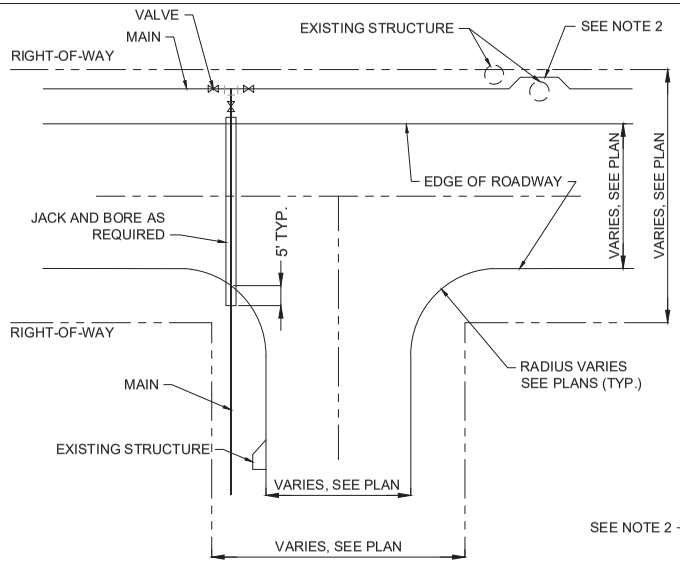
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
132B

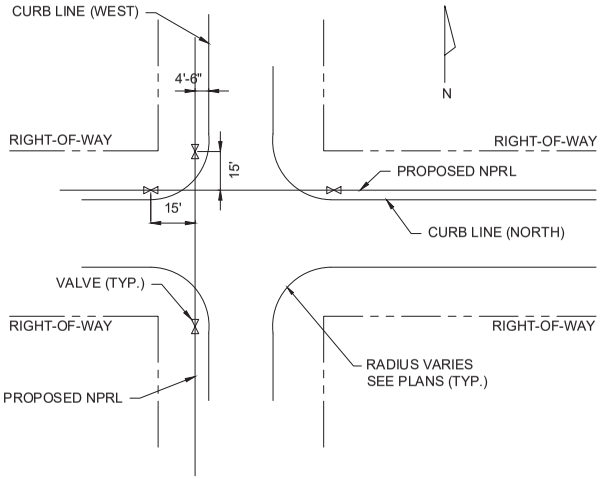
132B-S.dwg December 10, 2025 - 10:19am

NOTES:

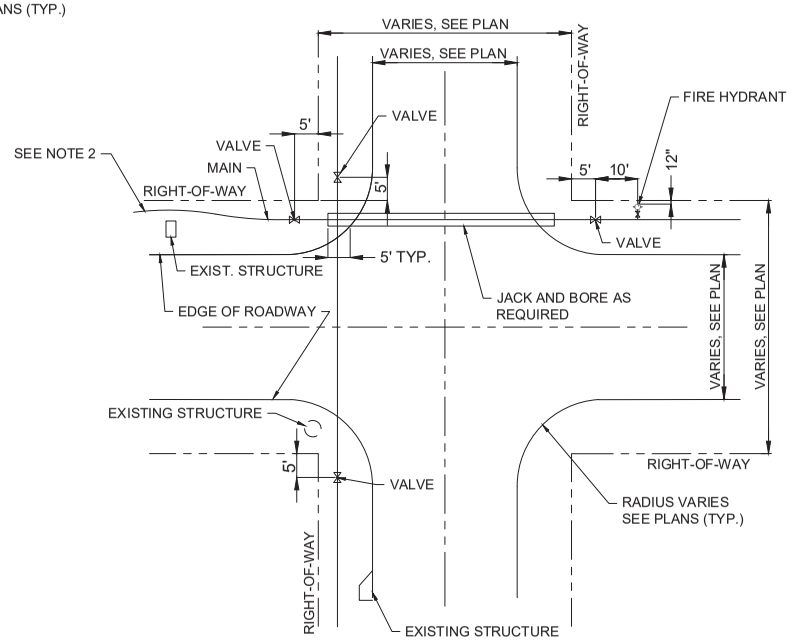
1. DEPTH OF COVER OVER WATER MAINS SHALL BE MINIMUM OF 4 FT.
2. WHEN GOING AROUND STRUCTURES, ROUTE WATER MAIN AROUND STRUCTURES BY PIPE JOINT DEFLECTION, AND WHERE NECESSARY, INSTALL 45° BENDS OR LESS.
3. VALVES SHALL BE MARKED IN THE CURB WITH A SAWCUT "V" AND PAINT.



TYPICAL BRANCH CONNECTION AT INTERSECTION
NTS



SUBDIVISION INTERSECTION DETAIL VALVE & MAIN
NTS



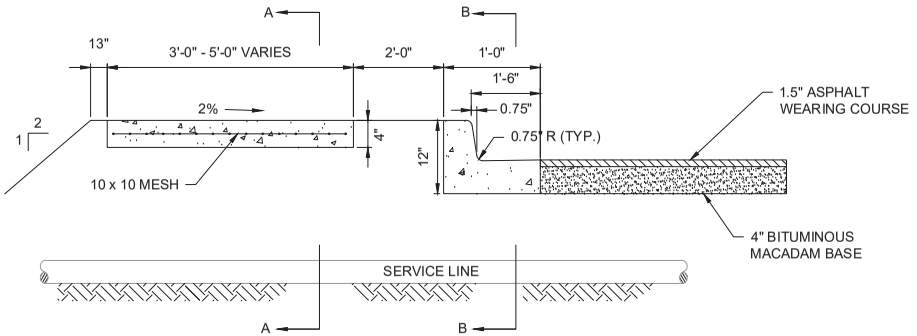
TYPICAL WATER MAIN AT INTERSECTION
NTS

FULTON COUNTY STANDARD DETAIL 133 MAIN EXTENSION BLOCKING DETAILS AND SUBDIVISION INTERSECTION DETAILS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 133

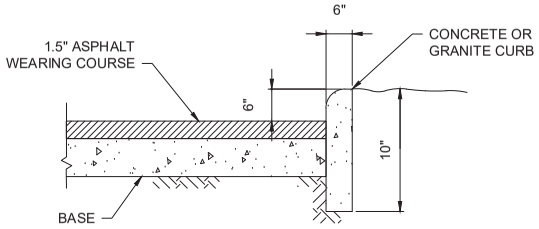
133-S.dwg December 10, 2025 - 10:19am

NOTES:

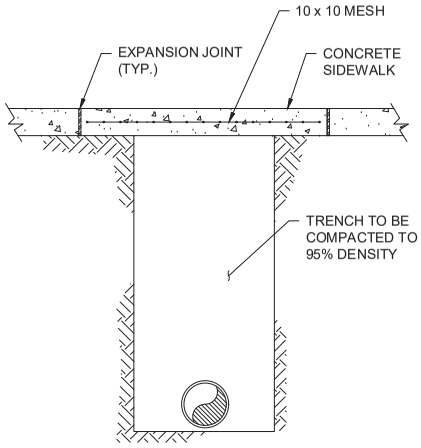
1. DETAILS ARE TYPICAL.
2. REPLACE SIDEWALKS, CURB AND GUTTER AND CURBING TO MATCH EXISTING MATERIALS AS DIRECTED.



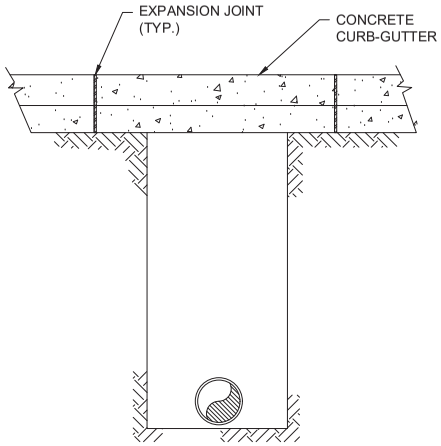
TYPICAL CURB-GUTTER DETAIL
NTS



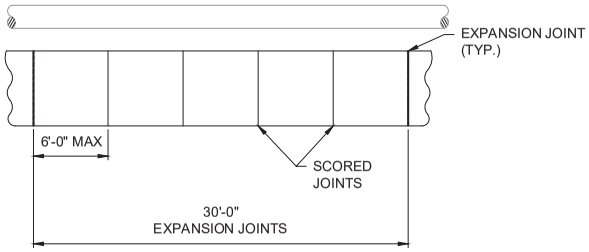
TYPICAL CURB DETAIL
NTS



SECTION A - A



SECTION B - B



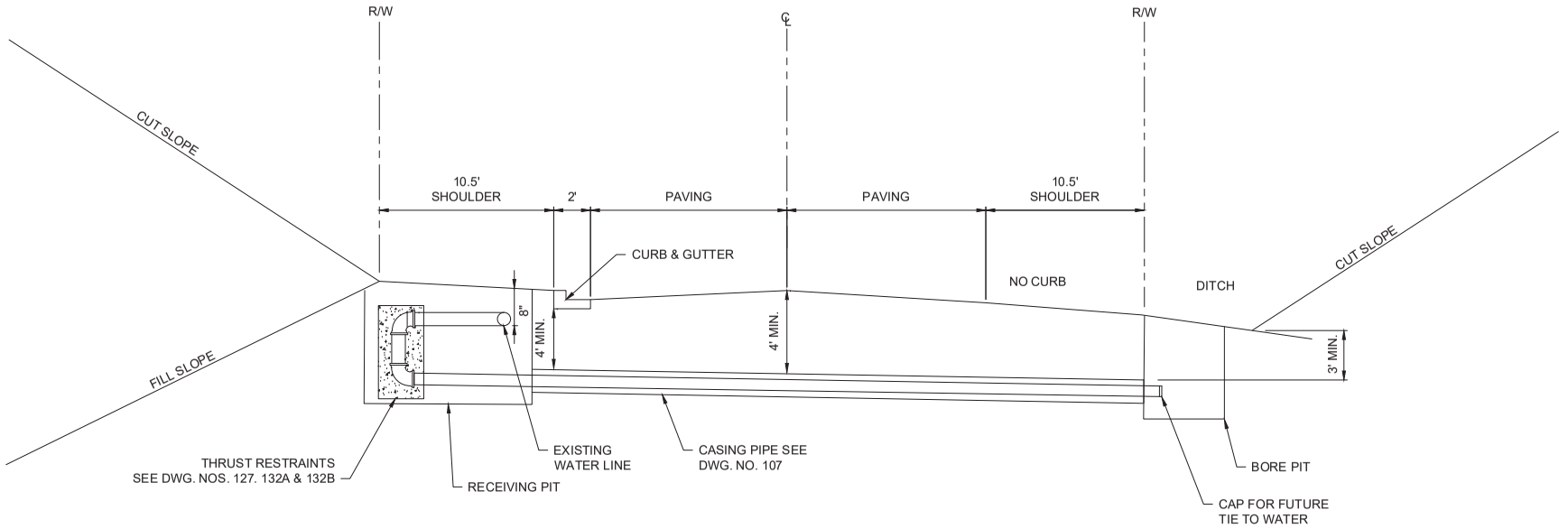
TYPICAL SIDEWALK JOINT PLACEMENT DETAIL
NTS

FULTON COUNTY STANDARD DETAIL 134 SIDEWALK, CURB AND GUTTER REPAIRS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 134

134-S.dwg December 10, 2025 - 10:19am

NOTES:

1. SEE DWG. NO. 125 FOR CONCRETE COLLAR THRUST RESTRAINT DETAIL.



FULTON COUNTY STANDARD DETAIL 135 ROADWAY CROSSING BACK TAP DETAIL		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 135

135-S.dwg December 10, 2025 - 10:19am

DWG. NO.	DESCRIPTION
300	INDEX AND GENERAL NOTES
301	TYPICAL SECTIONS STREETS
302	TYPICAL SECTIONS SUBDIVISION STREETS
303	TYPICAL SECTIONS CUL DE SAC
304	DRIVEWAY DETAILS
305	DIVIDED ENTRANCE DETAILS
306	MISCELLANEOUS DETAILS
307	CURB AND GUTTER DETAILS
308	STANDARD SIDEWALK SECTION
309	TYPICAL SECTION TWO LANE ROAD DECELERATION LANE
310	LEFT TURN LANE WITH WIDING ON BOTH SIDES
311	LEFT TURN LANE WITH WIDING ON ONE SIDE
312	HANDICAP RAMP DETAILS
313	MINI ROUNDABOUT
314	CHICANES
315	SPEED TABLE
316	INTERSECTION HUMP
317	ONE LANE CHOKER
318	ENTRANCE TREATMENT
319	CENTER ISLAND
320	BEAM TYPE GUARD RAIL
322A	SIGN DETAILS AND LOCATIONS
322B	SIGN DETAILS AND LOCATION SHEET 2 OF 3
322C	SIGN DETAILS AND LOCATION SHEET 3 OF 3

GENERAL NOTES

1. SHOW THE FOLLOWING NOTES ON THE APPROVED PLANS:

   A. SIGNING, STRIPING, MARKING, AND HIGH LEVEL WARNING DEVICES TO BE PLACED AS SHOWN AND/OR AS DIRECTED BY THE FULTON COUNTY TRAFFIC ENGINEER AND/OR FULTON COUNTY INSPECTOR. THIS TRAFFIC CONTROL PLAN IS SUBJECT TO CHANGE BY THE FULTON COUNTY TRAFFIC ENGINEER.

   B. WARNING DEVICES SHALL BE PLACED PRIOR TO THE COMMENCEMENT OF ANY ROAD IMPROVEMENT WORK ON COUNTY ROADS AND SHALL REMAIN IN PLACE UNTIL THE CONCLUSION OF ALL SIGNING AND STRIPING WORK.

   C. ALL SIGNS AND WARNING DEVICES SHALL BE EITHER TYPE I BARRICADES OR DRUMS WITH WARNING LIGHTS ON EVERY OTHER DEVICE, AND SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, (M.U.T.C.D.), STANDARDS AND FULTON COUNTY FOR COLOR, SIZE, REFLECTIVITY, HEIGHT, AND PLACEMENT.

   D. SPACING OF WARNING DEVICES IN FEET SHALL BE EQUAL TO THE POSTED SPEED OF THE ROAD IN MPH. (I.E., 30 FEET SPACING FOR 30 MPH SPEED LIMIT)

   E. ALL SIGNS SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, (M.U.T.C.D.), STANDARDS AND FULTON COUNTY FOR COLOR, SIZE, REFLECTIVITY, HEIGHT, AND PLACEMENT.

   F. STRIPING (WHITE AND YELLOW) AND ARROW MARKING SHALL BE APPLIED USING FULTON COUNTY OR GEORGIA DEPARTMENT OF TRANSPORTATION, GDOT, STANDARD THERMOPLASTIC.

   G. WHEN NECESSARY, EXISTING STRIPING SHALL BE REMOVED BY GRINDING, UNLESS SPECIFIED BY THE FULTON COUNTY TRAFFIC ENGINEER.

   H. ALL SIGNS MUST BE INSTALLED CONCURRENTLY WITH THE PERFORMANCE OF THE STRIPING WORK.

   I. CONTACT THE FULTON COUNTY TRAFFIC INSPECTOR ENGINEER ONE WEEK PRIOR TO COMMENCEMENT OF ANY STRIPING WORK.

300-S.dwg December 08, 2025 - 1:55pm

FULTON COUNTY STANDARD DETAIL 300

INDEX AND GENERAL NOTES

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML

APPROVED: TM

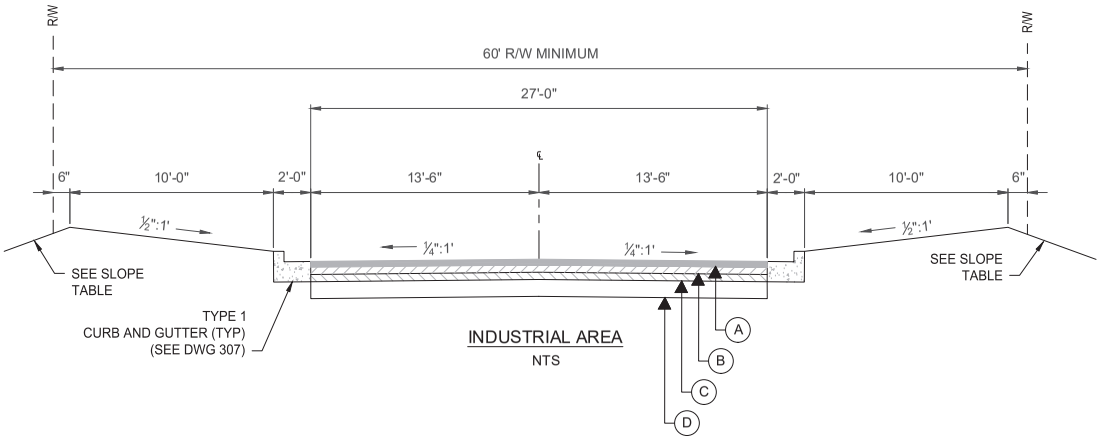
DATE: 01-21-2026

FULTON COUNTY

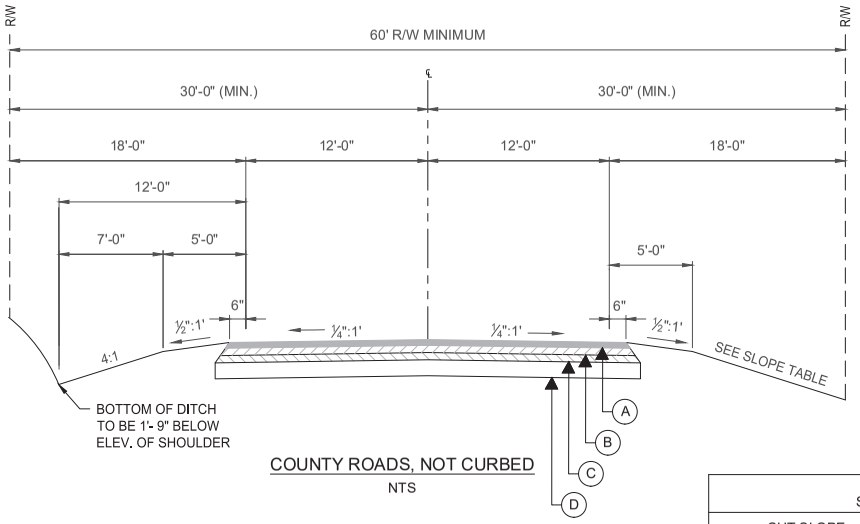
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.

300



INDUSTRIAL AREA
NTS

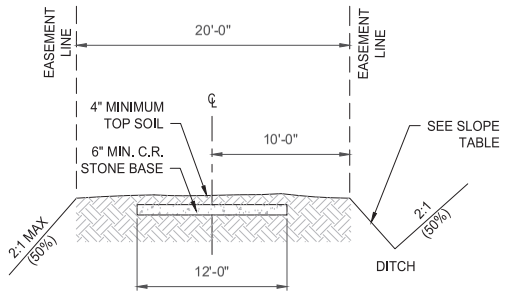


COUNTY ROADS, NOT CURBED
NTS

NOTES:

1. THE DIRECTOR OF PUBLIC WORKS DUE TO TRAFFIC CHARACTERISTICS MAY REQUIRE A HEAVIER PAVEMENT SECTION.
2. PAVING SECTION TO BE APPROVED BY DEPARTMENT OF PUBLIC WORKS.
3. RAISED PAVEMENT MARKERS TO BE USED AS REQUIRED AND MUST BE APPROVED BY COUNTY ENGINEER/INSPECTOR.
4. TACK COAT (CRS2H, SS1 OR AC30) TO BE USED AS REQUIRED.
5. PRIME COAT (RC70) TO BE USED AS REQUIRED.

TABLE 301-1 INDUSTRIAL & COUNTY ROADS
PAVEMENT MATERIAL SCHEDULE
Ⓐ ASPHALT, CONCRETE 9.5 mm SUPERPAVE, 165 lb/yd² (1-1/2")
Ⓑ ASPHALT, CONCRETE 19 mm SUPERPAVE, 220 lb/yd² (2")
Ⓒ ASPHALT, CONCRETE 25 mm SUPERPAVE, 330 lb/yd² (3")
Ⓓ GRADED AGGREGATE BASE (CRUSHER RUN) (8")



20' ACCESS EASEMENT
(DETENTION POND ROAD)
NTS

TABLE 301-2 SLOPE TABLE			
CUT SLOPE		FILL SLOPE	
0' - 5'	5' OR MORE	0' - 5'	5' OR MORE
4:1	2:1	4:1	2:1

FULTON COUNTY STANDARD DETAIL 301

TYPICAL SECTIONS
STREETS

DATE	REVISIONS	DATE	REVISIONS

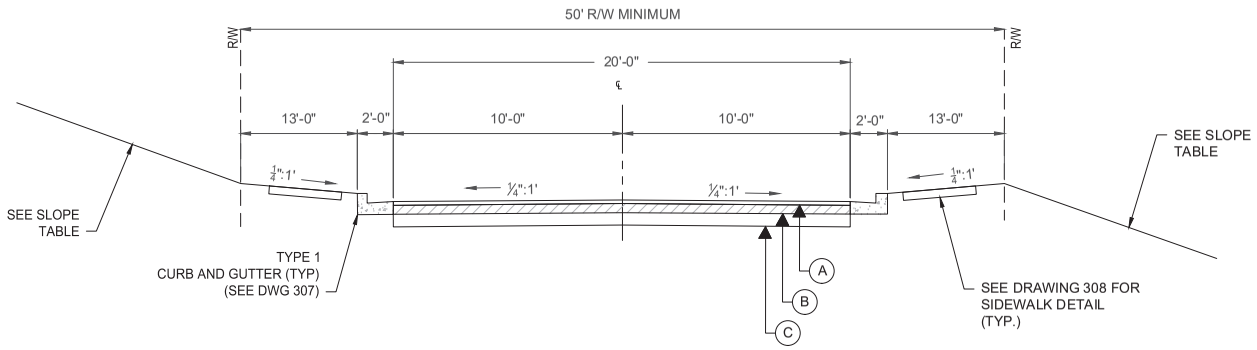
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
301

301-S.dwg December 08, 2025 - 1:56pm

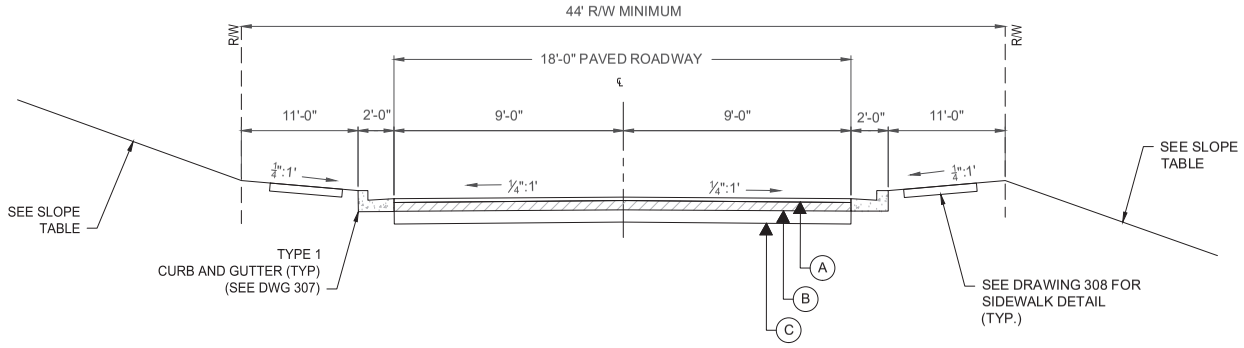


MAJOR SUBDIVISION STREET & ENTRANCE ROADS
SERVING 40 OR MORE HOUSING UNITS
NTS

NOTES:

1. THE DIRECTOR OF PUBLIC WORKS DUE TO TRAFFIC CHARACTERISTICS MAY REQUIRE A HEAVIER PAVEMENT SECTION.
2. PAVING SECTION TO BE APPROVED BY DEPARTMENT OF PUBLIC WORKS.
3. RAISED PAVEMENT MARKERS TO BE USED AS REQUIRED AND MUST BE APPROVED BY COUNTY ENGINEER/INSPECTOR.
4. TACK COAT (CRS2H, SS1 OR AC30) TO BE USED AS REQUIRED.
5. PRIME COAT (RC70) TO BE USED AS REQUIRED.

TABLE 302-1 MAJOR SUBDIVISION STREETS AND ENTRANCE ROADS
PAVEMENT MATERIAL SCHEDULE
Ⓐ ASPHALT, CONCRETE 9.5 mm SUPERPAVE, 165 lb/yd² (1-1/2")
Ⓑ ASPHALT, CONCRETE 19 mm SUPERPAVE, 220 lb/yd² (2")
Ⓒ GRADED AGGREGATE BASE (CRUSHER RUN) (8")



MINOR SUBDIVISION STREET & SIDE ROADS
SERVING LESS THAN 40 HOUSING UNITS
(APPLY HEAVY DUTY PAVEMENT WHERE REQUIRED)
NTS

TABLE 302-2 MINOR SUBDIVISION STREETS AND SIDE ROADS
PAVEMENT MATERIAL SCHEDULE
Ⓐ ASPHALT, CONCRETE 9.5 mm SUPERPAVE, 165 lb/yd² (1-1/2")
Ⓑ ASPHALT, CONCRETE 19 mm SUPERPAVE, 220 lb/yd² (2")
Ⓒ GRADED AGGREGATE BASE (CRUSHER RUN) (6")

TABLE 302-3 SLOPE TABLE			
CUT SLOPE		FILL SLOPE	
0' - 5'	5' OR MORE	0' - 5'	5' OR MORE
4:1	2:1	4:1	2:1

FULTON COUNTY STANDARD DETAIL 302

TYPICAL SECTIONS
SUBDIVISION STREETS

DATE	REVISIONS	DATE	REVISIONS

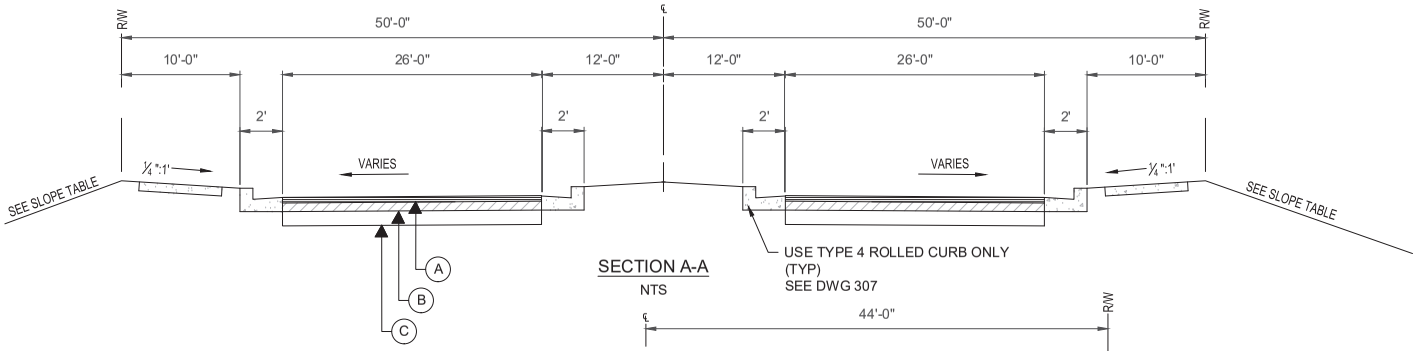
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

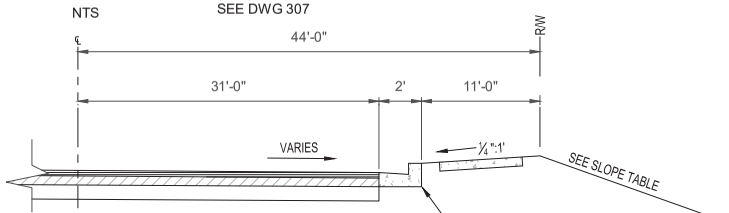
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
302

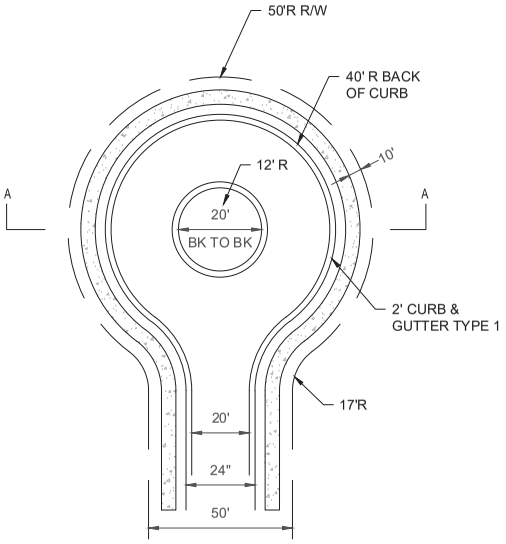
302-S.dwg December 08, 2025 - 1:56pm



SECTION A-A
NTS

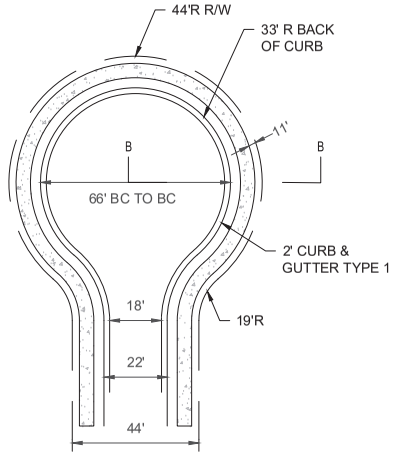


SECTION B-B
(HALF SECTION)
NTS



CUL-DE-SAC PLAN
MAJOR SUBDIVISION STREET
NTS

NOTES:
1. RAISED PAVEMENT MARKERS TO BE USED AS REQUIRED AND MUST BE APPROVED BY COUNTY ENGINEER/INSPECTOR.
2. TACK COAT (CRS2H, SS1 OR AC30) TO BE USED AS REQUIRED.
3. PRIME COAT (RC70) TO BE USED AS REQUIRED.



CUL-DE-SAC PLAN
MINOR SUBDIVISION STREET
NTS

TABLE 303-1 MAJOR SUB.DIV.STREETS & ENTRANCE SCHEDULE
PAVEMENT MATERIAL SCHEDULE
(A) ASPHALT, CONCRETE 9.5 mm SUPERPAVE, 165 LB/YD² (1-1/2")
(B) ASPHALT, CONCRETE 19 mm SUPERPAVE, 220 LB/YD² (2")
(C) GRADED AGGREGATE BASE (CRUSHER RUN) 8"

TABLE 303-2 MINOR SUB.DIV.STREET & SIDE ROADS
PAVEMENT MATERIAL SCHEDULE
(A) ASPHALT, CONCRETE 9.5 mm SUPERPAVE, 165 LB/YD² (1-1/2")
(B) ASPHALT, CONCRETE 19 mm SUPERPAVE, 220 LB/YD² (2")
(C) GRADED AGGREGATE BASE (CRUSHER RUN) 8"

TABLE 303-3 SLOPE TABLE			
CUT SLOPE		FILL SLOPE	
0'-5'	5' OR MORE	0'-5'	5' OR MORE
4:1	2:1	4:1	2:1

FULTON COUNTY STANDARD DETAIL 303

TYPICAL SECTIONS
CUL DE SAC

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
303

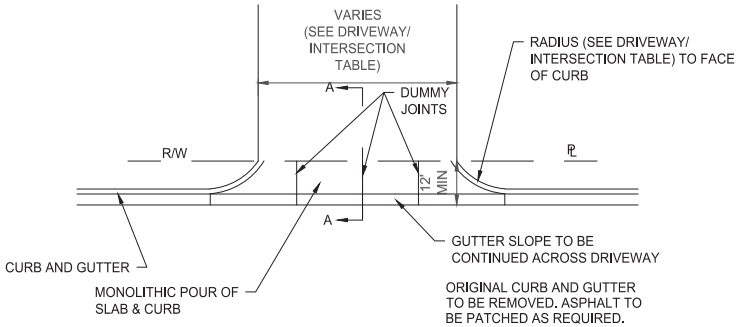
303-S.dwg December 08, 2025 - 1:56pm

TABLE 304-1 DRIVEWAY/INTERSECTION TABLE			
DRIVEWAY/INTERSECTION USE	WIDTH IN FEET MIN.	MAX.	MIN. RADIUS IN FEET
RESIDENTIAL DRIVEWAY (1-3 UNITS)	14	18	5' (RADIUS OR FLARE)
RESIDENTIAL STREET(TWO LANES)	20	25	30'-0"
COMMERCIAL DRIVEWAY	24	30	35'-0"
WHEN DESIGNED FOR TRUCKS	24	40	75'-0"
TWO-LANE DIVIDED DRIVEWAY	SEE DETAIL 305		30'-0"
FOUR LANE- DIVIDED PLANE	SEE DETAIL 305		30'-0"

TABLE 304-2 CONCRETE DRIVES	
RESIDENTIAL	COMMERCIAL
6" CONCRETE VALLEY GUTTER	8" CONCRETE VALLEY GUTTER
4" CONCRETE DRIVEWAY	8" CONCRETE DRIVEWAY

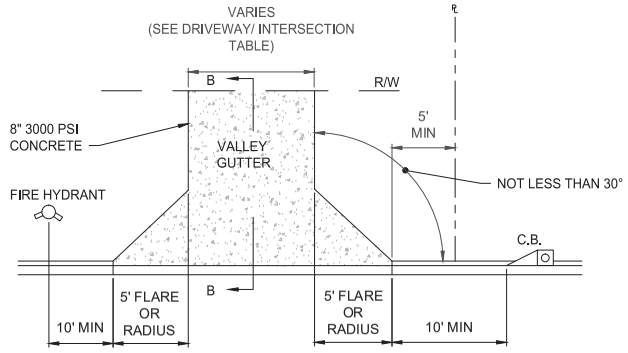
NOTES:

1. MAXIMUM DRIVEWAY GRADES SHOWN ABOVE ARE INTENDED FOR RESIDENTIAL DRIVEWAYS WHERE FLATTER GRADES ARE NOT FEASIBLE. GRADES FOR COMMERCIAL DRIVEWAYS OR FOR TRUCKS SHALL NOT BE GREATER THAN 11% UNLESS SPECIFIED OTHERWISE.
2. PUBLIC STREET INTERSECTIONS SHALL BE ASPHALT.



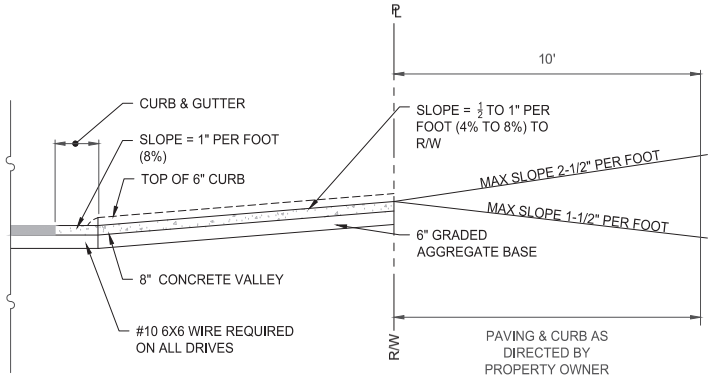
COMMERCIAL DRIVEWAY PLAN VIEW

NTS



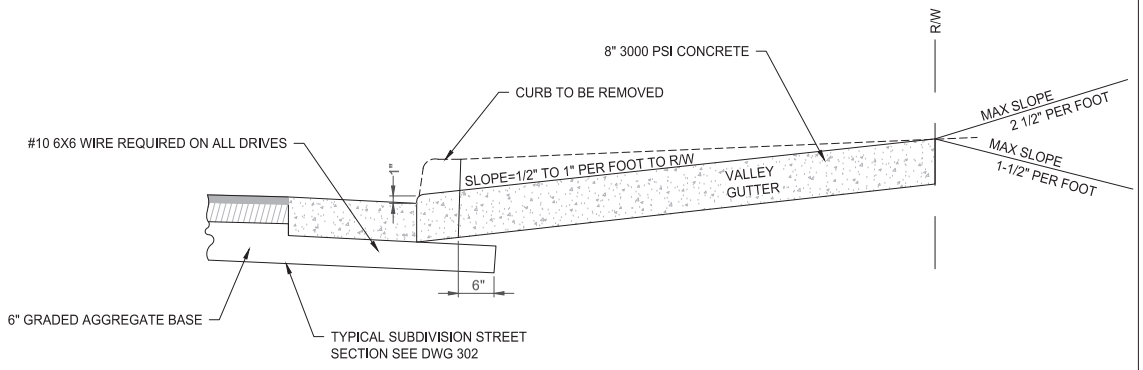
RESIDENTIAL DRIVEWAY (1-3 UNITS)

NTS



SECTION A-A

NTS



SECTION B-B

NTS

FULTON COUNTY STANDARD DETAIL 304 DRIVEWAY DETAILS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 304

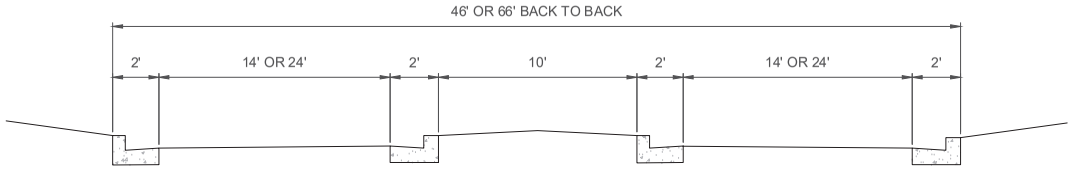
304-S.dwg December 08, 2025 - 1:56pm

TABLE 305-1 DRIVEWAY/INTERSECTION			
DRIVEWAY/INTERSECTION USE	WIDTH IN FEET		MIN. RADIUS IN FEET
	MIN.	MAX.	
RESIDENTIAL DRIVEWAY (1-3 UNITS)	14	18	5' (RADIUS OR FLARE)
RESIDENTIAL STREET (TWO LANES)	20	25	30'-0"
COMMERCIAL DRIVEWAY	24	30	35'-0"
WHEN DESIGNED FOR TRUCKS	24	40	75'-0"
TWO-LANE DIVIDED DRIVEWAY	46	66	30'-0"
FOUR-LANE DIVIDED DRIVEWAY	46	66	30'-0"

TABLE 305-2 CONCRETE DRIVES	
RESIDENTIAL	COMMERCIAL
6" CONCRETE VALLEY GUTTER	8" CONCRETE VALLEY GUTTER
4" CONCRETE VALLEY	8" CONCRETE DRIVEWAY

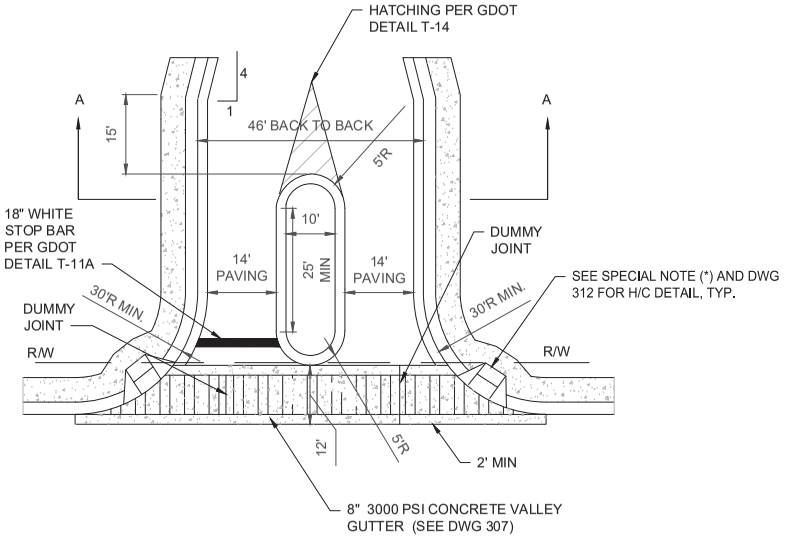
NOTES:

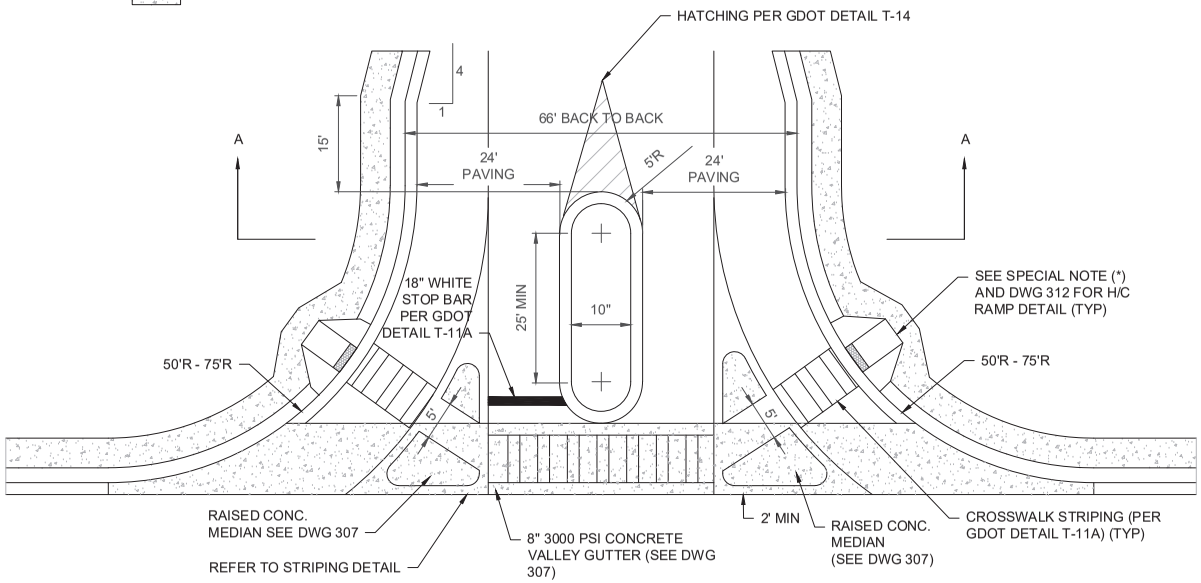
1. PUBLIC STREET INTERSECTIONS SHALL BE ASPHALT.
2. ALL STRIPING MUST BE DONE ACCORDING TO THE LATEST MUTCD STANDARDS.
3. ALL STRIPING DESIGNS TO BE APPROVED BY COUNTY ENGINEER/INSPECTOR.
4. FOR CURB RAMP WITH DETECTABLE WARNING: DETECTABLE WARNING SHALL BE 24 INCHES IN THE DIRECTION OF PEDESTRIAN TRAVEL AND EXTEND THE FULL WIDTH OF THE CURB RAMP OR FLUSH SURFACE. REFER TO GDOT STANDARD SHEET A4 FOR INSTALLATION INSTRUCTIONS.



SECTION A-A

NTS





OPTIONAL DIVIDED ENTRANCE
(PRIVATE OR COMMERCIAL)

NTS

FULTON COUNTY STANDARD DETAIL 305

DIVIDED ENTRANCE DETAILS

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML

APPROVED: TM

DATE: 01-21-2026

FULTON COUNTY

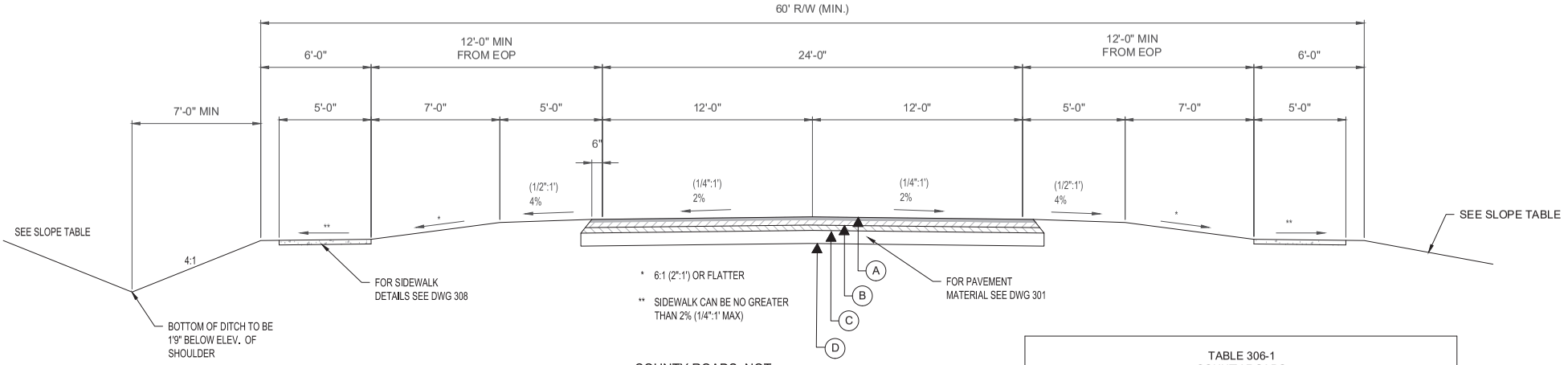
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.

305

305-S.dwg December 08, 2025 - 1:56pm

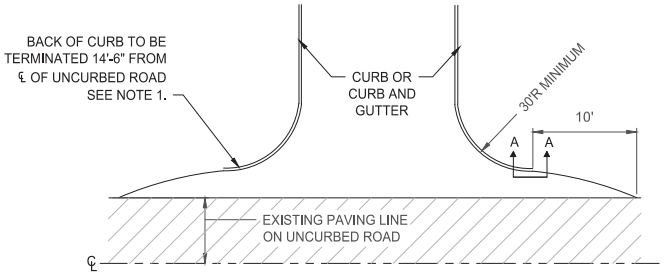
NOTE 1:
IF EXISTING UNCURBED ROAD IS WIDER THAN 29', THE DIMENSION IS TO BE 6'-6" FROM EXISTING EDGE OF PAVEMENT.



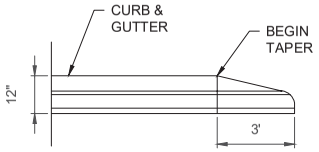
COUNTY ROADS, NOT CURBED WITH SIDEWALK
NTS

TABLE 306-1 COUNTY ROADS	
A	ASPHALT, CONCRETE 9.5 mm SUPERPAVE, 165 LB/YD²
B	ASPHALT, CONCRETE 19 mm SUPERPAVE, 220 LB/YD²
C	ASPHALT, CONCRETE 25 MM SUPERPAVE, 300 LB/YD²
D	GRADED AGGREGATE BASE (CRUSHER RUN) 8"

****TACK COAT (CRS2H, SS1 or AC30) TO BE USED AS REQUIRED
****PRIME COAT (RC70) TO BE USED AS REQUIRED



INTERSECTION OF CURBED AND UNCURBED ROADS WITH NO TURN LANES
NTS

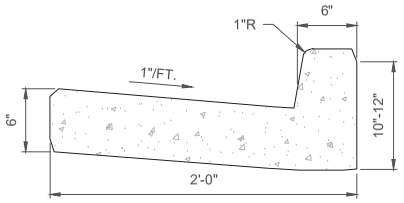


SECTION A-A
NTS

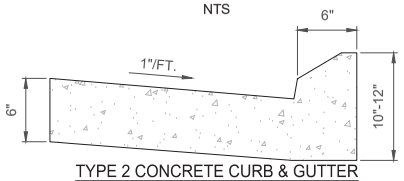
TABLE 306-2 SLOPE TABLE			
CUT SLOPE		FILL SLOPE	
0' - 5'	5' OR MORE	0' - 5'	5' OR MORE
4:1	2:1	4:1	2:1

FULTON COUNTY STANDARD DETAIL 306 MISCELLANEOUS DETAILS	DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 306

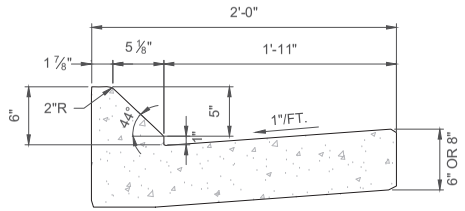
306-S.dwg December 08, 2025 - 1:56pm



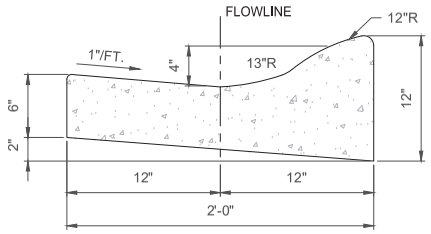
TYPE 1 CONCRETE CURB & GUTTER
INDUSTRIAL ROAD
NTS



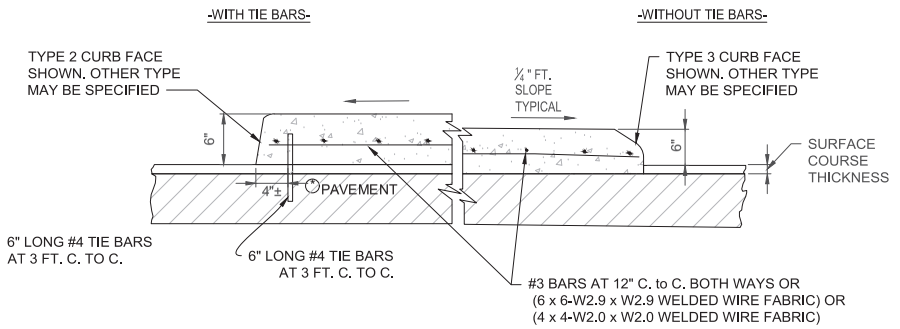
TYPE 2 CONCRETE CURB & GUTTER
MAJOR & MINOR RESIDENTIAL SIDE STREETS ONLY
NTS



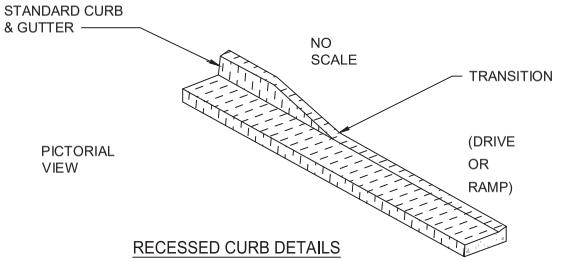
TYPE 3 MOUNTABLE CURB & GUTTER
NTS



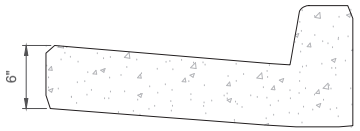
TYPE 4 CONCRETE ROLLED CURB & GUTTER
NTS



CONCRETE MEDIANS (ISLAND)
NTS



RECESSED CURB DETAILS
TYPICAL USE: AT DRIVEWAYS OR CURB CUT RAMPS
NTS



SECTION VIEW
NTS

NOTES:

1. IF CONCRETE MEDIAN INTERCEPTS PEDESTRIAN CROSSWALKS, HANDICAP RAMPS (SEE DWG 312) WILL BE REQUIRED.
2. CURB & GUTTER WILL BE MEASURED FOR PAYMENT THRU THE DRIVE OR RAMP OPENING.
3. CONCRETE PAVEMENT: TIE BARS WILL BE PLACED AFTER FINISHING AND BEFORE INITIAL SET HAS TAKEN PLACE.
4. ASPHALT PAVEMENT: TIE BARS MAY BE DRIVEN IN OR DRILLED AND GROUTED.

FULTON COUNTY STANDARD DETAIL 307

CURB & GUTTER DETAILS

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

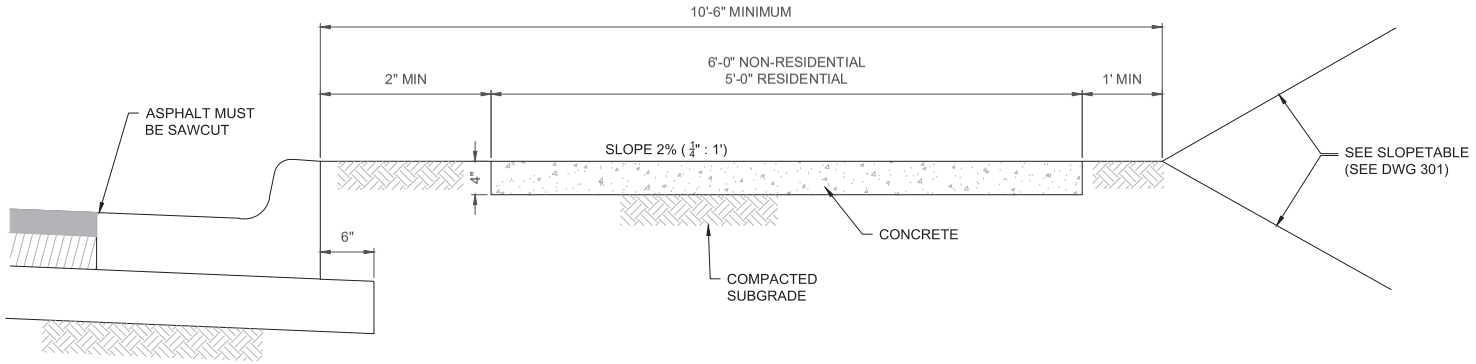
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
307

307-S.dwg December 08, 2025 - 1:56pm

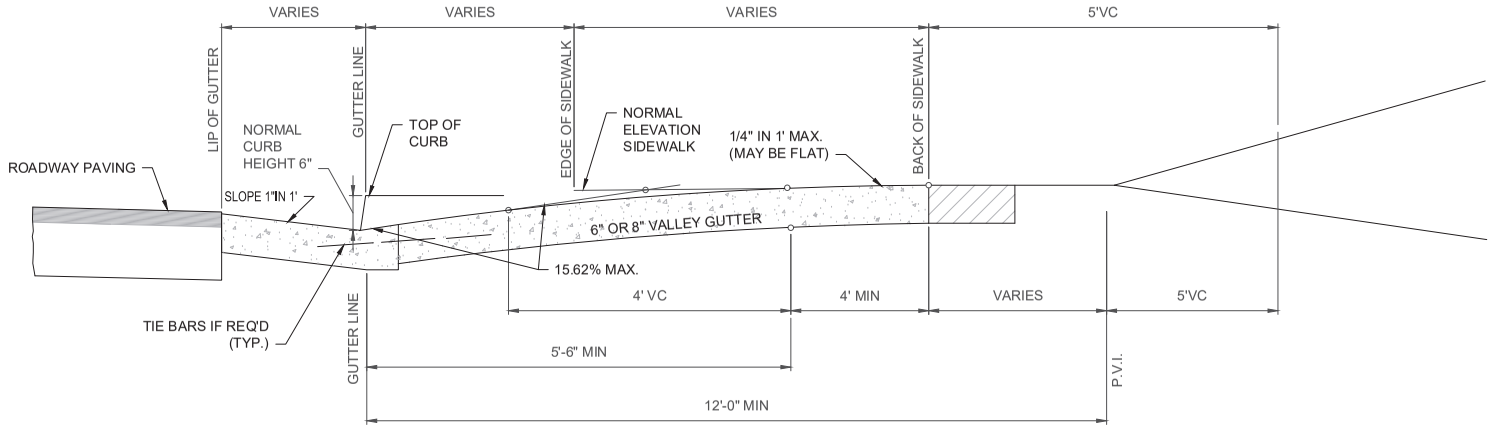
NOTES:

1. USE ⅜" x 4" EXPANSION JOINTS AT CHANGE OF DIRECTIONS, CURBS, RIGID STRUCTURES AND RIGID PAVEMENT. ON STRAIGHT RUNS PROVIDE EXPANSION JOINTS EVERY 24 FEET.
2. TOOL ALL EXPOSED EDGES AND JOINTS TO ¼" RADIUS.
3. BROOM FINISH PERPENDICULAR TO TRAVEL.
4. PROVIDE ¾" DEEP SAW CUT CONTRACTION JOINTS EVERY 5'-0".
5. ZONING OVERLAY REQUIREMENTS MAY SUPERCEDE STANDARD DETAIL.



TYPICAL SECTION OF SIDEWALK

NTS



SECTION AT CENTERLINE OF DRIVEWAY

NTS

FULTON COUNTY STANDARD DETAIL 308 STANDARD SIDEWALK SECTION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 308

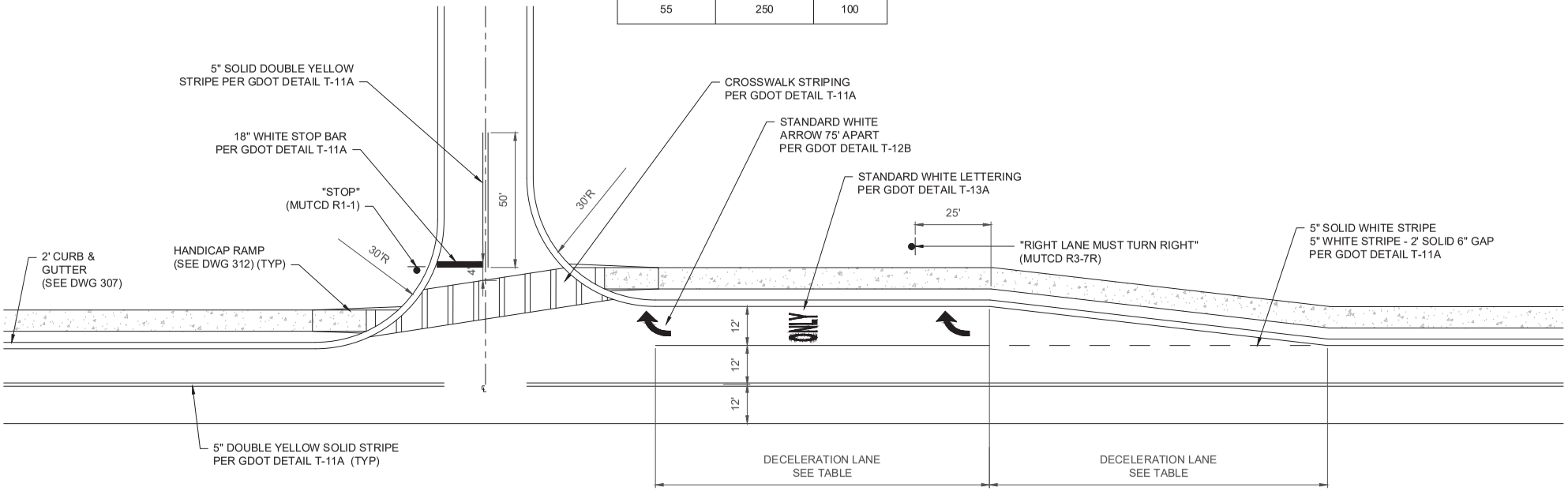
308-S.dwg December 08, 2025 - 1:56pm

NOTES:

1. ALL STRIPING MUST BE DONE IN THERMOPLASTIC PER LATEST MUTCD STANDARDS.
2. CONTACT FULTON COUNTY DEPT. OF PUBLIC WORKS, THREE (3) WORKING DAYS PRIOR TO STRIPING FOR INSPECTION OF LAYOUT.
3. STRIPING LAYOUT IS SUBJECT TO FIELD MODIFICATION PER THE FIELD INSPECTION.
4. SEE SIGN INSTALLATION DETAIL DWG 322 A/B/C.

TABLE 309-1
LANE LENGTHS

POSTED SPEED LIMIT (MPH)	DECELERATION LANE LENGTH (FT)	TAPER LENGTH (FT)
35	100	50
40	150	50
45	175	100
50	225	100
55	250	100



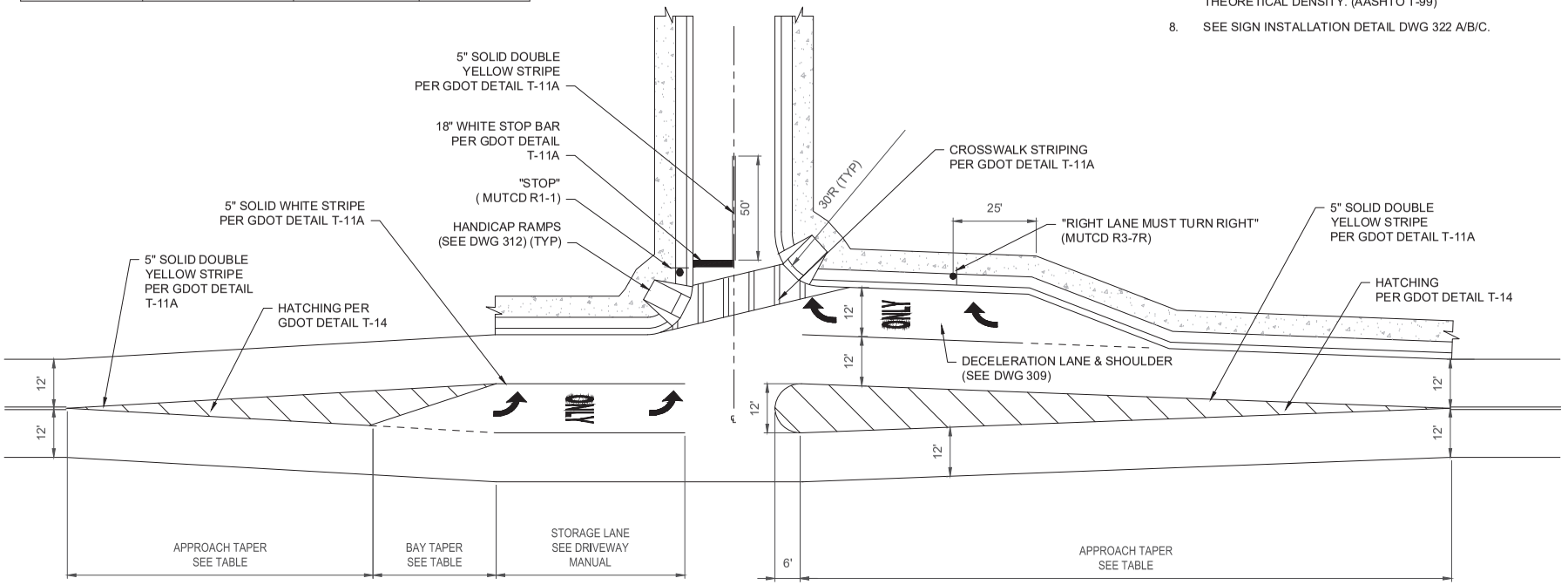
FULTON COUNTY STANDARD DETAIL 309 TYPICAL SECTION TWO LANE ROAD DECELERATION LANE		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 309

309-S.dwg December 08, 2025 - 1:56pm

TABLE 310-1 LANE LENGTHS			
POSTED SPEED LIMIT (MPH)	APPROACH TAPER 6' SHIFT LENGTH (FT)	BAY TAPER LENGTH (FT)	STORAGE LANE LENGTH (FT)
35	125	50	95-190
40	160	50	95-190
45	270	100	95-210
50	300	100	95-210
55	330	100	95-210

NOTES:

1. LEFT STORAGE TURN LANE LENGTH TO BE IN ACCORDANCE WITH TABLE 14 OF THE FULTON COUNTY DRIVEWAY MANUAL.
2. ALL STRIPING MUST BE DONE IN THERMOPLASTIC PER LATEST MUTCD STANDARDS.
3. CONTACT FULTON COUNTY DEPT. OF PUBLIC WORKS, THREE (3) WORKING DAYS PRIOR TO STRIPING FOR INSPECTION OF LAYOUT.
4. STRIPING LAYOUT IS SUBJECT TO FIELD MODIFICATION PER THE FIELD INSPECTION.
5. ON EXISTING PAVEMENTS WHERE LANE WIDENING IS REQUIRED. SAW CUT THE FIRST 12 INCHES OF PAVEMENT AND ESTABLISH REQUIRED SUB-GRADE MATERIAL AND THICKNESS.
6. NEW PAVEMENT IS REQUIRED ACROSS THE ENTIRE LENGTH AND WIDTH OF ALL PROPERTY FRONTAGE AND INSTALLED AS PER FULTON COUNTY INSPECTORS INSTRUCTIONS.
7. SUBGRADE TO BE COMPACTED TO 95% OF MAXIMUM THEORETICAL DENSITY. (AASHTO T-99)
8. SEE SIGN INSTALLATION DETAIL DWG 322 A/B/C.



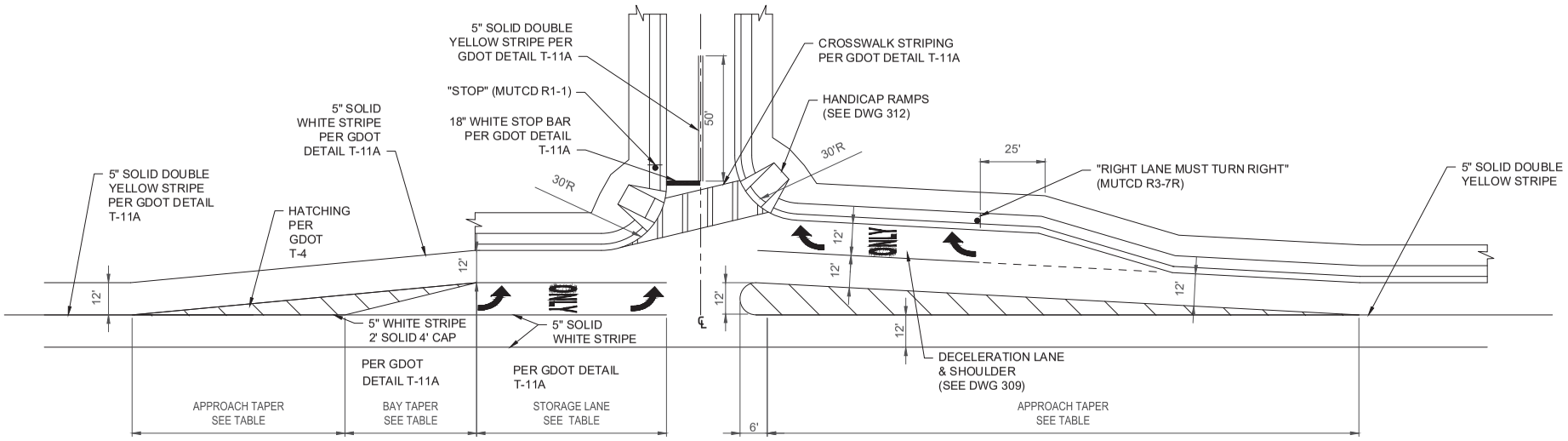
FULTON COUNTY STANDARD DETAIL 310 LEFT TURN LANE WITH WIDENING ON BOTH SIDES		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 310

310-S.dwg December 08, 2025 - 1:56pm

TABLE 311-1 LANE LENGTHS			
POSTED SPEED LIMIT (MPH)	APPROACH TAPER 12' SHIFT LENGTH (FT)	BAY TAPER LENGTH (FT)	STORAGE LANE LENGTH (FT)
35	250	50	95-190
40	320	50	95-190
45	540	100	95-210
50	600	100	95-210
55	660	100	95-210

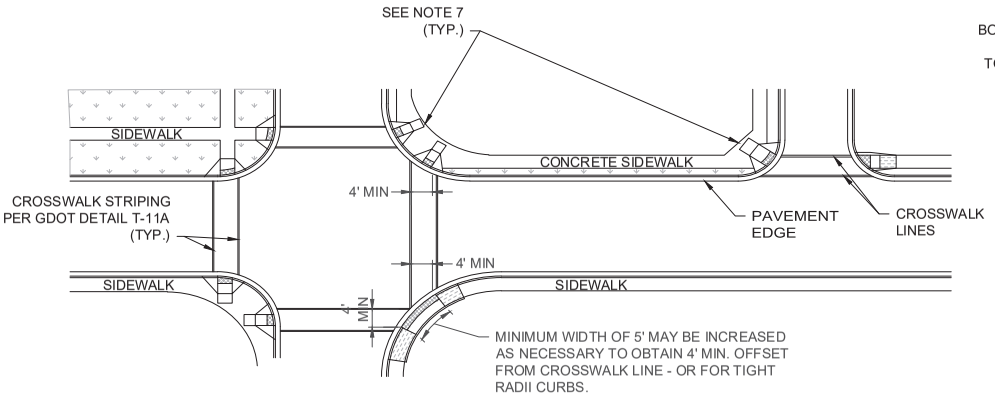
NOTES:

1. LEFT STORAGE TURN LANE LENGTH TO BE IN ACCORDANCE WITH TABLE 14 OF THE FULTON COUNTY DRIVEWAY MANUAL.
2. ALL STRIPING MUST BE DONE IN THERMOPLASTIC PER LATEST MUTCD STANDARDS.
3. CONTACT FULTON COUNTY DEPT. OF PUBLIC WORKS, THREE (3) WORKING DAYS PRIOR TO STRIPING FOR INSPECTION OF LAYOUT.
4. STRIPING LAYOUT IS SUBJECT TO FIELD MODIFICATION PER THE FIELD INSPECTION.
5. ON EXISTING PAVEMENTS WHERE LANE WIDENING IS REQUIRED. SAW CUT THE FIRST 12 INCHES OF PAVEMENT AND ESTABLISH REQUIRED SUB-GRADE MATERIAL AND THICKNESS.
6. NEW PAVEMENT IS REQUIRED ACROSS THE ENTIRE LENGTH AND WIDTH OF ALL PROPERTY FRONTAGE AND INSTALLED AS PER FULTON COUNTY INSPECTORS INSTRUCTIONS.
7. SUBGRADE TO BE COMPACTED TO 95% OF MAXIMUM THEORETICAL DENSITY. (AASHTO T-99)
8. SEE SIGN INSTALLATION DETAIL DWG 322 A/B/C.

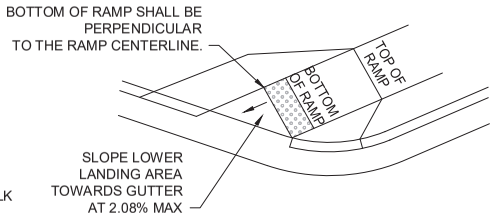


FULTON COUNTY STANDARD DETAIL 311 LEFT TURN LANE WITH WIDENING ON ONE SIDE		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 311

311-S.dwg December 08, 2025 - 1:57pm



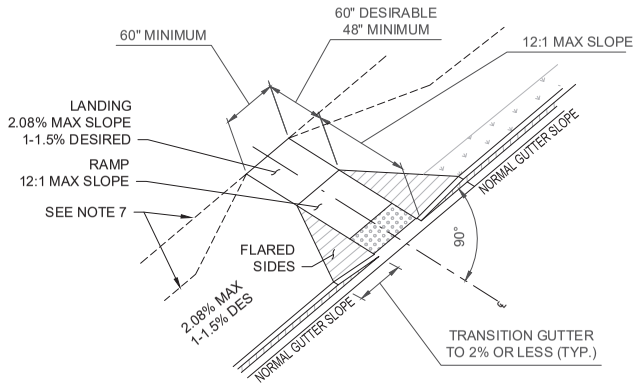
TYPICAL LOCATIONS FOR CURB CUT RAMPS - PLAN VIEW
NTS



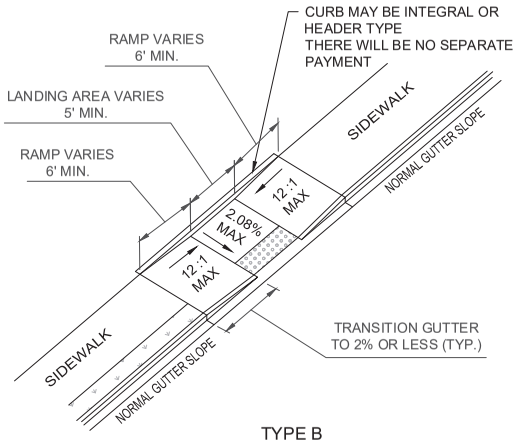
SKEWED RAMP DETAILS
(APPLIES TO TYPE A & TYPE D RAMPS ONLY)
NTS

NOTES:

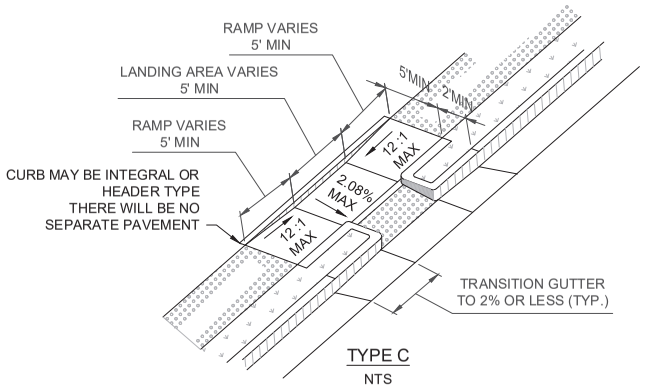
1. THE RAMP LENGTH IS NOT REQUIRED TO EXCEED 15 FEET. THE RAMP SLOPE MAY EXCEED 12:1 IF THE SITE CONDITIONS PREVENT THE USE OF A RAMP 15 FEET LONG.
2. IN AREAS WHERE THE GUTTER HAS A SLOPE 1" IN 1' END NORMAL GUTTER SLOPE AT A DISTANCE OF 6 TO 10 FEET FROM THE RAMP AND BEGIN TRANSITION TO A FLAT GUTTER SLOPE. NORMAL GUTTER SLOPE SHALL BE RESUMED AT A SIMILAR DISTANCE BEYOND THE RAMP.
3. TYPE A IS THE PREFERRED RAMP STYLE.
4. TYPE B RAMPS ARE NORMALLY USED WHEN SPACE IS NOT AVAILABLE FOR A LANDING AT THE TOP OF A TYPE A RAMP.
5. TYPE D RAMPS ARE NORMALLY USED WHEN THE SIDEWALK TIES DIRECTLY INTO THE CROSSWALK.
6. WHEN THE RAMP CENTERLINE IS NOT PERPENDICULAR TO THE CURB A LEVEL LANDING AREA WITH SLOPES LESS THAN 2.08% MUST BE PROVIDED AT THE BOTTOM OF THE RAMP.
7. BACK OF SIDEWALK SHALL BE LOCATED AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER SO AS NOT TO ENCROACH INTO THE REQUIRED LANDING AREA.



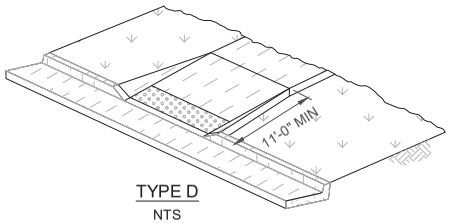
TYPE A (THE PREFERRED RAMP)
NTS

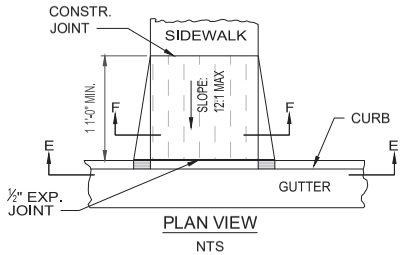


TYPE B
NTS

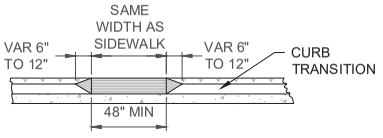


TYPE C
NTS

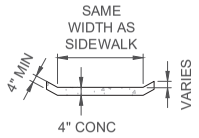




PLAN VIEW
NTS



SECTION E-E



SECTION F-F

FULTON COUNTY STANDARD DETAIL 312 HANDICAP RAMP DETAILS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 312

312-S.dwg December 08, 2025 - 1:57pm

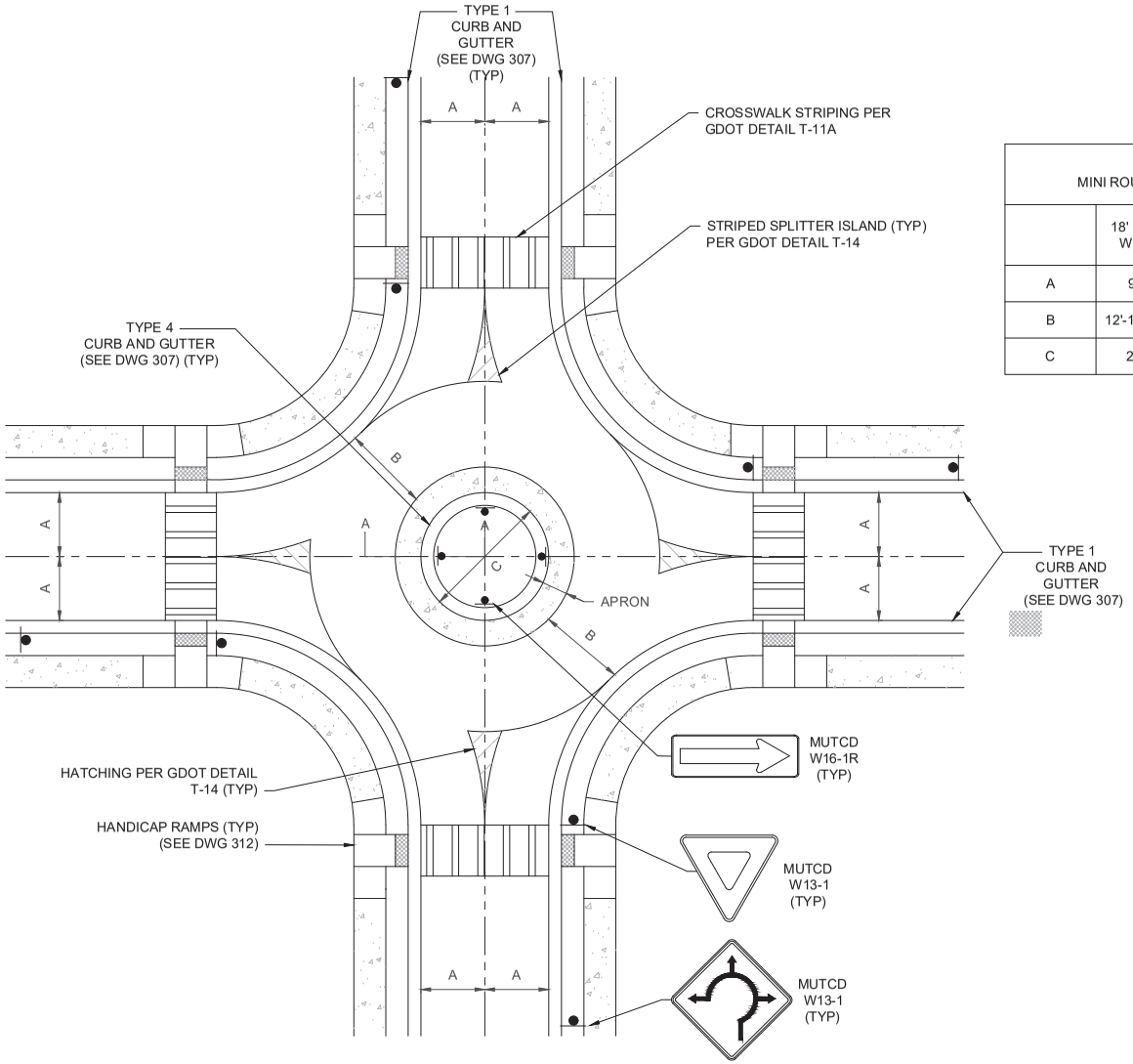
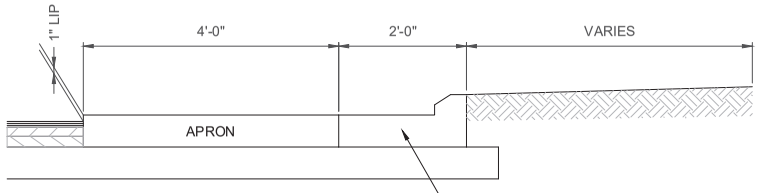


TABLE 313-1
MINI ROUNDABOUT DIMENSIONS

	18' ROAD WIDTH	20' ROAD WIDTH	25' ROAD WIDTH
A	9'-0"	10'-0"	12'-6"
B	12'-1 13/16"	12'-6 3/4"	14'-1 3/16"
C	26' D	28' D	32' D

NOTES:

1. APRON TO BE 4' WIDE, 6" THICK 3000 PSI CONCRETE PAVEMENT.
2. ALL STRIPING MUST BE DONE IN THERMOPLASTIC PER LATEST MUTCD STANDARDS.
3. CONTACT FULTON COUNTY DEPT. OF PUBLIC WORKS AND 1 WEEK PRIOR TO STRIPING FOR INSPECTION OF LAYOUT.
4. STRIPING LAYOUT IS SUBJECT TO FIELD MODIFICATION PER THE FIELD INSPECTION.
5. SEE SIGN INSTALLATION DETAIL AND DWG 322 A/B/C.



HALF SECTION A-A
NTS

FULTON COUNTY STANDARD DETAIL 313

MINI ROUNDABOUT

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

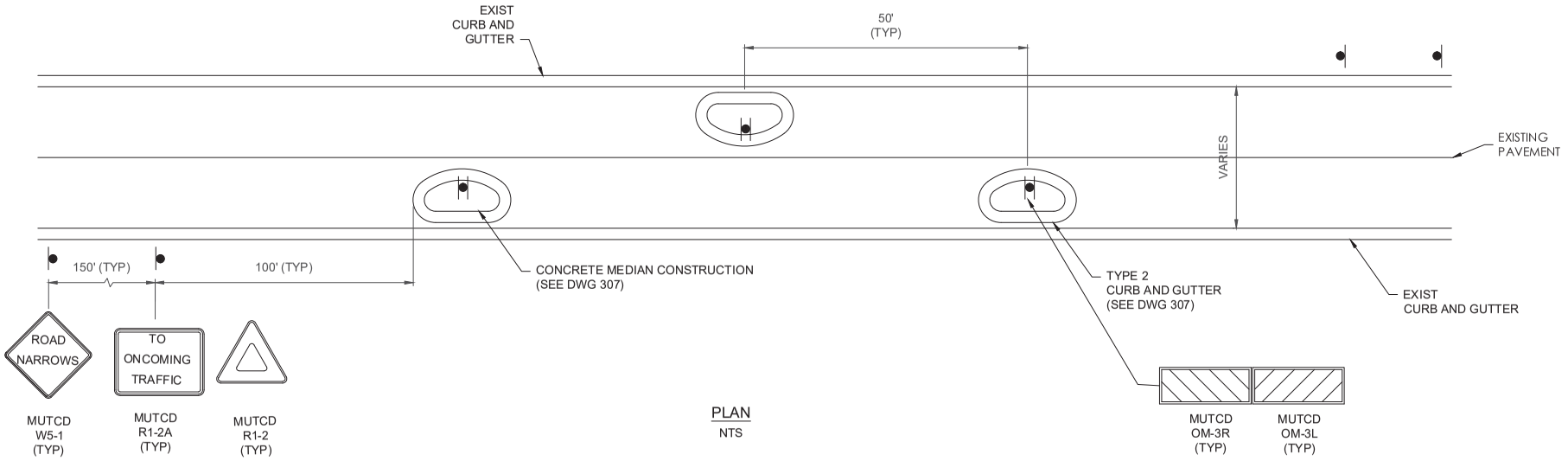
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
313

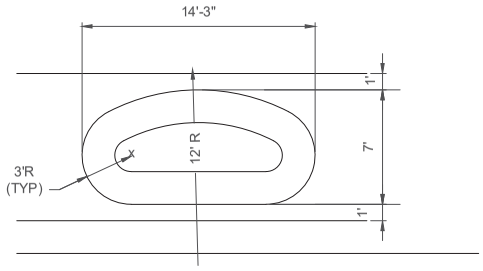
313-S.dwg December 08, 2025 - 1:57pm

NOTES:

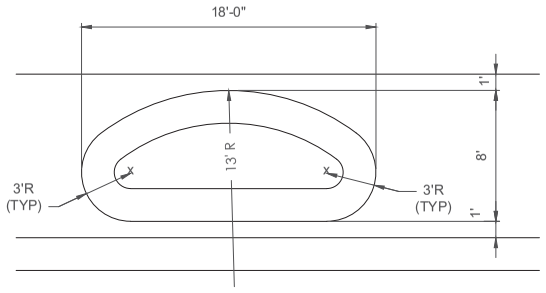
1. SEE DWG 322 A/B/C FOR SIGN INSTALLATION DETAILS.



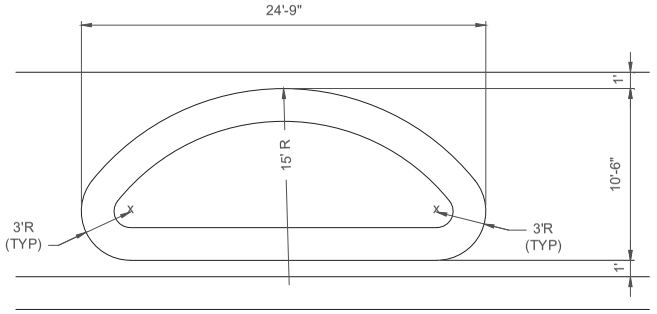
PLAN
NTS



EXIST 18' ROAD WIDTH
NTS



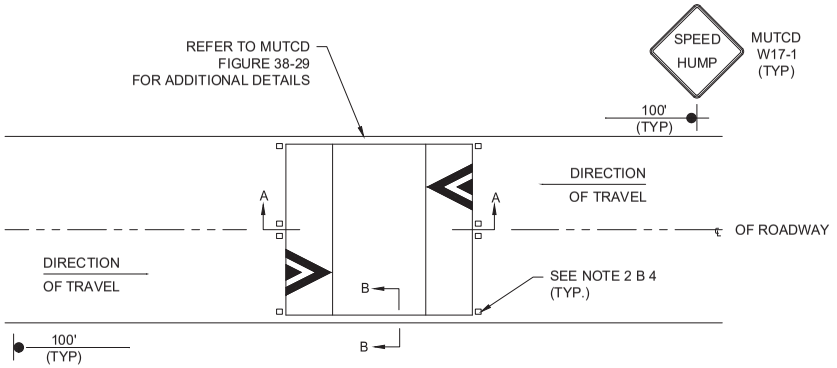
EXIST 20' ROAD WIDTH
NTS

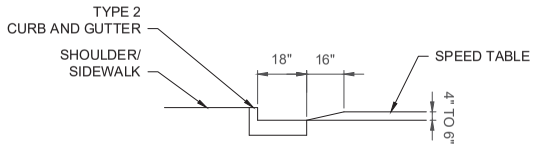


EXIST 25' ROAD WIDTH
NTS

FULTON COUNTY STANDARD DETAIL 314 CHICANES		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 314

314-S.dwg December 08, 2025 - 1:57pm

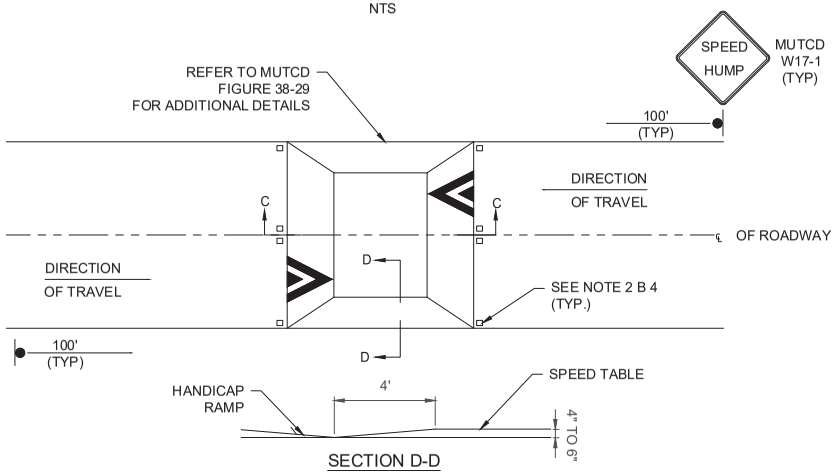




SECTION B-B

TYPE 1 SPEED TABLE DETAIL

NTS



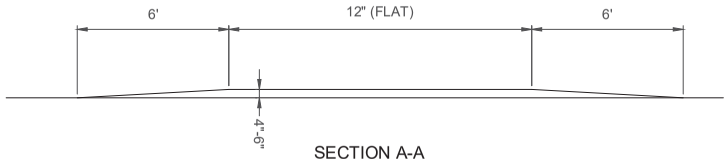
SECTION D-D

TYPE 2 SPEED TABLE DETAIL

NTS

NOTES:

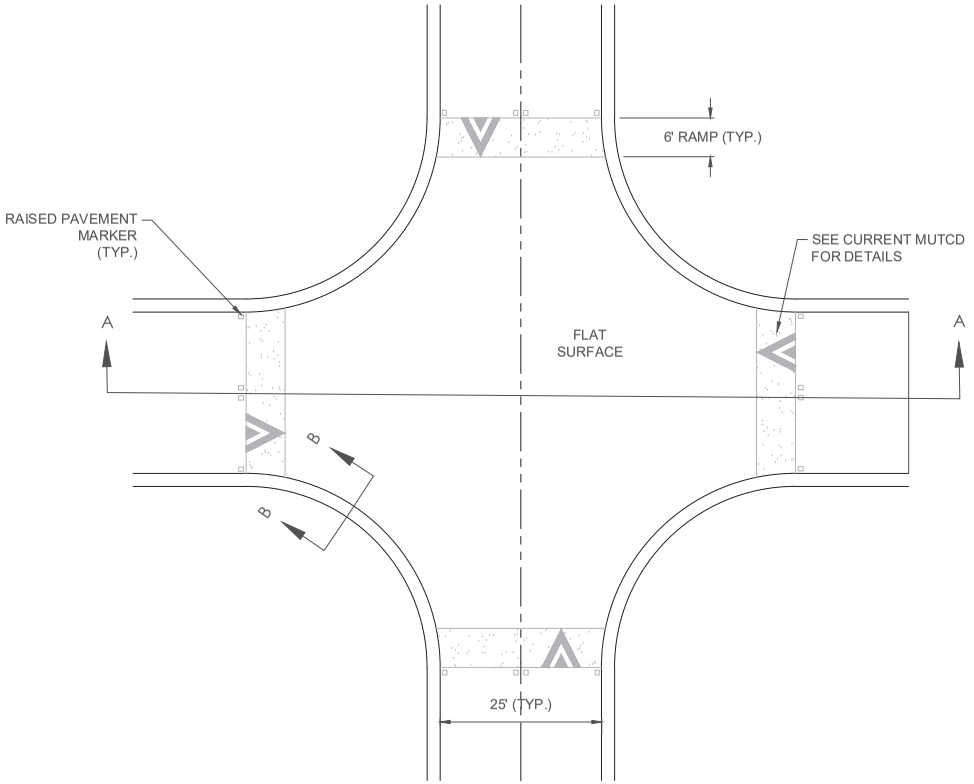
1. USE TYPE 2 SPEED TABLES IN CONJUNCTION WITH CROSSWALKS, ONLY.
2. SPEED TABLES MAY BE CONSTRUCTED USING ASPHALT OR CONCRETE, PER FULTON COUNTY TRAFFIC ENGINEER.
   A. CONCRETE CONSTRUCTION:
      1) CONSTRUCT SPEED TABLES USING 3000 PSI HIGH/EARLY CONCRETE REINFORCED WITH #3 BARS AT 12" C. TO C. BOTH WAYS, OR 6 X 6 -W2.9 X W2.9 WELDED WIRE FABRIC OR 4 X 4 - W2.0 X W2.0 WELDED WIRE FABRIC.
      2) CONCRETE WILL BE COLORED AND TOP STAMPED WITH TEXTURE PER FULTON COUNTY TRAFFIC ENGINEER.
   B. ASPHALT CONSTRUCTION:
      1) CONSTRUCT SPEED TABLES USING ASPHALTIC CONCRETE 12.5 MM SUPERPAVE IN ACCORDANCE WITH SECTION 402 OF THE GEORGIA DOT STANDARD SPECIFICATIONS, CURRENT EDITION.
      2) APPLY TACK COAT AT A RATE OF 0.04 TO 0.06 GALLONS PER SQUARE YARD IN ACCORDANCE WITH SECTION 413 OF THE GDOT STANDARD SPECIFICATIONS, CURRENT EDITION, OR AS DIRECTED BY ENGINEER.
      3) APPLY PAVEMENT MARKINGS USING WHITE THERMOPLASTIC 0.090 INCHES IN THICKNESS IN ACCORDANCE WITH SECTION 653 OF THE GDOT STANDARD SPECIFICATIONS, CURRENT EDITION.
      4) APPLY RAISED PAVEMENT MARKERS PER GDOT CONSTRUCTION DETAIL T-15C, TYPE 11 (YELLOW/YELLOW) (CENTERLINE) AND TYPE 13 (CLEAR/RED) (EDGE OF PAVEMENT), USING HEATED BITUMINOUS ADHESIVE IN ACCORDANCE WITH SECTION 868 OF THE GDOT SPECIAL SHELF PROVISION SPECIFICATIONS, CURRENT EDITION.
3. SEE SIGN INSTALLATION DETAIL DWG 322 A/B/C.

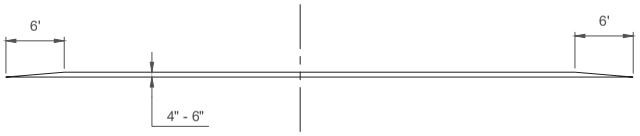


SECTION A-A
SECTION C-C

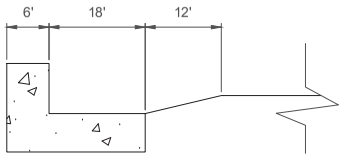
FULTON COUNTY STANDARD DETAIL 315 SPEED TABLE		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 315

315-S.dwg December 08, 2025 - 1:57pm





SECTION A - A
NTS



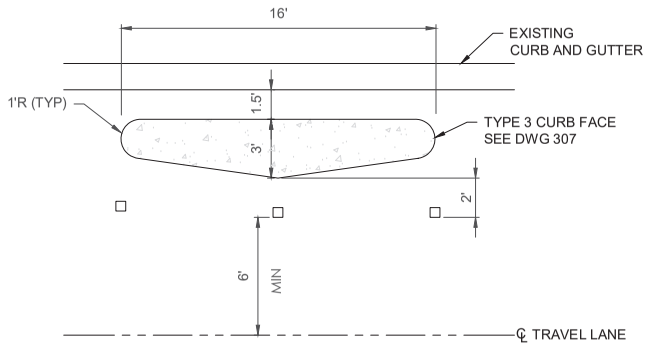
SECTION B - B
NTS

NOTES:

1. MINIMUM 1" SLOPE REQUIRED IN ALL AREAS FOR DRAINAGE.
2. A 30" X 30" YELLOW WARNING SIGN WITH THE LEGEND "RAISED INTERSECTION" MAY BE REQUIRED ON ALL APPROACHES NOT CONTROLLED BY A STOP SIGN.
3. INTERSECTION HUMP MAY BE CONSTRUCTED USING ASPHALT PR CONCRETE, PER FULTON COUNTY TRAFFIC ENGINEER.
   A. CONCRETE CONSTRUCTION:
      1) CONSTRUCT INTERSECTION HUMP USING 3000 PSI HIGH/EARLY CONCRETE REINFORCED WITH #3 BARS AT 12" C. TO C. BOTH WAYS, OR 6 X 6 - W2.9 WELDED WIRE FABRIC, OR 4 X 4 - W2.0 X W2.0 WELDED WIRE FABRIC.
      2) CONCRETE WILL BE COLORED AND TOP STAMPED WITH TEXTURE PER FULTON COUNTY TRAFFIC ENGINEER.
   B. ASPHALT CONSTRUCTION:
      1) CONSTRUCT INTERSECTION HUMP USING ASPHALTIC CONCRETE 12.5 MM SUPERPAVE IN ACCORDANCE WITH SECTION 402 OF THE GEORGIA DOT STANDARD SPECIFICATIONS, CURRENT EDITION.
      2) APPLY TACK COAT AT A RATE OF 0.04 TO 0.06 GALLONS PER SQUARE YARD IN ACCORDANCE WITH SECTION 413 OF THE GEORGIA DOT STANDARD SPECIFICATIONS, CURRENT EDITION, OR AS DIRECTED BY ENGINEER.
4. APPLY PAVEMENT MARKING USING WHITE THERMOPLASTIC 0.090 INCHES IN THICKNESS IN ACCORDANCE WITH SECTION 653 OF THE GEORGIA DOT STANDARD SPECIFICATIONS, CURRENT EDITION.
   A. APPLY RAISED PAVEMENT MARKERS, TP 11 (YELLOW/YELLOW) (CENTERLINE) AND TP 13 (CLEAR/RED) (EDGE OF PAVEMENT), USING HEATED BITUMINOUS ADHESIVE IN ACCORDANCE WITH SECTION 868 OF THE GEORGIA DOT SPECIAL SHELF PROVISION SPECIFICATIONS, CURRENT EDITION.

FULTON COUNTY STANDARD DETAIL 316 INTERSECTION HUMP		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 316

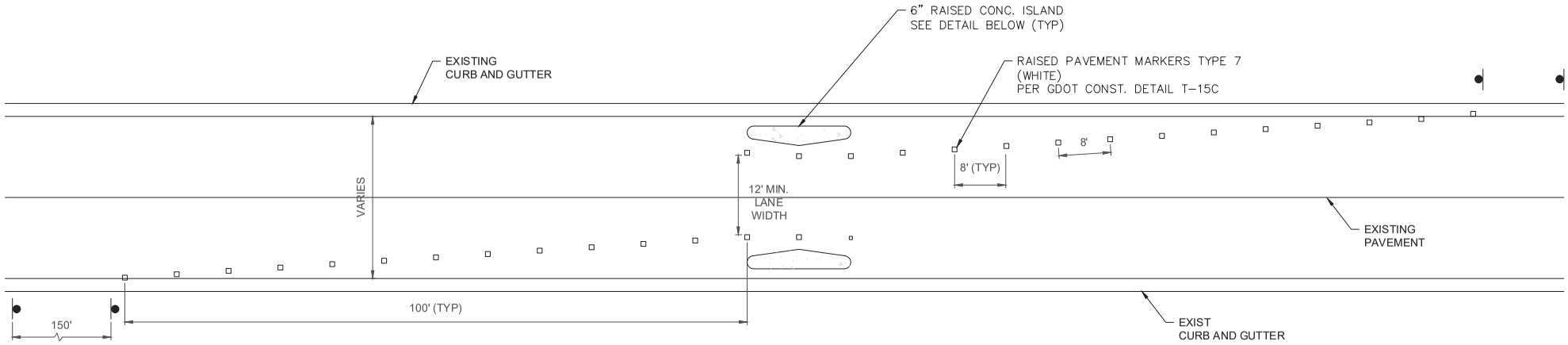
316-S.DWG December 08, 2025 - 1:57pm



CONC ISLAND DETAIL
NTS

NOTES:

1. SEE DWG. 307 FOR CONCRETE MEDIAN CONSTRUCTION DETAIL.
2. SEE SIGN INSTALLATION DETAIL DWG 322 A/B/C.
3. INSTALL RAISED PAVEMENT MARKERS USING HEATED BITUMINOUS ADHESIVE IN ACCORDANCE WITH SECTION 868 OR GDOT SPECIAL SHELF PROVISION SPECIFICATIONS.



PLAN
NTS



W5-1 (TYP) R1-2A (TYP) R1-2 (TYP)

FULTON COUNTY STANDARD DETAIL 317 ONE LANE CHOKER		DATE	REVISIONS	DATE	REVISIONS

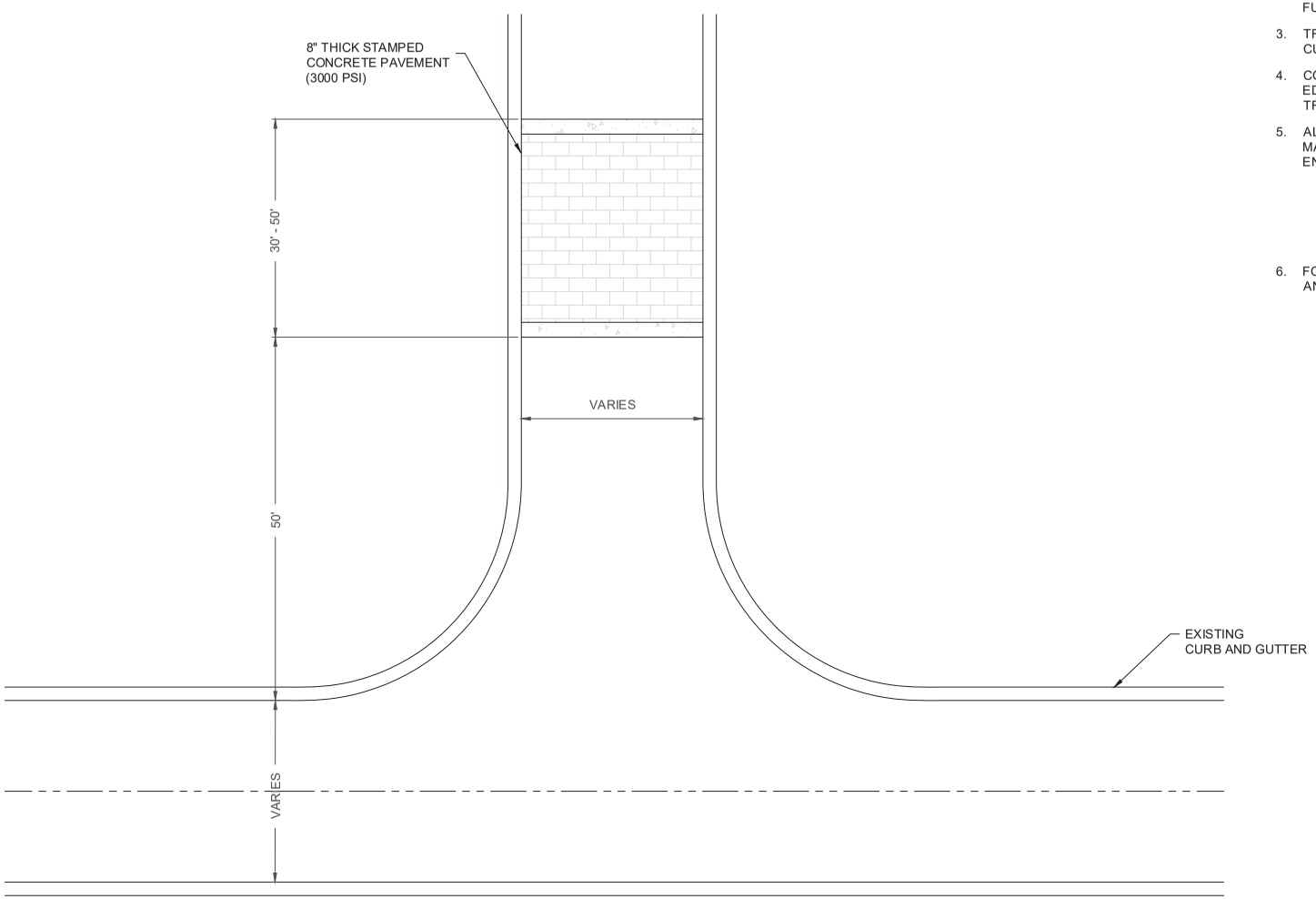
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
317

317-S.dwg December 08, 2025 - 1:57pm



NOTES:

1. CONSTRUCT ENTRANCE TREATMENT USING 3000 PSI HIGH/EARLY CONCRETE.
2. CONCRETE WILL BE COLORED AND STAMPED WITH TEXTURE PER FULTON COUNTY TRAFFIC ENGINEER.
3. TREATMENT WILL EXTEND FROM GUTTER TO GUTTER OR FACE OF CURB TO FACE OF CURB WHERE NO GUTTER EXISTS.
4. CONCRETE MAY BE FORMED 1 INCH ABOVE EXISTING GRADE WITH EDGE SLOPED TO GRADE OVER 1 INCH PER FULTON COUNTY TRAFFIC ENGINEER.
5. ALTERNATE PAVER MATERIAL (STONE, BRICK, CONCRETE, ETC.) MAY BE USED AS APPROVED BY FULTON COUNTY TRAFFIC ENGINEER. IF USED, APPLY FOLLOWING MODIFICATIONS:
   A. 18 INCH BAND OF 3000 PSI HIGH/EARLY CONCRETE POURED IN PLACE EXTENT OF TREATMENT.
   B. ALL PAVERS SET IN 1 INCH LEVELING SAND ON MINIMUM OF 4 INCH CONCRETE BASE.
6. FOR PRIVATE STREETS ONLY UNLESS APPROVED BY ECONOMIC AND COMMUNITY DEVELOPMENT DIRECTOR.

FULTON COUNTY STANDARD DETAIL 318

ENTRANCE TREATMENT

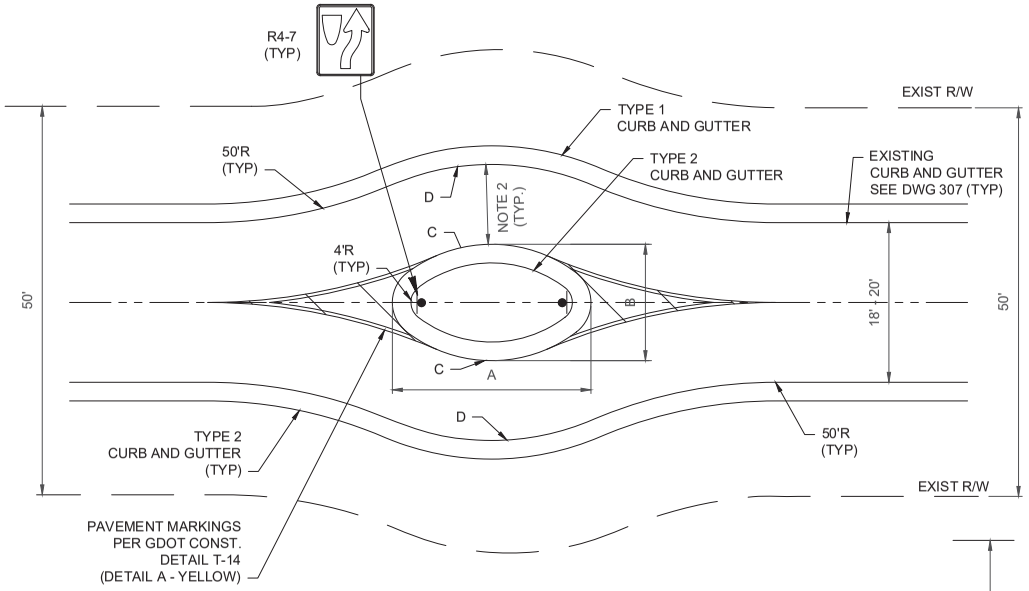
DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
318

318-S.DWG December 08, 2025 - 1:57pm

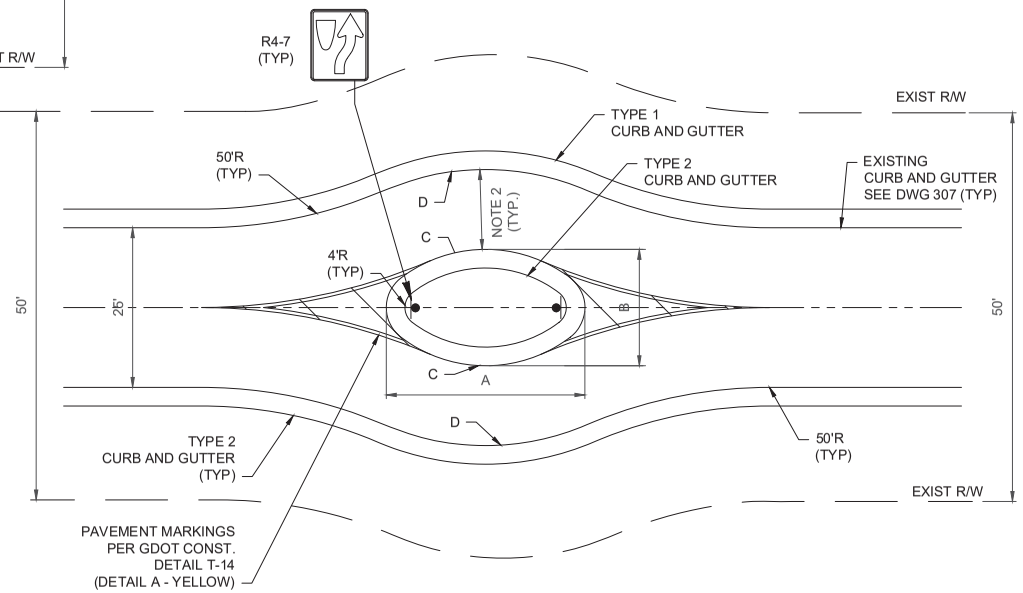


CENTER ISLAND EXIST 25' ROADWAY
WITHOUT SIDEWALK
NTS

TABLE 319-1			
	18' ROADWAY	20' ROADWAY	25' ROADWAY
A	13'-7"	16'-3"	21'-4"
B	9'-0"	10'-0"	12'-6"
C	12' R	13' R	15' R
D	21' R	23' R	27'-6" R

NOTES:

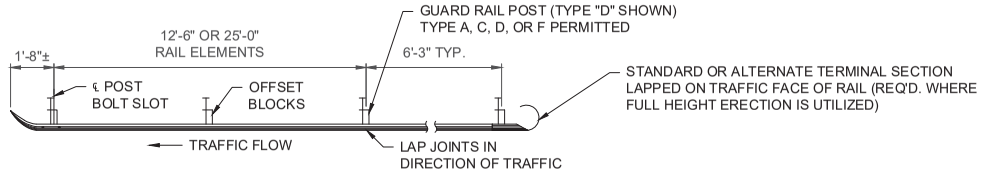
1. ALL STRIPING MUST BE DONE IN THERMOPLASTIC PER GDOT SPECIFICATION SECTION 653.
2. 20' LANE WIDTH REQUIRED BY FIRE DEPARTMENT *
3. NO RESIDENTIAL DRIVEWAYS ALLOWED WITHIN 20-FEET OF CENTER ISLAND.
4. SEE SIGN INSTALLATION DETAIL DWG 322 A/B/C.



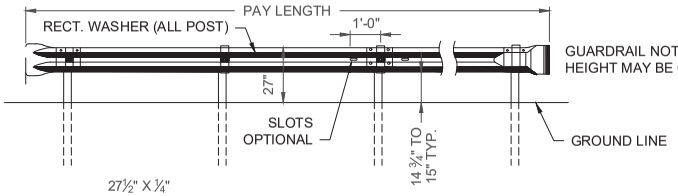
CENTER ISLAND EXIST 25' ROADWAY
WITHOUT SIDEWALK
NTS

FULTON COUNTY STANDARD DETAIL 319 CENTER ISLAND		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 319

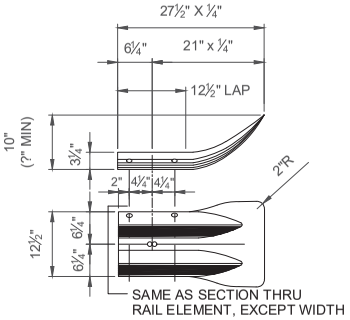
319-S.dwg December 08, 2025 - 1:57pm



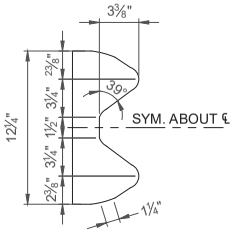
STANDARD OR ALTERNATE TERMINAL SECTION LAPPED ON TRAFFIC FACE OF RAIL (REQ'D. WHERE FULL HEIGHT ERECTION IS UTILIZED).



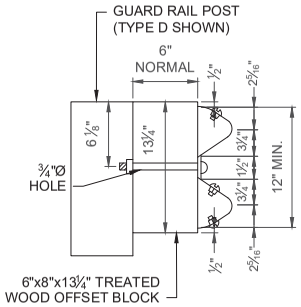
GUARDRAIL NOT ERECTED AT A 27" TOP OF RAIL HEIGHT MAY BE CAUSE FOR REJECTION.

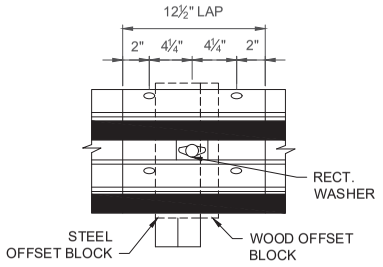


STANDARD TERMINAL SECTION
NTS



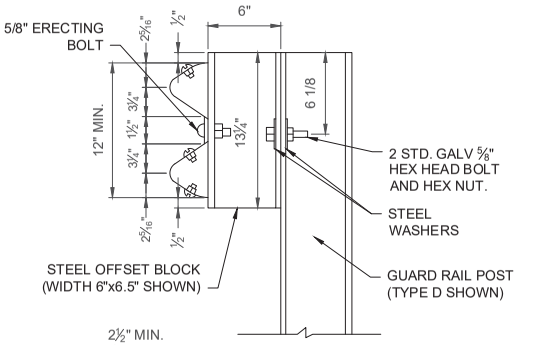
SECTION THRU
RAIL ELEMENT
NTS





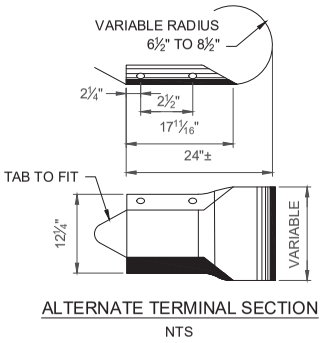
NOTE: OFFSET BLOCKS MAY BE WOOD OR STEEL.

GUARD RAIL SPLICE AT POST
NTS



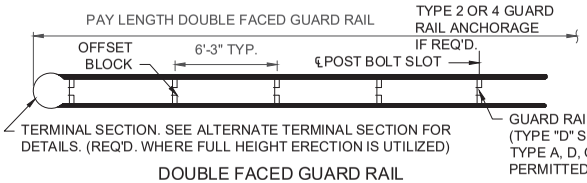
NOTES:

1. GUARD RAIL, ITS FITTINGS, PARTS, ETC, ARE TO BE IN ACCORDANCE WITH STATE HIGHWAY DEPARTMENT OF GEORGIA STANDARD SPECIFICATIONS AND/OR SPECIAL PROVISIONS.
2. FOR DETAILS OF POSTS & OFFSET BLOCKS SEE GA. STANDARD 4011.
3. FOR DETAILS OF GUARD RAIL ANCHORAGES SEE GEORGIA STANDARD 4012.
4. FOR LOCATION OF GUARD RAIL SEE APPLICABLE LOCATION STANDARDS.
5. ON PROJECTS WHERE GUARD RAIL CONNECTIONS AT BRIDGE END HAVE BEEN PLACED ON PREVIOUS CONTRACTS THE END PANEL MAY BE SHORTENED BY CUTTING OR SHEARING TO FIT EXISTING STRUCTURE.
6. WHEN GUARD RAIL IS REQUIRED ON CURVES WITH RADII LESS THAN 150' PRECURVED RAIL WILL BE REQUIRED.
7. UNIT PRICE FOR GUARD RAIL TO INCLUDE OFFSET BLOCKS, POST, BACK-UP PLATES WHERE REQ'D, BOLTS, NUTS, WASHERS, TERMINAL SECTIONS, ADDITIONAL POST WHERE REQUIRED AND REMOVAL AND REPLACEMENT OF PORTIONS OF MEDIAN PAVING, SPILLWAYS OR CATCH BASINS WHERE NECESSARY.
8. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
9. STANDARD NET LENGTH OF RAIL ELEMENTS MAY BE EITHER 12'-6" OR 25'-0". THESE LENGTHS SHALL BE ARRANGED TO PROVIDE AS NEARLY AS POSSIBLE THE OVERALL LENGTH ORDERED BY THE ENGINEER FOR ANY ONE LOCATION.

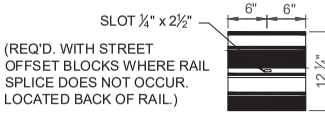


ALTERNATE TERMINAL SECTION
NTS

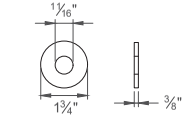
TERMINAL SECTION FOR DOUBLE FACED GUARD RAIL SIMILAR RADIUS VARIABLE 12" TO 16" AND LENGTH VARIABLE.



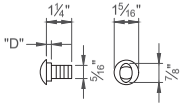
DOUBLE FACED GUARD RAIL
NTS



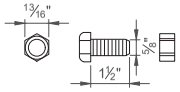
BACK-UP PLATE
NTS



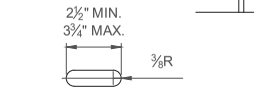
STEEL WASHER (GALV.)
NTS
(REQ'D. UNDER ALL HEX BOLT HEADS AND UNDER ALL HEX NUTS)



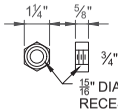
SPLICE BOLT
(6 REQ'D PER SPLICE)
NTS



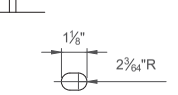
5/8"Ø HEX BOLT AND HEX NUT
NTS
(TO BE USED ONLY FOR ATTACHING STEEL OFFSET BLOCK TO STEEL POST.)



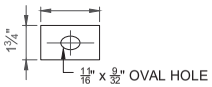
ERECTING BOLT SLOT
NTS



RECESS NUT
NTS



SPLICE BOLT SLOT
NTS



NOTE: WASHER REQ'D AT ALL POSTS.

RECTANGULAR WASHER
(GALV) (8 GAUGE)
NTS

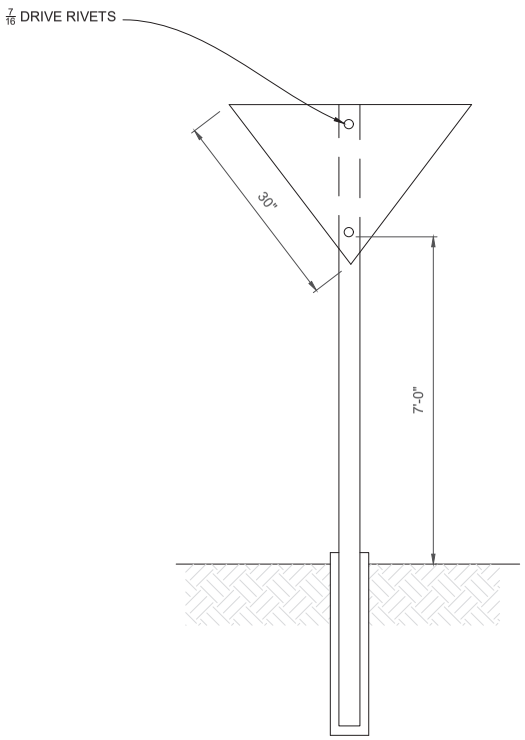
FULTON COUNTY STANDARD DETAIL 320 BEAM TYPE GUARD RAIL		DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

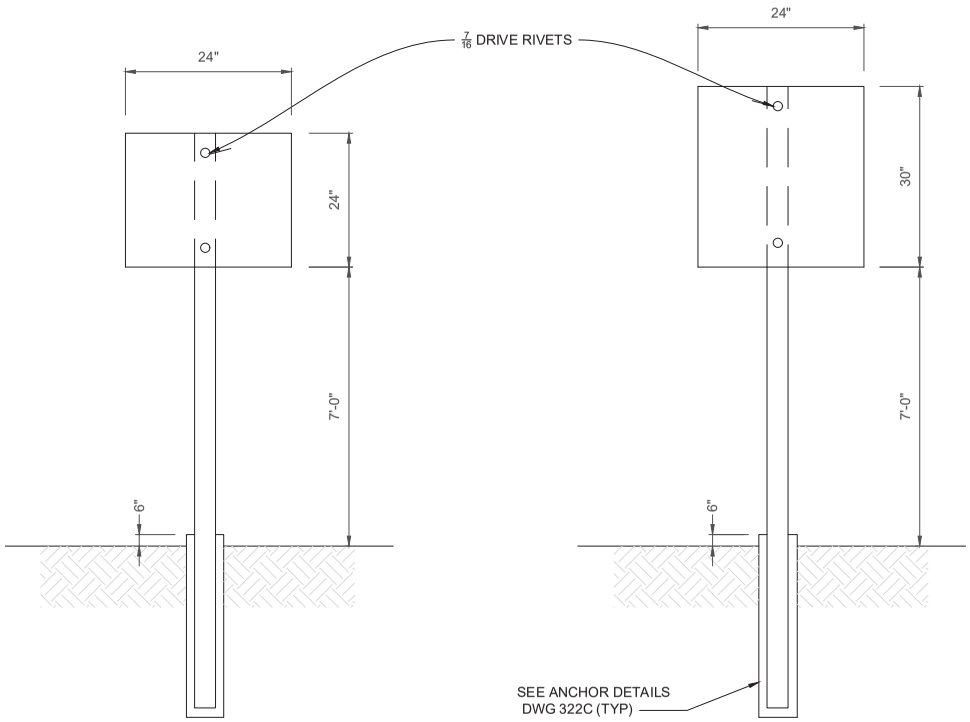
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
320

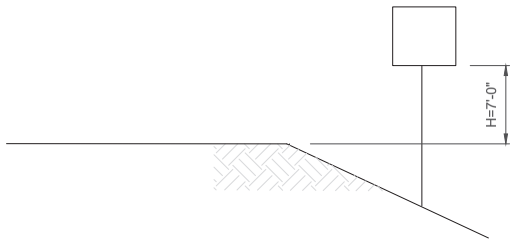
320-S.dwg December 08, 2025 - 1:57pm



YIELD SIGN DETAILS
NTS



REGULARLY SIGN DETAILS
NTS



FULTON COUNTY STANDARD DETAIL 322A

SIGN DETAILS AND LOCATIONS

DATE	REVISIONS	DATE	REVISIONS

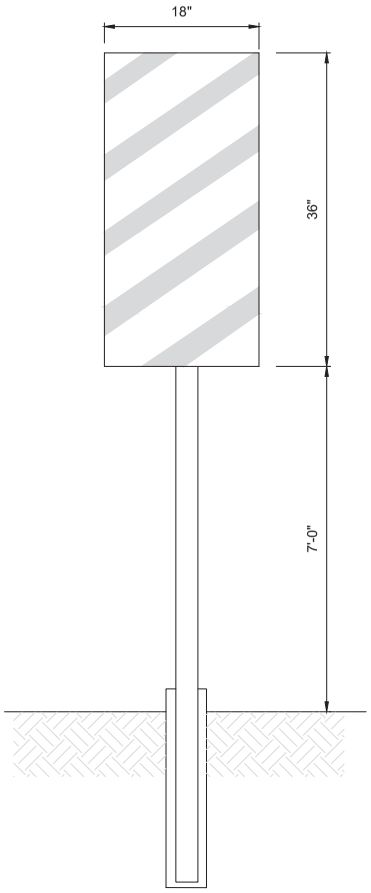
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

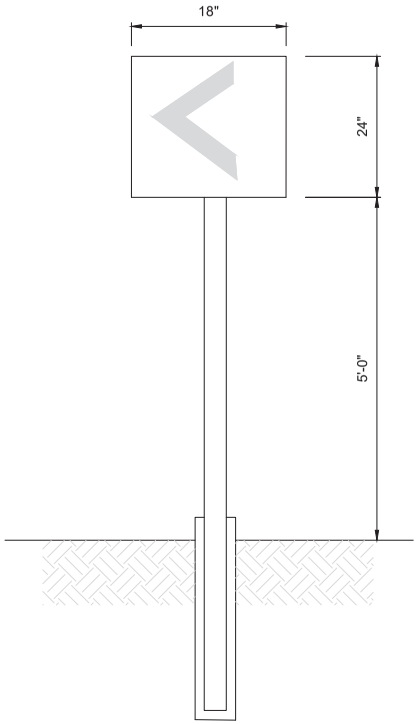
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
322A

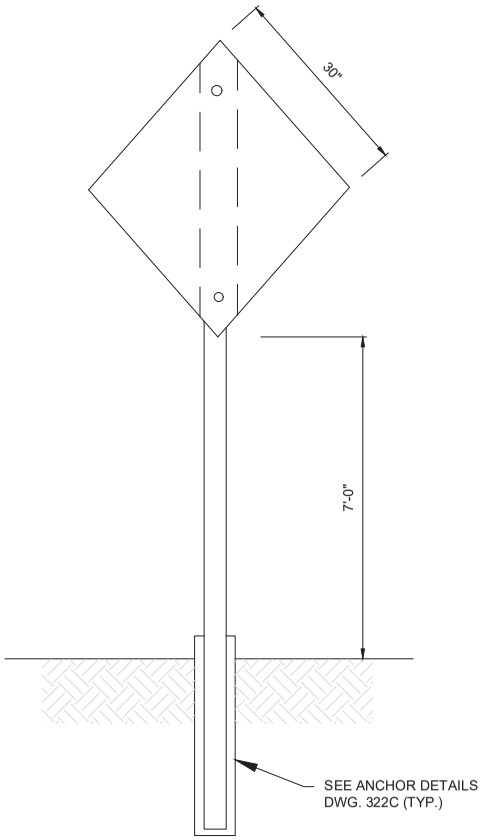
322A-S.dwg December 08, 2025 - 1:58pm



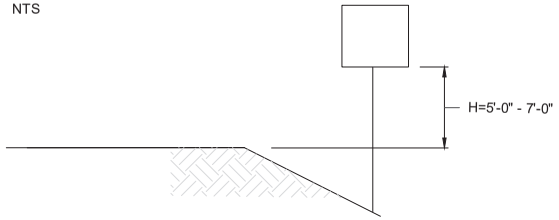
OBJECT MARKER
NTS



CHEVRON DETAILS
NTS



WARNING SIGN DETAILS
NTS

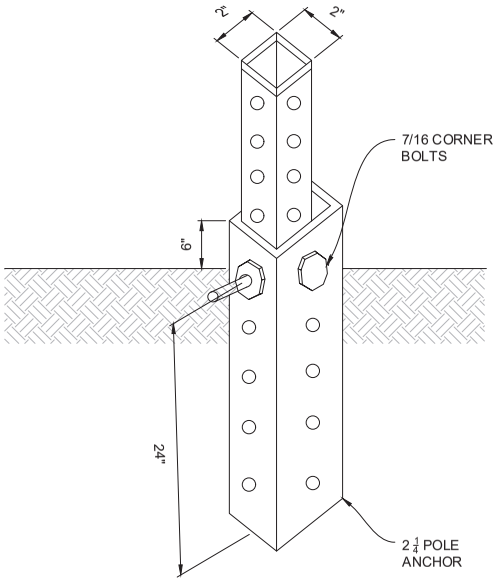


FULTON COUNTY STANDARD DETAIL 322B SIGN DETAILS AND LOCATION SHEET 2 OF 3		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 322B

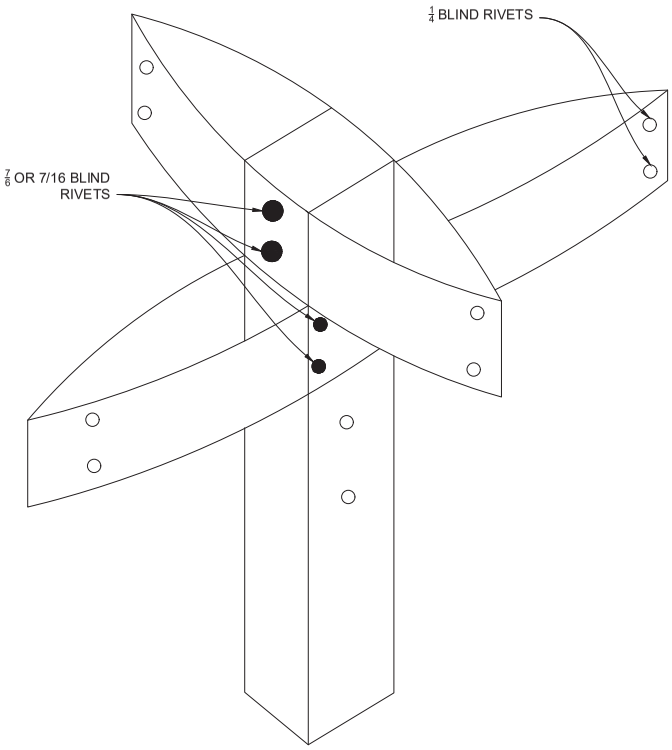
322B-S.dwg December 08, 2025 - 1:58pm

NOTES:

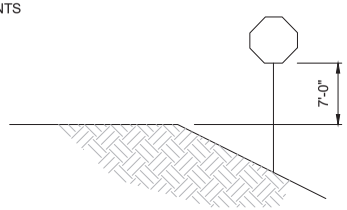
1. SEPARATE STREET SIGN AND STOP SIGN AT SUBDIVISION ENTRANCE ONLY. COMBINE STREET SIGN AND STOP SIGN WITHIN SUBDIVISION.
2. ALL TEXT IS TO BE: 6" LETTER HEIGHT, 9" BLADE.
3. FOR STREET SIGNS ONLY, USE THE FHWA SERIES 'E' FONT FOUND IN THE FHWA STANDARD SIGN MANUAL.
4. FOR WARNING AND PRIVATE SIGNS, USE THE MUTCD SIGN STANDARDS.



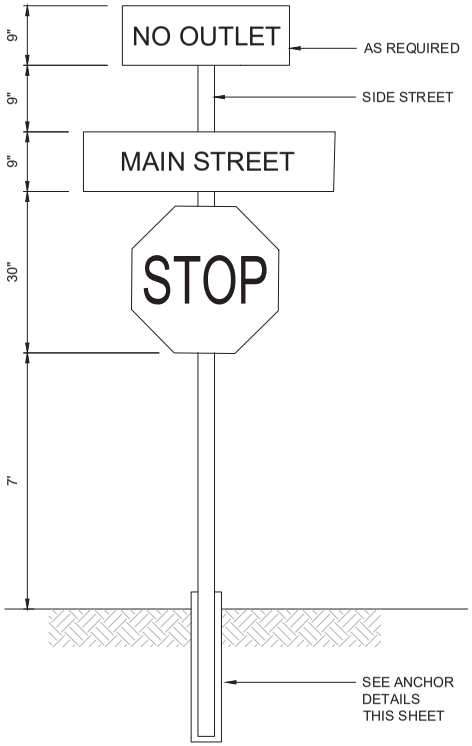
ANCHOR DETAILS
NTS



STREET NAME SIGN MOUNTING DETAILS
NTS



SIGN- INSTALLATION DETAIL
NTS



TYPICAL SIGN ASSEMBLY
NTS

FULTON COUNTY STANDARD DETAIL 322C

SIGN DETAILS AND LOCATION
SHEET 3 OF 3

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
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DATE: 01-21-2026

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DRAWING NO.
322C

322C-S.dwg December 08, 2025 - 1:58pm

DWG. NO.	DESCRIPTION
400	INDEX AND GENERAL NOTES
401	SANITARY SEWER TYPICAL RIP-RAP CHANNEL PIPE CROSSING
402	CONSTRUCTION EXIT-TEMPORARY
403A	CONCRETE PIER AND FOOTING DETAIL ON SOIL
403B	CONCRETE PIER AND FOOTING DETAIL ON ROCK
403C	CONCRETE PIER AND FOOTING DETAIL TABLE
404	TEMPORARY SILT FENCE
405	DETAIL OF SOD DITCH
407	EROSION CONTROL STONE CHECK DAMS

400-S.dwg December 08, 2025 - 1:13pm

FULTON COUNTY STANDARD DETAIL 400

INDEX AND GENERAL NOTES

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML

APPROVED: TM

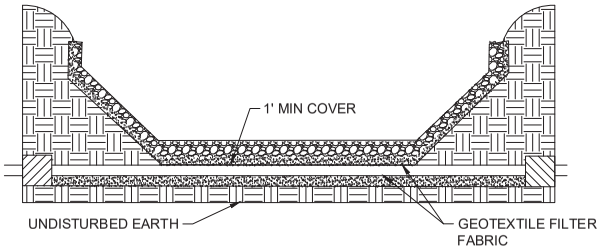
DATE: 01-21-2026

FULTON COUNTY

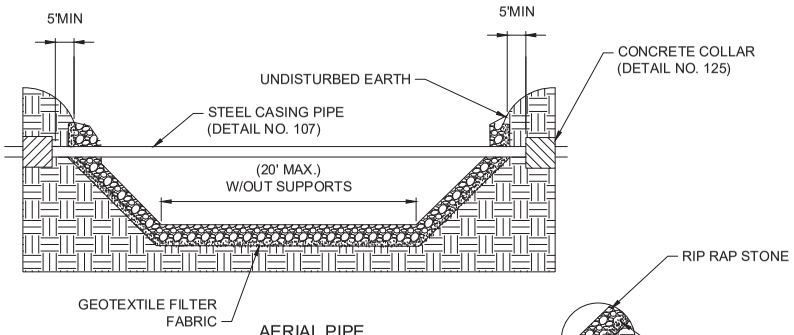
FULTON COUNTY PUBLIC WORKS
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DRAWING NO.

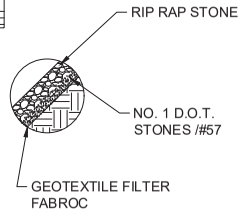
400



UNDERGROUND PIPE
SECTION A-A
NTS

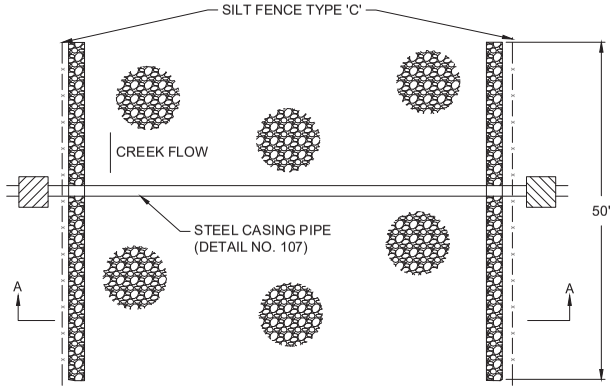


AERIAL PIPE
SECTION A-A
NTS



NOTES:

1. MINIMUM STONE SIZE SHALL BE 125 LBS.
2. STONE SIZE SHALL BE PROVIDED BY DESIGN ENGINEER OR FULTON COUNTY PUBLIC WORKS ENGINEER
3. ALL EROSION CONTROL DEVICES MUST BE IN PLACE PRIOR TO ANY GRADING OR CLEARING.
4. ALL EROSION CONTROL SHALL CONFORM TO FULTON COUNTY STANDARDS.
5. RIM OF MANHOLE SHALL BE 2' ABOVE GRADE. IF IN A FLOOD ZONE, RIM SHALL BE ABOVE 25 YEAR STORM ELEVATION. RING AND COVER OF MANHOLE TO BE COMPOSITE WATERTIGHT RING AND COVER PER DETAIL 105.
6. SEE MANUAL FOR EROSION & SEDIMENT CONTROL IN GEORGIA FOR MORE INFORMATION.
7. CONCRETE STRENGTH TEST MAY BE REQUIRED FOR ALL POURED IN PLACE CONCRETE.
8. AERIAL CROSSING MAY BE USED ONLY WITH FCPW'S SPECIFIC AND EXPLICIT APPROVAL AND DIRECTIONS.
9. REFER TO DETAIL 100 FOR ADDITIONAL INFORMATION.



PLAN VIEW
NTS

TABLE 401-1
GRADED RIP - RAP STONE

FLOW VELOCITY (FT/SEC.)	NATIONAL STONE, SAND & GRAVEL ASSOCIATION RATING	SIZE IN INCHES (SQ. OPENING)			PARTICLE WEIGHT (LBS)*
		MAX.	AVG.	MIN.	
25	R-1	1 1/2	3/4	NO.8	---
4.5	R-2	3	1 1/2	1	---
6.5	R-3	6	3	2	20
9.0	R-4	12	6	3	60
11.5	R-5	18	9	5	150
13.0	R-6	24	12	7	300
14.5	R-7	30	15	12	700
---	R-8	48	24	15	1500

* AT LEAST 50% OF ALL INDIVIDUAL STONE PARTICLES MUST WEIGH AT LEAST THE LISTED AMOUNT.

TABLE 401-2
GRADED RIP - RAP STONE

GEORGIA DOT CLASSIFICATION	SIZE INCHES (SQ. OPENING)			COMMON USES
	MAX.	AVG.	MIN.	
TYPE 3	12	9	5	CREEKS, BANKS, PIPE OUTLETS, LAKES, SHORELINES & RIVERS
TYPE 1	24	12	7	

GRADED RIP - RAP STONE (SEE TABLE 401-2)

TYPE 3: FOR GENERAL USE NORMAL DRAINAGE CONDITIONS: THE LARGEST PIECES OF MATERIAL SHALL HAVE A MAXIMUM APPROXIMATE VOLUME OF ONE CUBIC FOOT. AT LEAST 35% OF THE MASS SHALL BE COMPRISED OF PIECES WHICH WEIGH 15 POUNDS OR MORE.

TYPE 1: FOR SEVERE DRAINAGE CONDITIONS OR MODERATE WAVE ACTION: THE LARGEST PIECES OF MATERIAL SHALL HAVE A MAXIMUM VOLUME OF 4.2 CUBIC FEET. AT LEAST 35% OF THE MASS SHALL BE COMPRISED OF PIECES WHICH WEIGH 125 POUNDS OR MORE.

FULTON COUNTY STANDARD DETAIL 401

SANITARY SEWER TYPICAL RIP-RAP CHANNEL PIPE CROSSING

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

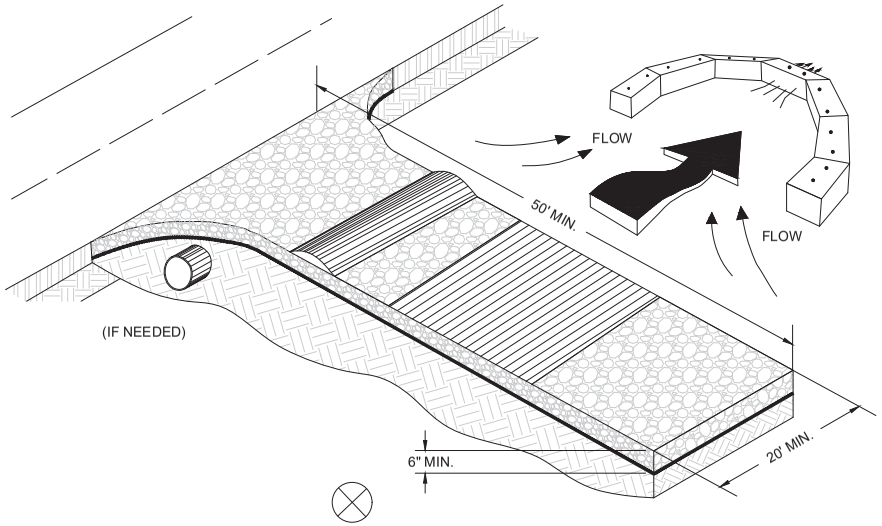
FULTON COUNTY

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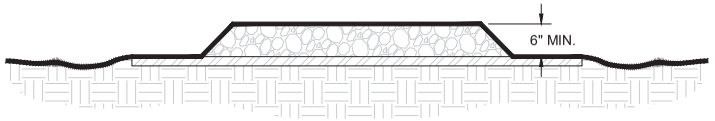
DRAWING NO.
401

401-S.dwg December 08, 2025 - 1:14pm

EXIT DIAGRAM



ENTRANCE ELEVATION

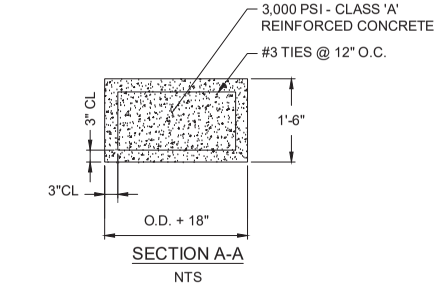


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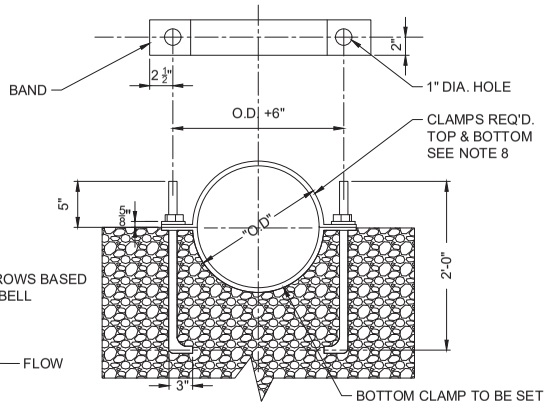
1. AVOID LOCATING ON STEEP SLOPES OR AT CURVES ON PUBLIC ROADS.
2. REMOVE ALL VEGETATION AND OTHER UNSUITABLE MATERIAL FROM THE FOUNDATION AREA. GRADE AND CROWN FOR POSITIVE DRAINAGE.
3. AGGREGATE SIZE SHALL BE IN ACCORDANCE WITH NATIONAL STONE ASSOCIATION R-2 (1.5"-3.5" STONE).
4. GRAVEL PAD SHALL HAVE A MINIMUM THICKNESS OF 6 INCHES.
5. PAD WIDTH SHALL BE EQUAL FULL WIDTH AT ALL POINTS OF VEHICULAR EGRESS, BUT NO LESS THAN 20 FEET.
6. A DIVERSION RIDGE SHOULD BE CONSTRUCTED WHEN GRADE TOWARD PAVED AREA IS GREATER THAN 2%.
7. INSTALL PIPE UNDER THE ENTRANCE IF NEEDED TO MAINTAIN DRAINAGE DITCHES.
8. WHEN WASHING IS REQUIRED, IT SHOULD BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN (DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE ENTRANCE TO A SEDIMENT CONTROL DEVICE).
9. WASHRACKS AND/OR TIRE WASHERS MAY BE REQUIRED DEPENDING ON SCALE AND CIRCUMSTANCE. IF NECESSARY, WASHRACK DESIGN MAY CONSIST OF ANY MATERIAL SUITABLE FOR TRUCK TRAFFIC THAT REMOVES MUD AND DIRT.
10. MAINTAIN AREA IN A WAY THAT PREVENTS TRACKING AND/OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

FULTON COUNTY STANDARD DETAIL 402 CONSTRUCTION EXIT - TEMPORARY		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 402

402-S.dwg December 08, 2025 - 1:14pm



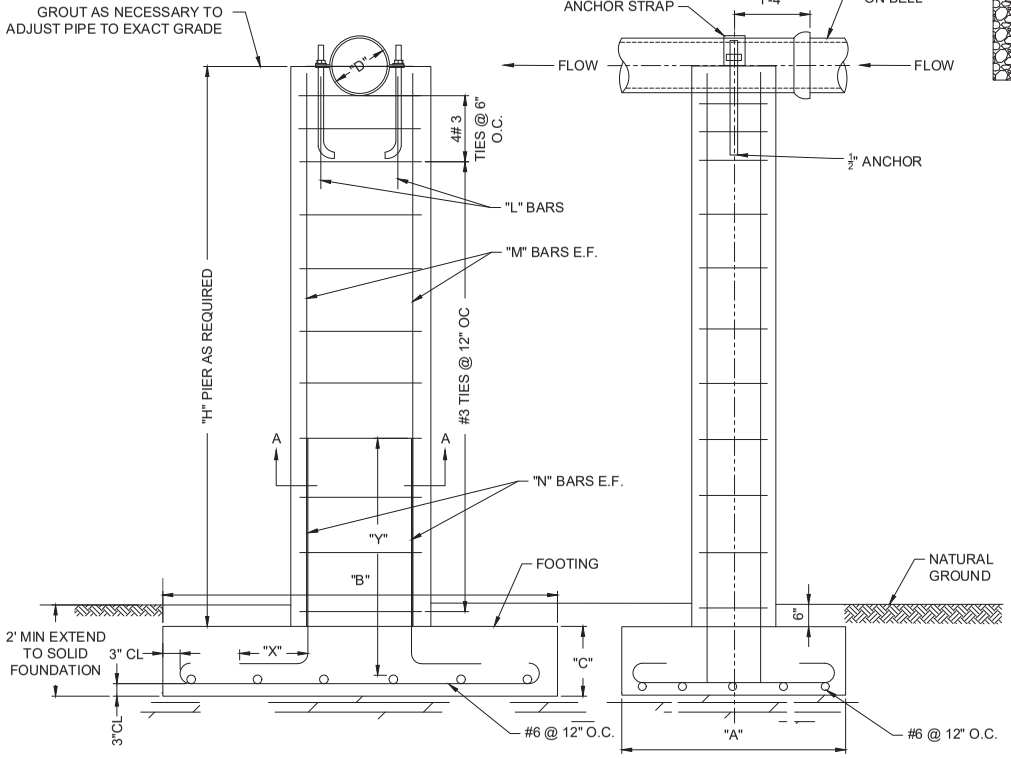
SECTION A-A
NTS



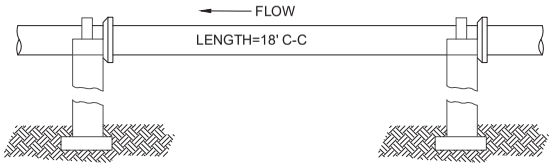
CLAMP DETAIL
NTS

NOTES:

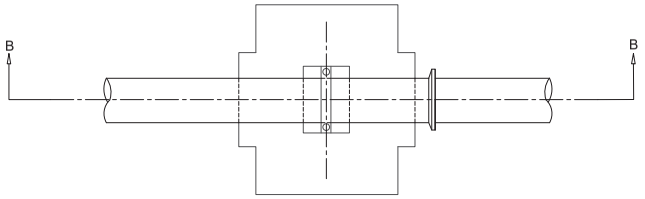
1. SEE DRAWING 403C FOR FOOTING DIMENSIONS AND REINFORCEMENT TABLE.
2. PIER LOCATION DETERMINED BY ENGINEER.
3. UNDER UNSTABLE CONDITIONS, ENGINEER PLANS FOR PIER DESIGN MUST BE SUBMITTED TO & APPROVED BY THE PUBLIC WORKS DEPARTMENT.
4. PLACE PIERS AT EVERY BELL.
5. ENGINEER TO SUBMIT PIER DESIGN.
6. STEEL REINFORCEMENT TO BE A.S.T.M DESIGNATION A -15 - 54T UNLESS OTHERWISE SPECIFIED, BENDS IN BARS TO CONFORM TO A.C.I. STANDARD.
7. PRECAST PIERS ARE ALLOWED PER PERMISSION OF COUNTY ENGINEER.
8. PROVIDE $\frac{1}{8}$ - INCH MINIMUM NEOPRENE PAD BETWEEN PIPE AND CLAMPS.



ELEVATIONS
NTS



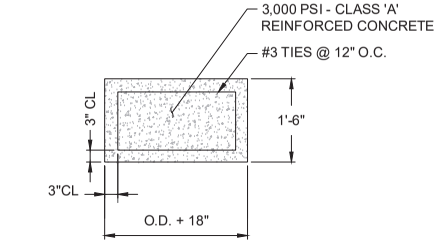
SECTION B-B
NTS



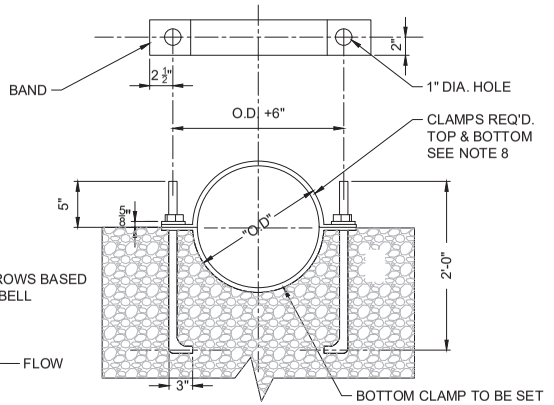
TOP VIEW OF PIER CONNECTION
NTS

FULTON COUNTY STANDARD DETAIL 403A CONCRETE PIER AND FOOTING DETAIL ON SOIL		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 403A

403A-S.dwg December 08, 2025 - 1:14pm



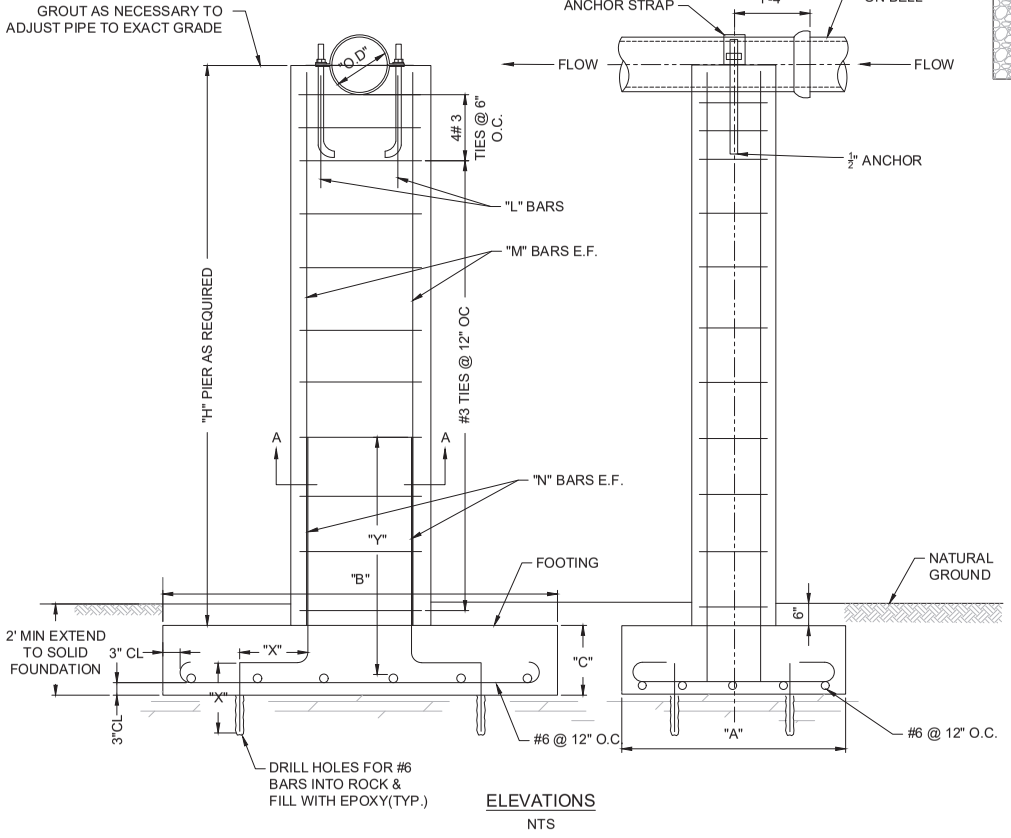
SECTION A-A
NTS



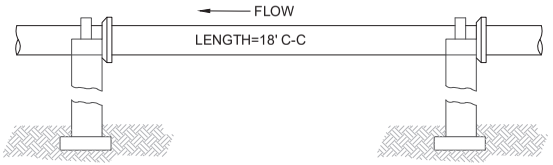
CLAMP DETAIL
NTS

NOTES:

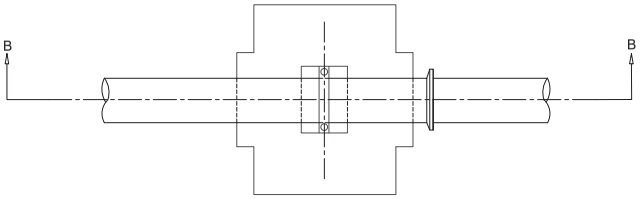
1. SEE DRAWING 403C FOR FOOTING DIMENSIONS AND REINFORCEMENT TABLE.
2. PIER LOCATION DETERMINED BY ENGINEER.
3. UNDER UNSTABLE CONDITIONS, ENGINEER PLANS FOR PIER DESIGN MUST BE SUBMITTED TO & APPROVED BY THE PUBLIC WORKS DEPARTMENT.
4. PLACE PIERS AT EVERY BELL.
5. ENGINEER TO SUBMIT PIER DESIGN.
6. STEEL REINFORCEMENT TO BE A.S.T.M DESIGNATION A -15 - 54T UNLESS OTHERWISE SPECIFIED, BENDS IN BARS TO CONFORM TO A.C.I. STANDARD.
7. PRECAST PIERS ARE ALLOWED PER PERMISSION OF COUNTY ENGINEER.
8. PROVIDE $\frac{1}{8}$ - INCH MINIMUM NEOPRENE PAD BETWEEN PIPE AND CLAMPS.



ELEVATIONS
NTS



SECTION B-B
NTS



TOP VIEW OF PIER CONNECTION
NTS

DATE	REVISIONS	DATE	REVISIONS

FULTON COUNTY STANDARD DETAIL 403B
CONCRETE PIER AND FOOTING DETAIL ON ROCK

DGS/DRN/CHKD: MB/EB/ML
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DRAWING NO.
403B

403B-S.dwg December 08, 2025 - 1:14pm

NOTES:

1. SEE DRAWING 403A & 403B FOR THE RELATED DETAILS.

TABLE 403C-1
CONCRETE PIER AND FOOTING DETAIL TABLE

STANDARD REINFORCEMENT PIER															
FOOTING DIMENSIONS AND REINFORCEMENT								PIER REINFORCEMENT							
PIER	FOOTING			NO. OF #5 BARS EA. DIRECTION				BARS M			BARS N				
H	A	B	C	8" & 10"D	12" & 14"D	16" & 18"D	20" & 24"D	NO.	SIZE	LENGTH	NO.	.7	LENGTH	X	Y
0'-4'	3'-0"	6'-0"	1'-3"	5	5	5	5	NONE			6	#6	H+2'-0"	1'-9"	H + 10"
5'	3'-0"	6'-2"	1'-3"	5	5	5	5	NONE			6	#6	H+2'-0"	1'-9"	H + 10"
6'	3'-0"	6'-4"	1'-3"	5	5	5	5	4	#6	4'-10"	6	#6	5'-4"	1'-9"	4'-2"
7'	3'-0"	6'-6"	1'-3"	5	5	5	6	4	#6	5'-10"	6	#6	5'-4"	1'-9"	4'-2"
8'	3'-0"	6'-8"	1'-3"	5	5	5	6	4	#6	7'-10"	6	#6	5'-4"	1'-9"	4'-2"
9'	3'-0"	6'-10"	1'-3"	5	5	6	7	4	#6	8'-10"	6	#6	5'-4"	1'-9"	4'-2"
10'	4'-0"	7'-0"	1'-3"	5	5	6	7	4	#6	9'-10"	6	#6	5'-4"	1'-9"	4'-2"
11'	4'-2"	7'-2"	1'-3"	5	5	7	8	4	#6	10'-10"	6	#6	5'-4"	1'-9"	4'-2"
12'	4'-4"	7'-4"	1'-3"	5	5	7	8	4	#6	11'-10"	6	#6	5'-4"	1'-9"	4'-2"
13'	4'-6"	7'-6"	1'-6"	5	6	7	8	4	#6	12'-10"	6	#6	5'-7"	1'-9"	4'-5"
14'	4'-8"	7'-8"	1'-6"	6	6	8	9	4	#6	13'-10"	6	#6	5'-7"	1'-9"	4'-5"
15'	4'-10"	7'-10"	1'-6"	6	6	8	9	4	#6	14'-10"	6	#6	5'-7"	1'-9"	4'-5"
16'	5'-0"	8'-0"	1'-6"	6	6	8	10	4	#6	15'-10"	6	#6	5'-7"	1'-9"	4'-5"
17'	5'-2"	8'-2"	1'-6"	6	7	9	10	4	#6	16'-10"	6	#6	5'-7"	1'-9"	4'-5"
18'	5'-4"	8'-4"	1'-6"	7	8	9	11	4	#6	17'-10"	6	#6	5'-7"	1'-9"	4'-5"
19'	5'-6"	8'-6"	1'-6"	7	8	10	12	4	#6	18'-10"	6	#6	5'-7"	1'-9"	4'-5"
20'	5'-8"	8'-8"	1'-6"	7	9	10	12	4	#6	19'-10"	6	#6	5'-7"	1'-9"	4'-5"
21'	5'-10"	8'-10"	1'-6"	8	9	11	13	4	#6	19'-10"	6	#6	6'-0"	1'-9"	4'-9"
22'	6'-0"	9'-0"	1'-6"	9	10	12	13	4	#6	19'-10"	6	#6	7'-0"	1'-9"	5'-9"
23'	6'-2"	9'-2"	1'-6"	9	10	12	13	4	#6	19'-10"	6	#6	8'-0"	1'-9"	6'-9"
24'	6'-4"	9'-4"	1'-6"	10	11	13	15	4	#6	19'-10"	6	#6	9'-0"	1'-9"	7'-9"
25'	6'-6"	9'-6"	1'-6"	10	11	14	16	4	#6	19'-10"	6	#6	11'-0"	1'-9"	9'-3"
26'	6'-8"	9'-8"	1'-6"	11	12	15	16	4	#6	19'-10"	6	#6	12'-0"	1'-9"	10'-3"
27'	6'-10"	9'-10"	1'-6"	12	13	16	17	4	#6	19'-10"	6	#6	13'-0"	1'-9"	11'-3"
28'	7'-0"	10'-0"	1'-6"	12	13	16	18	4	#6	19'-10"	6	#6	14'-0"	1'-9"	12'-3"

TABLE 403C-2
BARS "L" TABLE

H	NO - SIZE LENGTH		
0' - 4'	NONE		
4' - 28'	2	#6	2'-6"

403C - S.dwg December 08, 2025 - 1:14pm

FULTON COUNTY STANDARD DETAIL 403C

CONCRETE PIER AND FOOTING DETAIL TABLE

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML

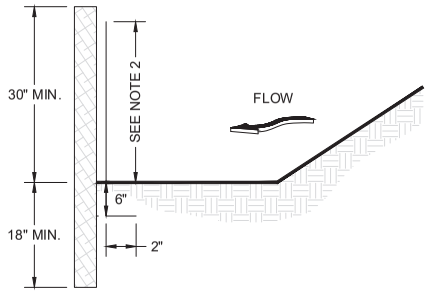
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DATE: 01-21-2026

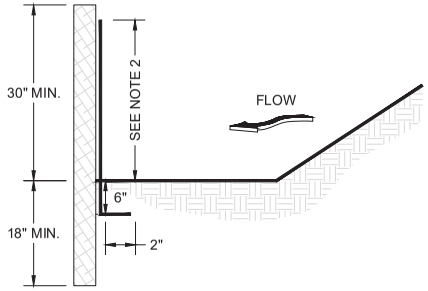
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404-612-7400 FAX: 404-224-0498

DRAWING NO.

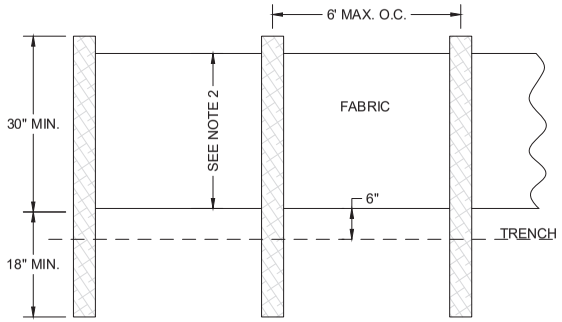
403C



SIDE VIEW

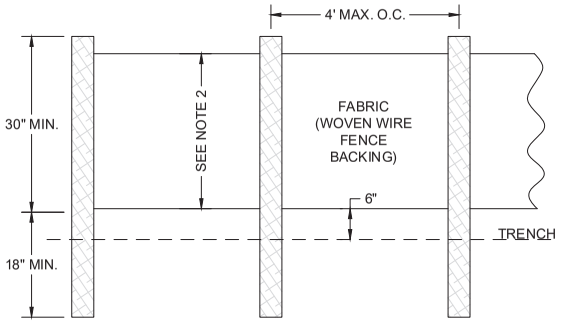


SIDE VIEW



FRONT VIEW

SILT FENCE - TYPE NON-SENSITIVE



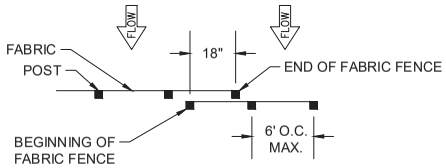
FRONT VIEW

SILT FENCE - TYPE SENSITIVE

NOTES:

1. USE STEEL OR WOOD POSTS OR AS SPECIFIED BY THE EROSION, SEDIMENTATION, AND POLLUTION CONTROL PLAN.
2. HEIGHT OF SILT FENCE IS TO BE SHOWN ON THE EROSION, SEDIMENTATION, AND POLLUTION CONTROL PLAN.
3. THE FABRIC AND WIRE SHOULD BE SECURELY FASTENED TO POSTS AND FABRIC ENDS MUST BE OVERLAPPED A MINIMUM OF 18" OR WRAPPED TOGETHER AROUND A POST TO PROVIDE A CONTINUOUS FABRIC BARRIER AROUND THE INLET.

OVERLAP AT FABRIC ENDS



TOP VIEW
N.T.S.



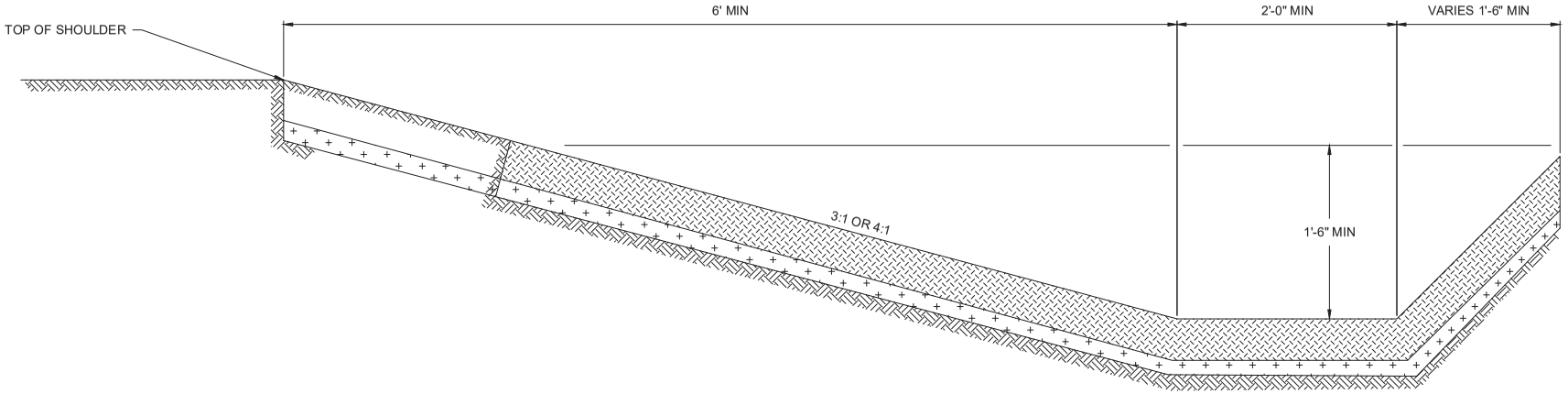
FRONT VIEWS
N.T.S.

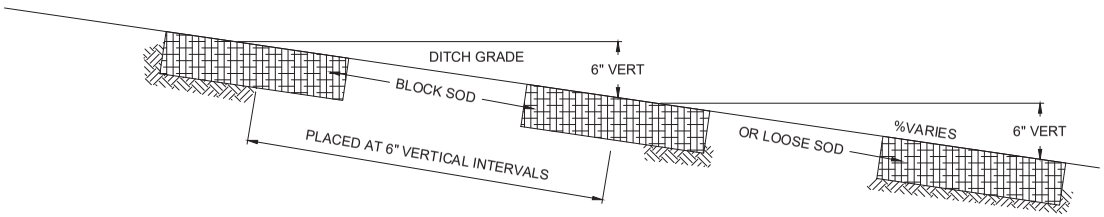
404-S.dwg December 08, 2025 - 1:14pm

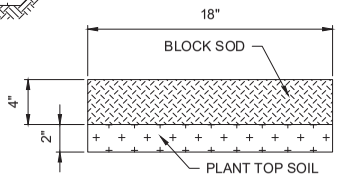
FULTON COUNTY STANDARD DETAIL 404 TEMPORARY SILT FENCE		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 404

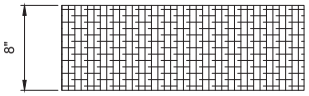
NOTES:

1. SOD DITCH CHECKS MAY BE OF LOOSE SOD OR BLOCK SOD. SOD DITCH CHECKS TO BE PLACED AT 6" VERTICAL INTERVALS. THIS STANDARD TO BE USED WHERE EROSION IN ROADSIDE DITCHES IS EXCESSIVE DUE TO TYPE OF SOIL OR GRADE.
2. RIP RAP CHECK DAMS TO BE PLACED AS NECESSARY DEPENDING ON GRADE OF DITCH.









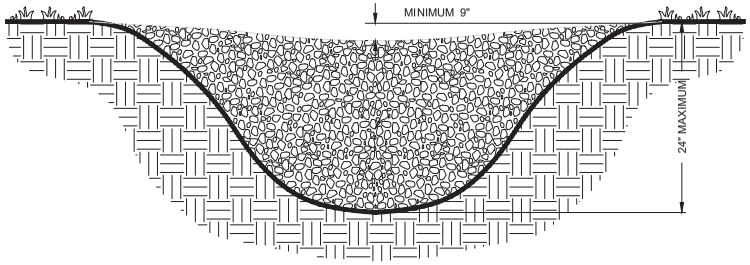
LOOSE SOD
NTS

FULTON COUNTY STANDARD DETAIL 405 DETAIL OF SOD DITCH		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 405

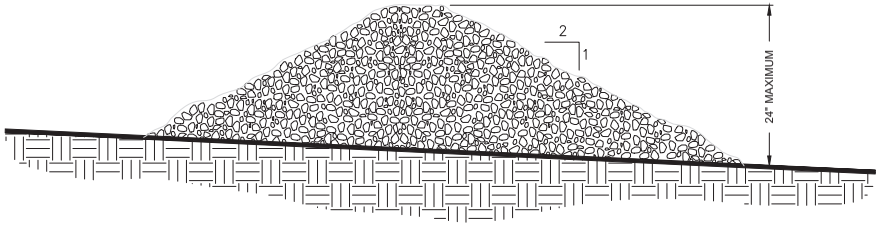
405-S.dwg December 08, 2025 - 1:14pm

NOTES:

1. USE AND LOCATION OF CHECK DAMS SHALL BE AS DIRECTED BY INSPECTOR.
2. CHECK DAMS ARE TO BE USED ONLY IN SMALL OPEN CHANNELS (THEY ARE NOT TO BE USED IN LIVE STREAMS).
3. THE DRAINAGE AREA FOR STONE CHECK DAMS SHALL NOT EXCEED TWO ACRES.
4. THE CENTER OF THE CHECK DAM MUST BE AT LEAST 9 INCHES LOWER THAN THE OUTER EDGES.
5. THE DAM HEIGHT SHOULD BE A MAXIMUM OF 2 FEET FROM CENTER TO RIM EDGE.
6. THE SIDE SLOPES OF THE CHECK DAM SHALL NOT EXCEED A 2:1 SLOPE.
7. GEOTEXTILE SHALL BE USED TO PREVENT THE MITIGATION OF SUBGRADE SOIL PARTICLES INTO THE STONES (REFER TO AASHTO M288-96, SECTION 7.3, TABLE 3).

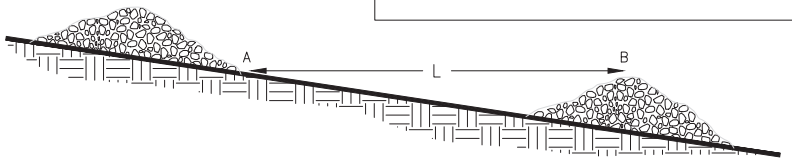


CROSS SECTION



PROFILE VIEW

A. THE TOE OF THE UPSTREAM CHECK DAM.
B. TOP OF THE DOWNSTREAM CHECK DAM.
L. THE DISTANCE SUCH THAT POINTS A AND B ARE OF EQUAL ELEVATION.



SPACING BETWEEN CHECK DAMS

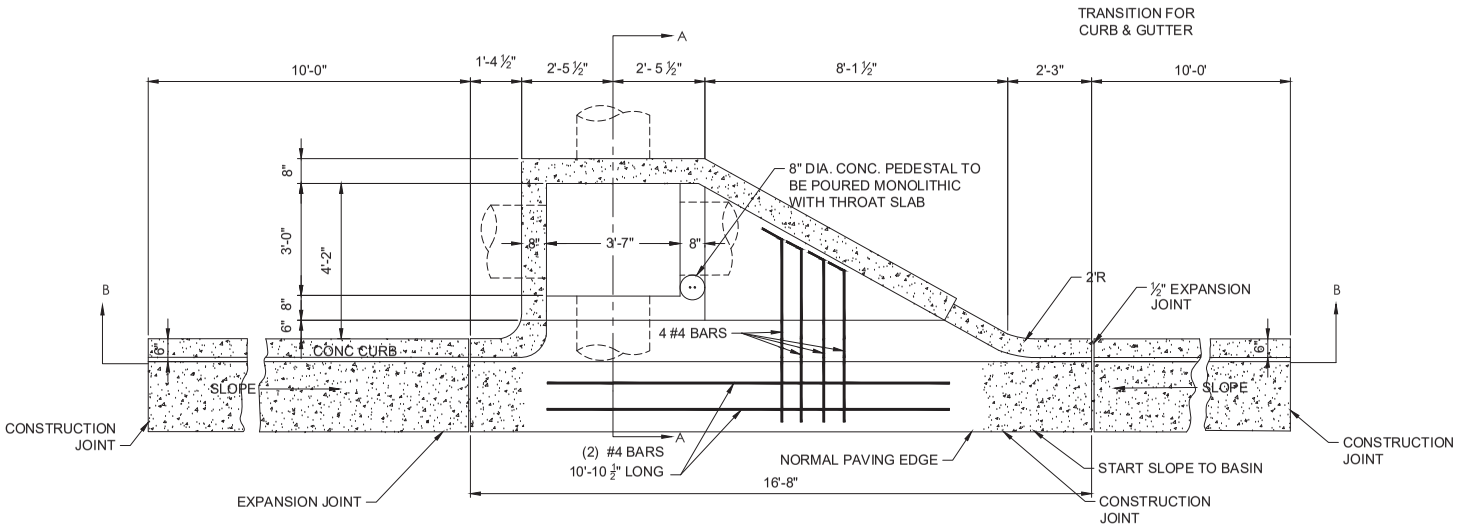
FULTON COUNTY STANDARD DETAIL 407 EROSION CONTROL STONE CHECK DAMS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 407

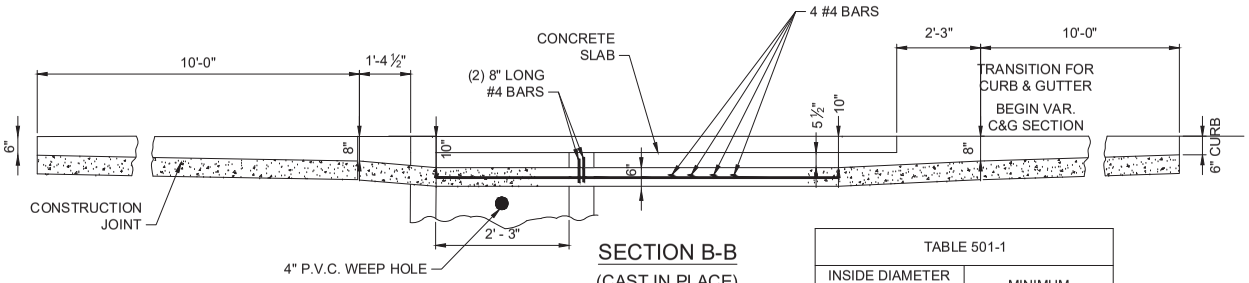
407-S.dwg December 08, 2025 - 1:14pm

DWG. NO.	DESCRIPTION
500	INDEX AND GENERAL NOTES
501	CATCH BASIN SINGLEWING ONE FOOT OFFSET (FACE OF CURB)
502	CATCH BASIN DOUBLE WING ONE FOOT OFFSET (FACE OF CURB)
503	CATCH BASIN WITH ROLLED CURB & GUTTER 10" OFFSET (PRIVATE DEVELOPMENT ONLY)
504	SINGLE WING ON - LINE CATCH BASIN (BRICK)
505	DOUBLE WING ON - LINE CATCH BASIN
506	CATCH BASIN TOPS
507	STANDARD PRECAST ROUND CATCH BASINS
508	LOCATION OF ROUND CATCH BASIN
509	DROP INLETS, BRICK & CATCH BASIN EXTENSION
510	DROP INLETS, CONCRETE DETAILS FOR PAVED SECTIONS ONLY
511	DROP INLET DIMENSIONS
512	DROP INLETS (WEIR TYPE)
513	REINFORCED PLASTIC STEP
514	PRECAST CONCRETE HEADWALL SYSTEMS (INLET & OUTLET HEADWALLS)
515	INLET & OUTLET HEADWALLS
516	ENERGY DISSIPATOR (ALTERNATE)
518	STRUCTURAL PLATE PIPE ARCH CULVERT
519A	STANDARD PIPE CULVERTS SHEET 1 OF 3
519B	PIPE CULVERTS SHEET 2 OF 3
519C	PIPE CULVERTS SHEET 3 OF 3
520	STANDARD PERFORATED UNDERDRAIN
521	PIPE GAUGE AND CLASS (CONCRETE & CORRUGATED STEEL PIPE)
522	EARTH FILL DAM FOR DETENTION PONDS
523	FENCE DETAIL FOR DETENTION PONDS SHEET 1 OF 2
524	FENCE DETAIL FOR DETENTION PONDS SHEET 2 OF 2

NOTES:

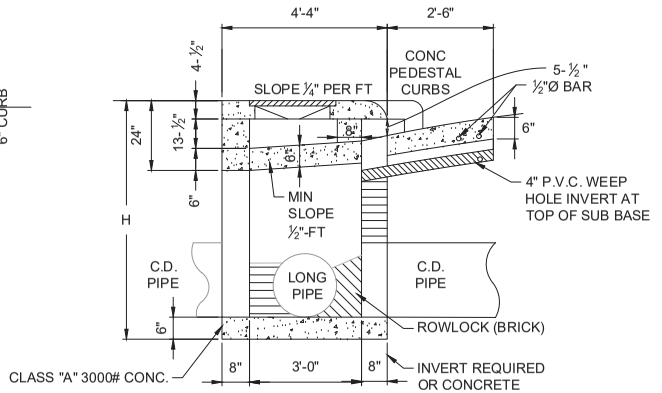
1. FOR ALL CATCH BASINS, 1/2" EXPANSION JOINT MATERIAL SHALL BE PLACED AROUND THE CATCH BASIN WHERE SIDEWALK OR MEDIAN PAVEMENT IS PLACED ADJACENT TO THE CATCH BASIN IN ANY SUBDIVISION THE OPTION IS TO USE EITHER ALL ONLINE CATCH BASINS OR ALL ONE FOOT OFFSET CATCH BASINS.
2. CONCRETE STRENGTH TEST REQUIRED FOR ALL POURED IN PLACE CONCRETE.
3. ALL POURED-IN-PLACE CONC. TO BE CLASS "A" 3000 P.S.I.
4. PLASTIC COATED STEEL STEPS ARE REQUIRED IN ALL CATCH BASINS.
5. SEE STANDARD DWG. 513 FOR STAIR DETAIL.





SECTION B-B
(CAST IN PLACE)
NTS

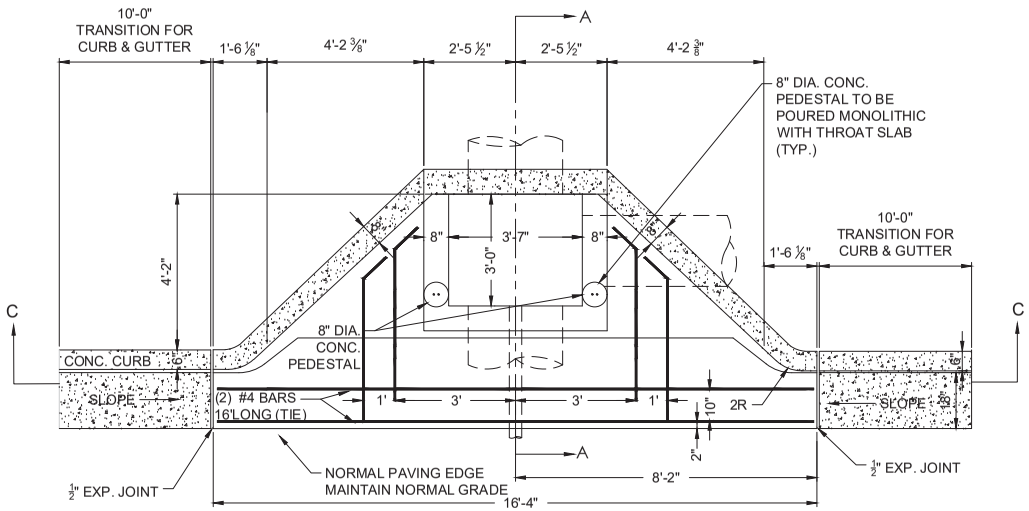
TABLE 501-1	
INSIDE DIAMETER OF PIPE (IN.)	MINIMUM "H"
18	4' - 10"
24	5' - 6"
30	6' - 2"
36	6' - 10"
42	7' - 4"
48	8' - 0"
54	8' - 6"
60	9' - 2"



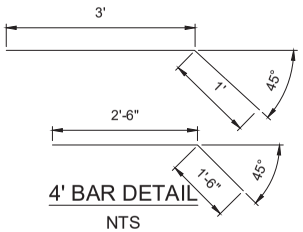
SECTION A-A
NTS

FULTON COUNTY STANDARD DETAIL 501 CATCH BASIN SINGLEWING ONE FOOT OFFSET (FACE OF CURB)		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 501

501-S.dwg December 08, 2025 - 2:41 pm



TOP OMITTED FOR CLARITY



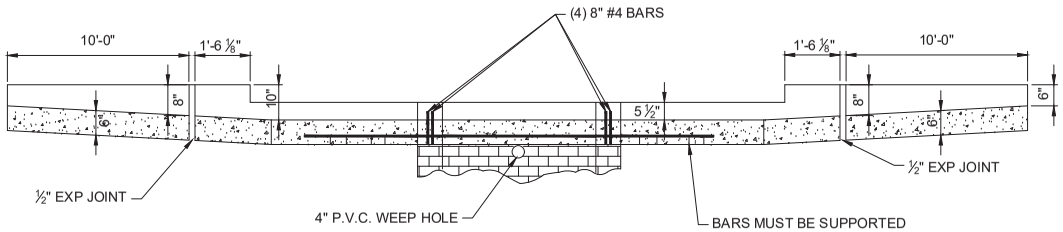
4' BAR DETAIL

NTS

NOTES:

1. CONCRETE STRENGTH TEST REQUIRED FOR ALL POURED IN PLACE CONCRETE.
2. FOR ALL CATCH BASINS, ½" EXPANSION JOINT MATERIAL SHALL BE PLACED AROUND THE CATCH BASIN WHERE SIDEWALK OR MEDIAN PAVEMENT IS PLACED ADJACENT TO THE CATCH BASIN.
3. IN ANY SUBDIVISION, THE OPTION IS TO USE EITHER ALL ONLINE CATCH BASINS OR ALL ONE FOOT OFFSET CATCH BASINS.
4. ONE FOOT OFFSET REQUIRED IN ALL CUL-DE-SACS.
5. PLASTIC COATED STEEL STEPS ARE REQUIRED IN ALL CATCH BASINS.
6. SEE STANDARD DWG. 513 FOR STAIR DETAIL.
7. ALL POURED-IN-PLACE CONC. TO BE CLASS "A" 3000 P.S.I.

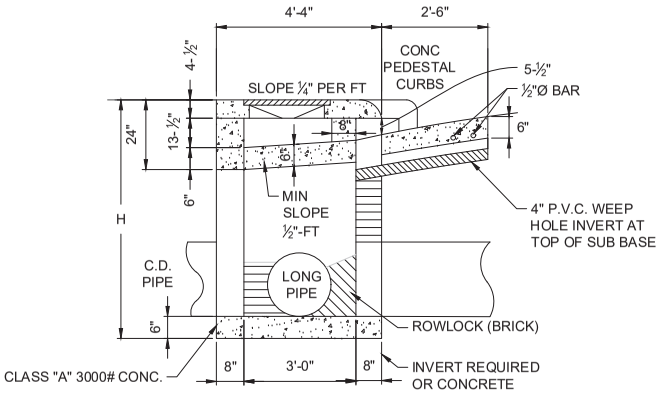
TABLE 502-1	
INSIDE DIAMETER OF PIPE (IN.)	MINIMUM "H"
12-18	4' - 10"
24	5' - 6"
30	6' - 2"



SECTION C-C

(CAST IN PLACE)

NTS

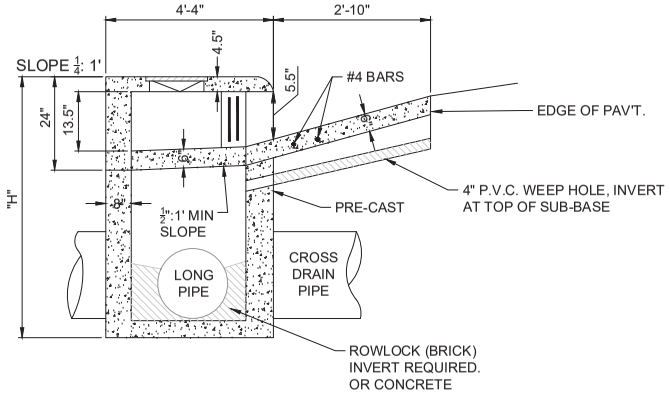


SECTION A-A

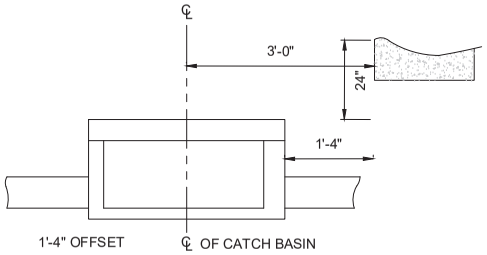
NTS

FULTON COUNTY STANDARD DETAIL 502 CATCH BASIN DOUBLEWING ONE FOOT OFFSET (FACE OF CURB)		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 502

502-S.dwg December 08, 2025 - 2:42pm



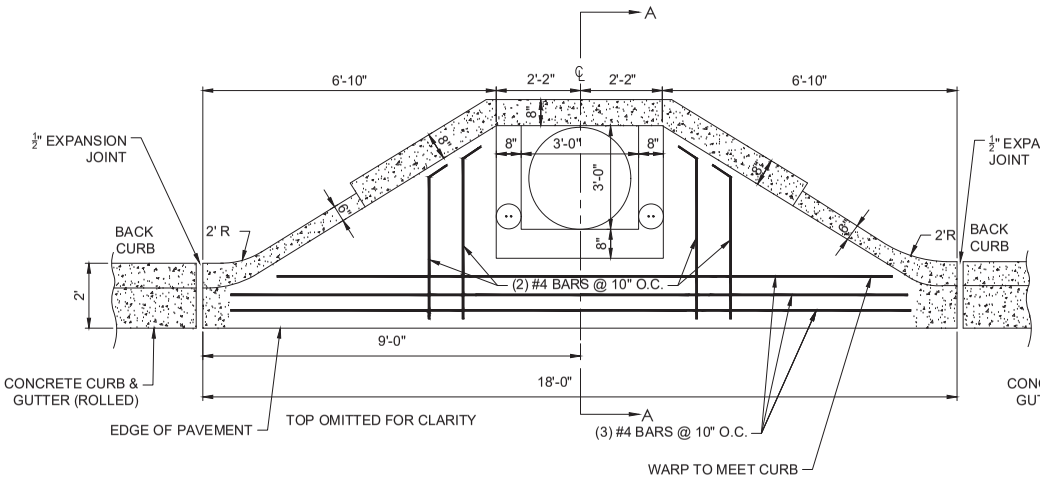
SECTION A-A
(N.T.S.)

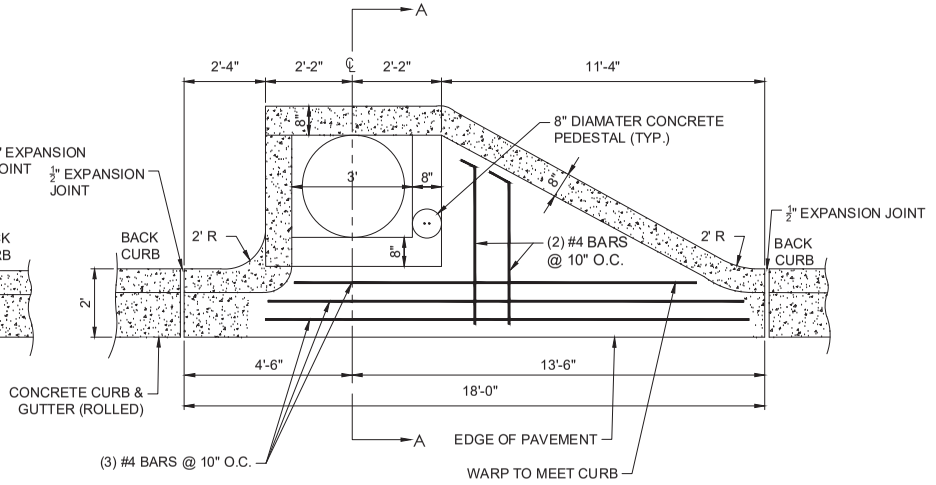


NOTES:

1. OPENING FOR CATCH BASINS TO BE 5-1/2" TO 7" MAXIMUM.
2. TOTAL DIMENSIONS FOR TOPS ± 2" (LENGTH) ± 2" (WIDTH).
3. COLLAR WALLS - FULL 360° - REQUIRED AT ALL JUNCTURES OF STORM PIPE TO BOXES.
4. IF THE DESIGN OF CATCH BASIN DOES NOT MEET THE REQUIREMENTS - YOU MAY NOT USE PRE - CAST STRUCTURES AND THE CATCH BASIN MUST BE BUILT OUT OF BRICK.

TABLE 503-1	
PIPE SIZE	"H"
18"	5' - 0"
24"	5' - 6"
30"	6' - 0"





FULTON COUNTY STANDARD DETAIL 503 CATCH BASINS WITH ROLLED CURB & GUTTER 10" OFFSET (PRIVATE DEVELOPMENT ONLY)		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 503

503-S.dwg December 08, 2025 - 2:42pm

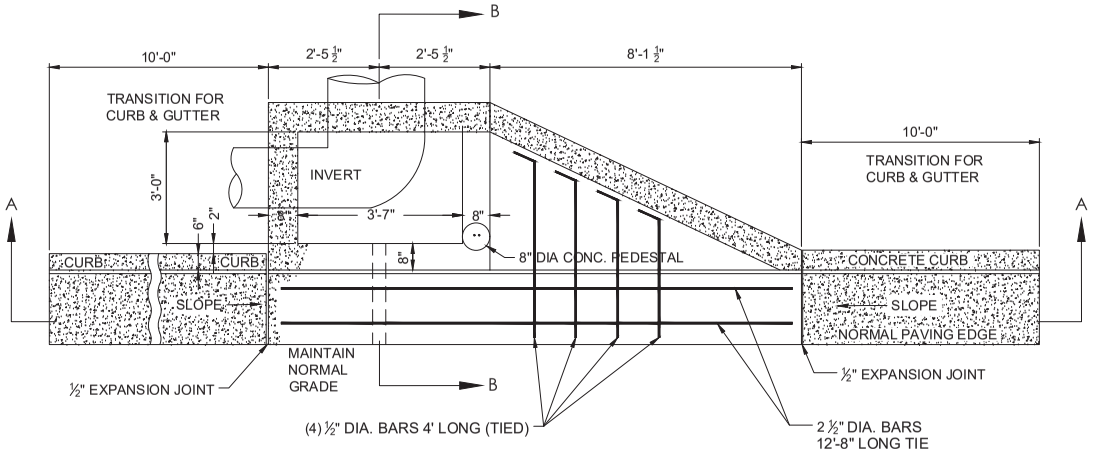
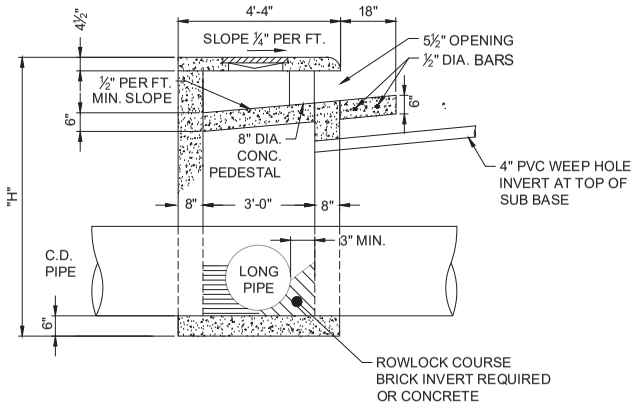


TABLE 504-1	
INSIDE PIPE DIAMETER (INCHES)	MINIMUM "H"
18	4' - 10"
24	5' - 6"
30	6' - 2"

NOTE:

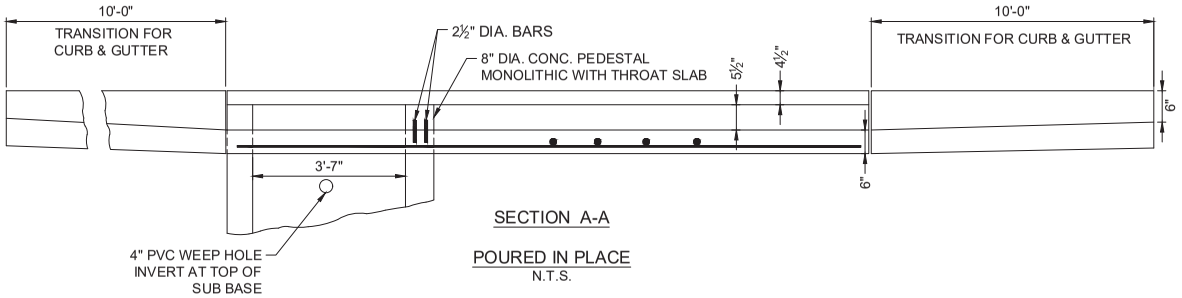
1. FOR ALL CATCH BASINS, ½-INCH EXPANSION JOINT MATERIAL SHALL BE PLACED AROUND THE CATCH BASIN WHERE SIDEWALK OR MEDIAN PAVEMENT IS PLACED ADJACENT TO THE CATCH BASIN.
2. D.O.T. STANDARD #1033D IS ALLOWABLE ALTERNATIVE.
3. PLASTIC COATED STEEL STEPS ARE REQUIRED IN ALL C.B.
4. SEE STANDARD DWG. 513 FOR STAIR DETAIL.



SECTION B-B

CLASS "A" 3000 PSI CONCRETE
N.T.S.

TOP OMITTED FOR CLARITY

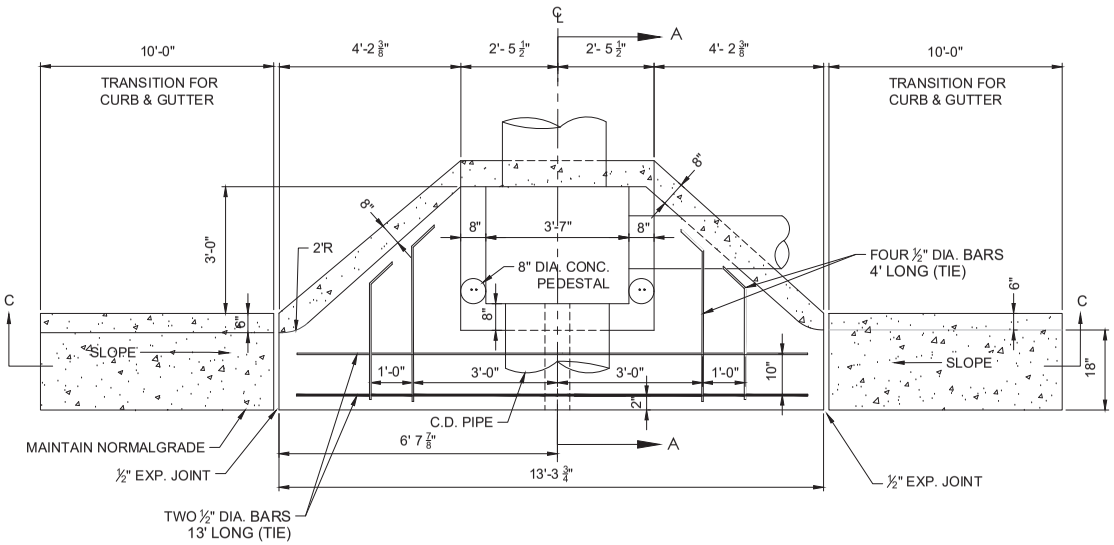


SECTION A-A

POURED IN PLACE
N.T.S.

FULTON COUNTY STANDARD DETAIL 504 SINGLE WING ON-LINE CATCH BASIN (BRICK)		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 504

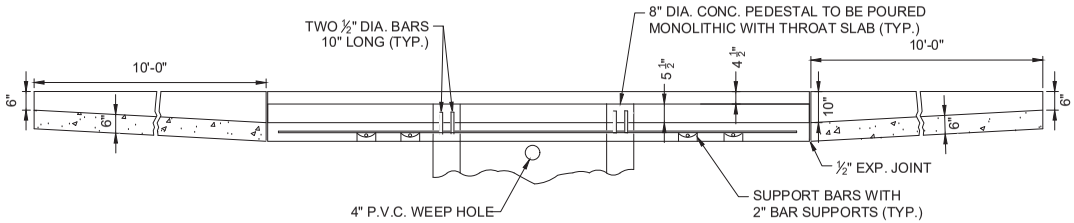
504-S.dwg December 08, 2025 - 2:42pm

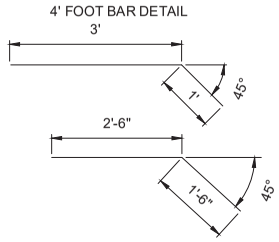


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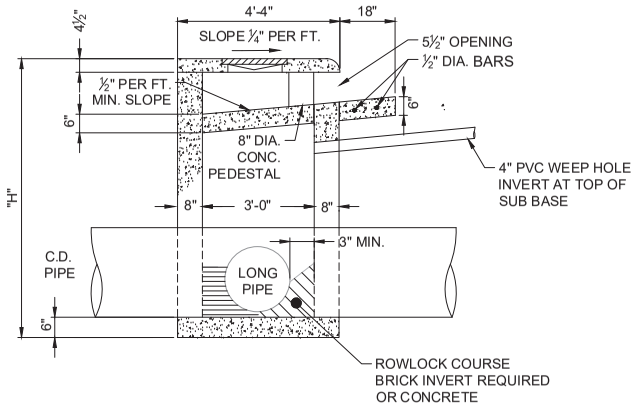
1. FOR ALL CATCH BASINS, ½" EXPANSION JOINT MATERIAL SHALL BE PLACED AROUND THE CATCH BASIN WHERE SIDEWALK OR MEDIAN PAVEMENT IS PLACED ADJACENT TO THE CATCH BASIN.
2. CONCRETE STRENGTH TEST REQUIRED FOR ALL POURED IN PLACE CONCRETE.
3. G.D.O.T. STANDARD #10340 IS ALLOWABLE ALTERNATIVE.
4. OPENING AT CATCH BASIN SHALL BE BETWEEN 5 1/2 " AND 7".
5. ALL POURED - IN - PLACE CONC. TO BE CLASS "A" 3000 P.S.I.
6. DRAINAGE STRUCTURE TOPS OMITTED FROM DETAILS FOR CLARITY.

TABLE 505-1	
INSIDE PIPE DIAMETER (INCHES)	MINIMUM "H"
18	4' - 10"
24	5' - 6"
30	6' - 2"





SECTION C - C
(CAST IN PLACE)



SECTION A-A

DATE	REVISIONS	DATE	REVISIONS

FULTON COUNTY STANDARD DETAIL 505

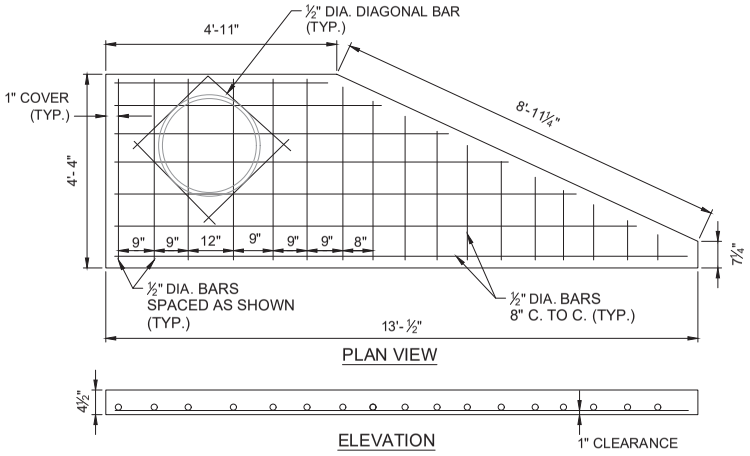
DOUBLE WING ON-LINE CATCH BASIN

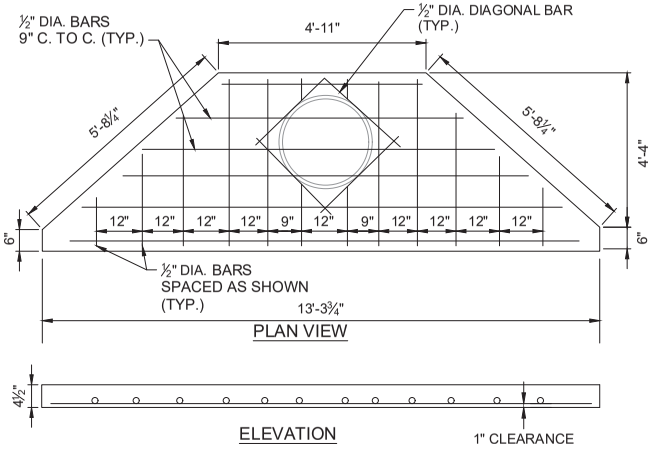
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO. 505

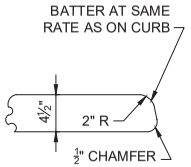
505-S.dwg December 08, 2025 - 2:42pm



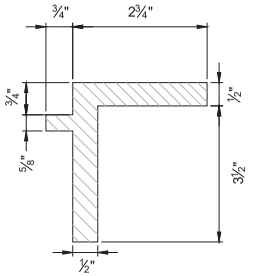


NOTES:

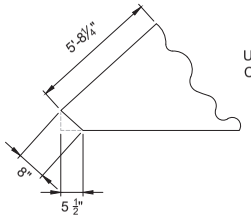
1. G.D.O.T. STANDARD #1033D IS ALLOWABLE ALTERNATIVE.
2. G.D.O.T. STANDARD #1034D IS ALLOWABLE ALTERNATIVE.
3. APPROXIMATE WEIGHTS OF MANHOLE AND FRAME:
   CAST IRON RING 78 LBS
   CAST IRON COVER63 LBS
4. TOP SLAB TO HAVE WOOD FLOAT FINISH.



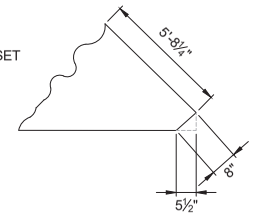
DETAIL OF TOP SLAB



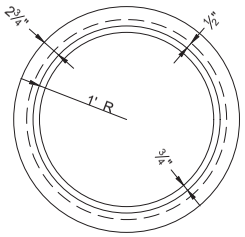
SECTION G-G



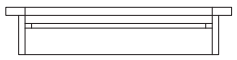
USE FOR OFFSET CATCH BASIN



RING

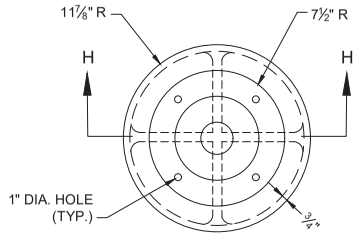


PLAN VIEW

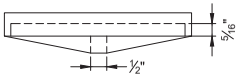


ELEVATION

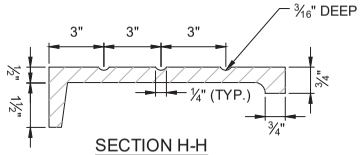
COVER



PLAN VIEW

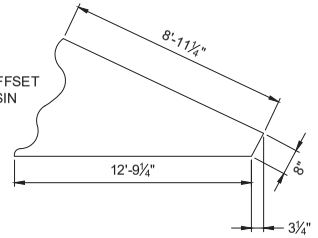


ELEVATION



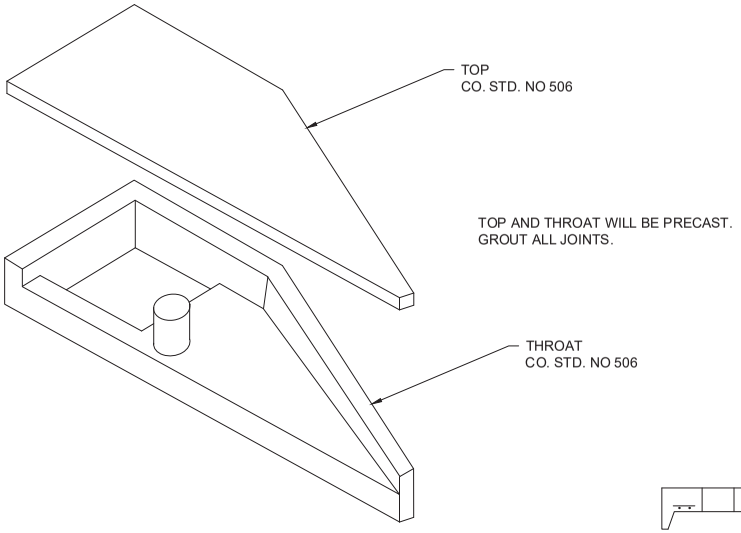
SECTION H-H

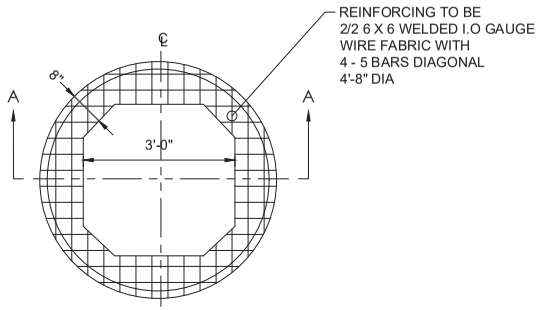
USE FOR OFFSET CATCH BASIN



FULTON COUNTY STANDARD DETAIL 506 CATCH BASIN TOPS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 506

506-S.dwg December 08, 2025 - 2:42pm

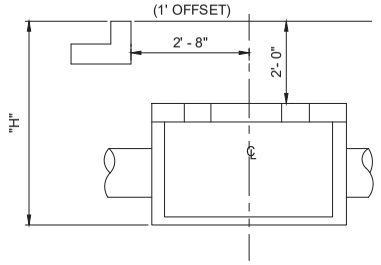


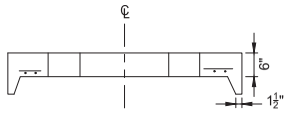


ROUND TO SQUARE ADAPTER

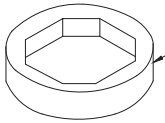
NOTES:

1. CATCH BASIN SHALL BE INSTALLED WITH PIPE OPENING AS SPECIFIED.
2. STEPS TO BE INSTALLED ON 15" VERTICAL SPACING.
3. SEE PRECAST MANHOLE STANDARD FOR SPECIFICATIONS.
4. ALL CONCRETE SHALL BE 4,000 PSI.
5. FOR ROLLED CURB & GUTTER, SEE STD. NO. 503-B FOR BOX LOCATION.

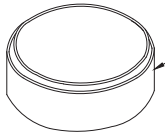




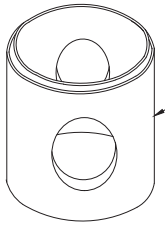
SECTION A-A



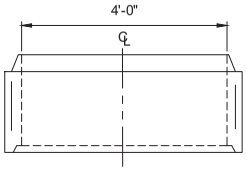
SQUARE TO ROUND ADAPTER



RISER SECTION (IF REQUIRED)
AVAILABLE IN HEIGHTS:
1'-0", 1'-6", 2'-0", 2'-6"
3'-0", 3'-6", 4'-0"

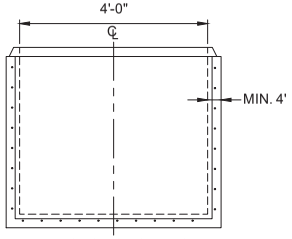


MONOLITHIC BASE
HOLES MUST BE PRECAST

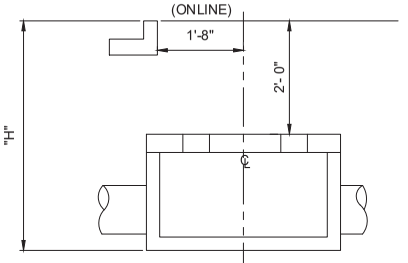


REINFORCING TO BE 2/2
6 X 6 WELDED WIRE FABRIC

RISER



REINFORCING TO BE 3/3
6 X 8 WELDED WIRE FABRIC



CENTERLINE OF
CATCH BASINS

TABLE 507 - 1			
BASE HEIGHT	METAL PIPE	CONC. PIPE	*H (MIN.)
4' DIA - 2' - 6"	18"	12"	5" - 0"
3' - 0"	24"	18"	5" - 6"
3' - 6"	30"	24"	6" - 0"
4' - 0"		30"	6' - 6"

*OTHERWISE BOX MUST BE BUILT OUT OF BRICK

FULTON COUNTY STANDARD DETAIL 507 STANDARD PRECAST ROUND CATCH BASINS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 507

507-S.dwg December 08, 2025 - 2:42pm

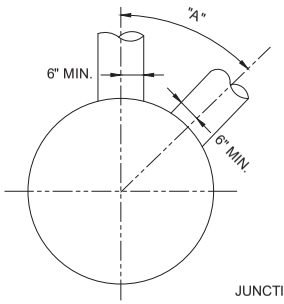
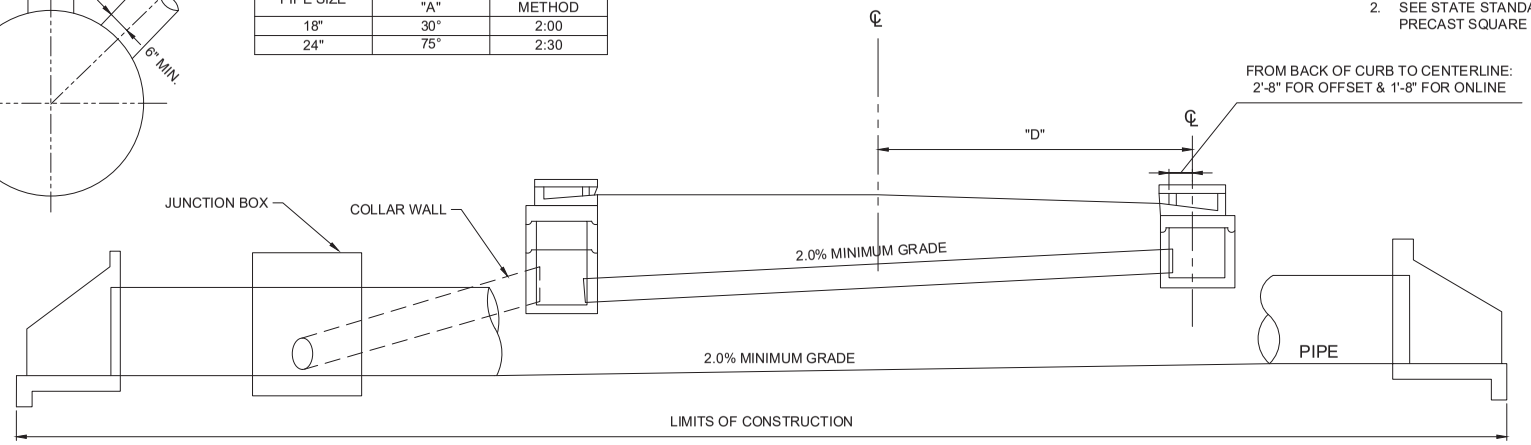
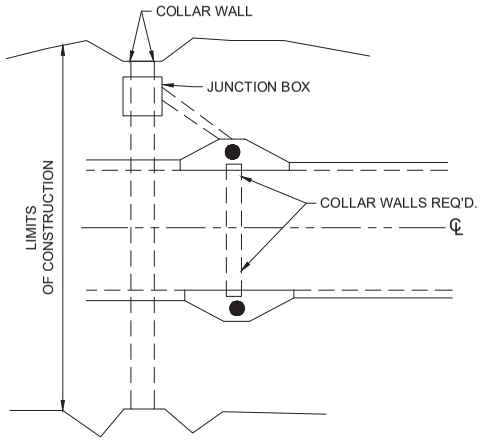


TABLE 508 - 1 MINIMUM ANGLE BETWEEN PIPES		
PIPE SIZE	ANGLE "A"	CLOCK METHOD
18"	30°	2:00
24"	75°	2:30

NOTES:

1. TABLE 508-1 IS BASED ON TWO PIPES OF EQUAL SIZE. WHEN ORDERING STATE ANGLE BY CLOCK METHOD. REQUEST ONE PIPE AT 12 O'CLOCK AND THE OTHER SIZE AND TIME AT WHATEVER ON THE JOB CONDITIONS REQUIRE.
2. SEE STATE STANDARD NO. 1033 D, E & F. OR 1034 D & E FOR PRECAST SQUARE CATCH BASIN.





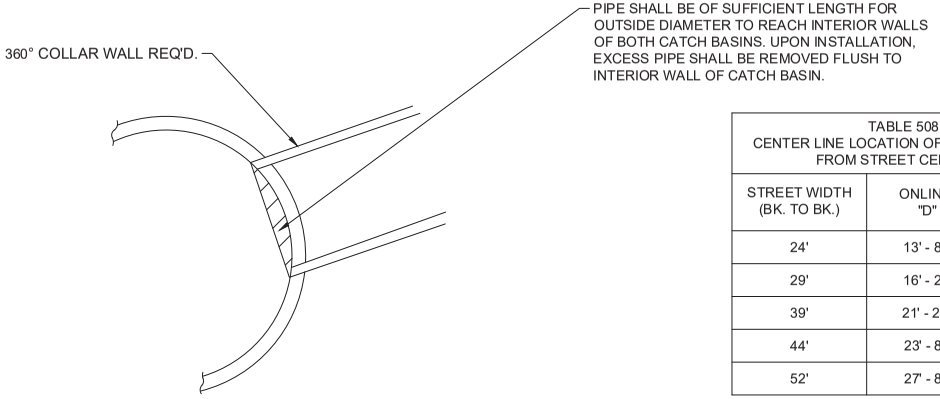


TABLE 508 - 2 CENTER LINE LOCATION OF CATCH BASIN BOX FROM STREET CENTER LINE		
STREET WIDTH (BK. TO BK.)	ONLINE "D"	OFFSET "D"
24'	13' - 8"	14' - 8"
29'	16' - 2"	17' - 2"
39'	21' - 2 "	22' - 2"
44'	23' - 8"	24' - 8"
52'	27' - 8"	28' - 8"

FULTON COUNTY STANDARD DETAIL 508

LOCATION OF ROUND CATCH BASIN

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML

APPROVED: TM

DATE: 01-21-2026

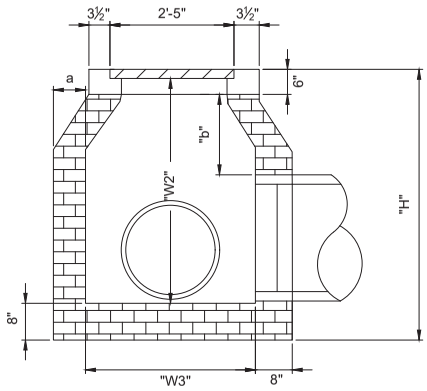
FULTON COUNTY

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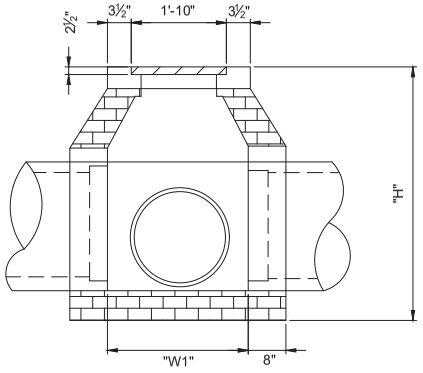
DRAWING NO.

508

508-S.dwg December 08, 2025 - 2:42pm



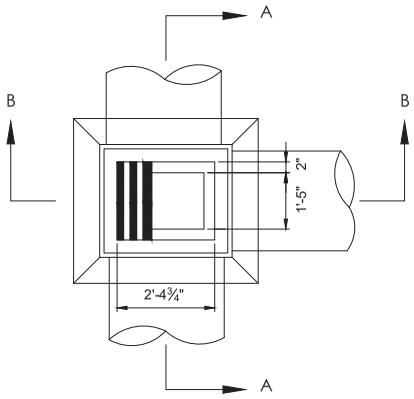
SECTION B-B



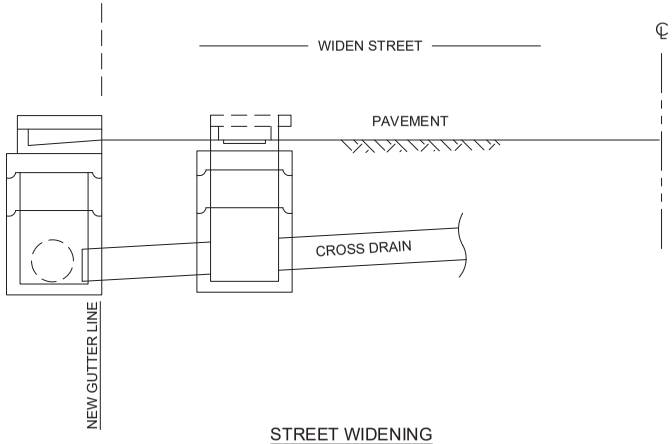
SECTION A-A

NOTES:

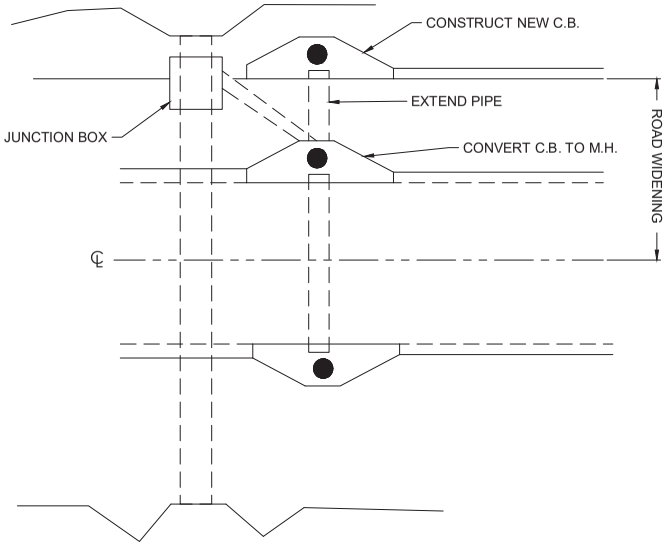
1. REMOVE EXISTING TOP & THROAT OF CATCH BASIN. ADD BRICK COURSES FOR GRADE ADJUSTMENT. COMPLETE BY ADDING STANDARD MANHOLE FRAME & COVER (#460 LBS. AND SET IN 8" MIN. REINFORCED CONC. SLAB).
2. ALL PIPES WITHIN RIGHT-OF-WAY SHALL BE RCP. THIS INCLUDES PIPE PARALLEL TO ROAD.
3. SEE STANDARD #511 FOR DIMENSION TABLE.



PLAN VIEW

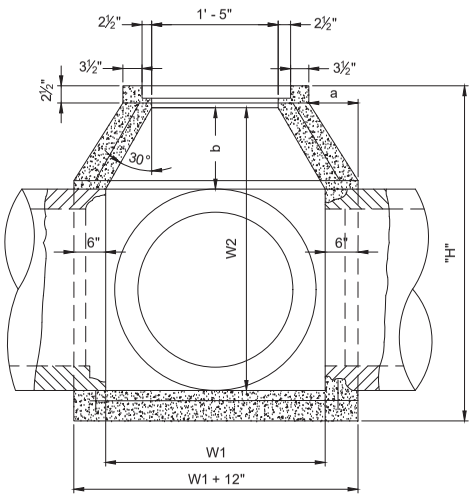


STREET WIDENING
CONVERTING CATCH BASIN TO MANHOLE

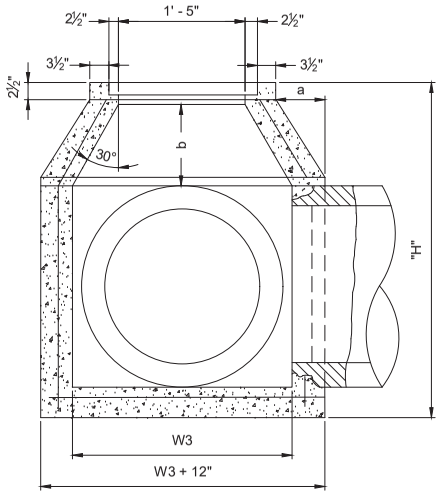


FULTON COUNTY STANDARD DETAIL 509 DROP INLETS, BRICK & CATCH BASIN EXTENSION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 509

509-S.dwg December 08, 2025 - 2:42pm



SECTION A-A

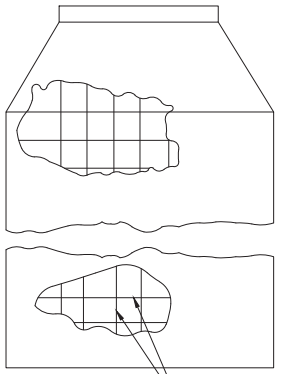


SECTION B-B

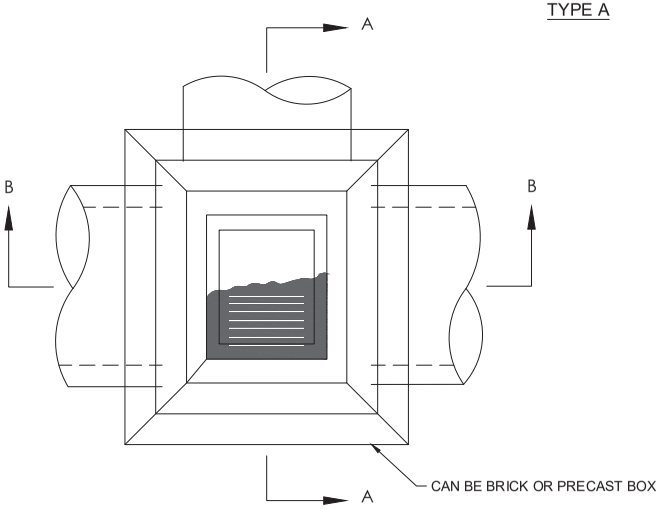
TYPE A

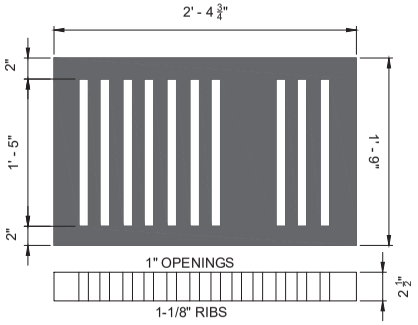
NOTES:

1. ROWLOCK BRICK INVERTS REQUIRED AT ALL JUNCTION BOXES & DROP INLETS. CONCRETE INVERT IS ALLOWED.
2. IN ALL DROP INLETS, ¾" DIA. BAR REINFORCING STEEL TO BE PLACED NOT MORE THAN 12" CENTER LINE AND COVERED NOT LESS THAN 2".

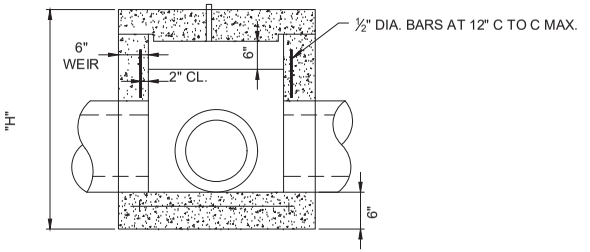


HOR. REINF. STEEL AT 6" C TO C
VERT. REINF. STEEL AT 12" C TO C





DETAIL OF CAST IRON GRATING
APPROX. WT. 200 LB.



TYPE B
SEE SHEET NO. 511 FOR DIMENSIONS

FULTON COUNTY STANDARD DETAIL 510

DROP INLETS, CONCRETE
DETAILS FOR PAVED SECTIONS ONLY

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
510

510-S.dwg December 08, 2025 - 2:42pm

TABLE 511-1 BRICK DROP INLET										
D (IN.)	W1	MIN. -W2	W3	a	b	MIN-H		NORMAL W OR W1	MIN-H	MIN-H
15	2'-2"	2'-11"	2'-9"	0'-4 1/2"	0'-8"	3'-9 1/2"		2'-0"	2'-7 1/2"	3'-7 1/2"
18	2'-2"	3'-2 1/2"	2'-9"	0'-4 1/2"	0'-8"	4'-1"		2'-0"	2'-10"	3'-10"
24	2'-8"	3'-3"	3'-3"	0'-7 1/2"	1'-1 1/4"	4'-9"		3'-0"	3'-8"	4'-8"
30	3'-7 1/4"	4'-0"	3'-10"	1'-0"	1'-9"	5'-10"		3'-6 1/2"	4'-2 1/2"	5'-10"
36	4'-2"	6'-$\frac{1}{2}$"	4'-9"	1'-4 $\frac{1}{2}$"	2'-2 $\frac{1}{4}$"	6'-11"		4'-2"	4'-10"	5'-10"
42	4'-5"	7'-1 3/4"	5'-0"	1'-6"	2'-7 1/4"	8'-0 1/4"		4'-8 1/2"	5'-4 1/2"	6'-11 1/2"
48	5'-0"	8'-2 3/4"	5'-7"	1'-9 1/2"	3'-1 1/4"	9'-1 1/4"		5'-3 1/2"	5'-11 1/2"	6'-11 1/2"
54	5'-7"	9'-4"	6'-2"	2'-1"	3'-7 1/2"	10'-2 1/2"		5'-10"	6'-6"	7'-6"
60	6'-2"	10'-5"	6'-9"	2'-4 1/2"	4'-1 1/2"	11'-3 1/4"		6'-4 1/2"	7'-0 1/2"	3'-0 $\frac{1}{2}$"
60	6'-9"	11'-6"	7'-4"	2'-8"	4'-7 1/2"	12'-4 1/2"		6'-11"	7'-7"	8'-7"
72	7'-4"	12'-7"	7'-11"	2'-11 1/2"	5'-2"	13'-5 1/2"		7'-5 1/2"	8'-1 1/2"	9'-1 1/2"

TABLE 511-2 CONCRETE DROP INLET										
D (IN.)	W1	MIN. -W2	W3	a	b	MIN-H		NORMAL W OR W1	MIN-H	MIN-H
15	2'-0"	2'-6 1/2"	2'-7"	0'-3 1/2"	0'-6"	3'-3"		2'-0"	2'-7 1/2"	3'-9 1/2"
18	2'-0"	2'-9 1/2"	2'-7"	0'-3 1/2"	0'-6"	3'-6"		2'-0"	2'-10"	4'-0"
24	2'-8"	4'-0 1/2"	3'-3"	0'-7 1/2"	1'-1"	4'-9"		3'-0"	3'-8"	4'-10"
30	3'-4"	5'-1 1/2"	3'-10"	0'-11 1/2"	1'-8"	5'-10"		3'-6 1/2"	4'-2 1/2"	5'-4 1/2"
36	3'-10"	6'-1 $\frac{1}{2}$"	4'-9"	1'2 $\frac{1}{2}$"	2'-1 $\frac{1}{4}$"	6'-10"		4'-2"	4'-10"	6'-0"
42	4'-5"	7'-2 1/2"	5'-0"	1'-6"	2'-7 1/4"	7'-11"		4'-8 1/2"	5'-4 1/2"	6'-6 1/2"
48	5'-0"	8'-3 1/2"	5'-7"	1'-9 1/2"	3'-1 1/4"	9'-0"		5'-3 1/2"	5'-11 1/2"	7'-1 1/2"
54	5'-7"	9'-4 1/2"	6'-2"	2'-1"	3'-7 1/2"	10'-1"		5'-10"	6'-6"	7'-8"
60	6'-2"	10'-5 1/2"	6'-9"	2'-4 1/2"	4'-1 1/2"	11'-2"		6'-4 1/2"	7'-0 1/2"	3'-0 $\frac{1}{2}$"
60	6'-9"	11'-6 1/2"	7'-4"	2'-8"	4'-7 1/2"	12'-3"		6'-11"	7'-7"	8'-7"
72	7'-4"	12'-7 1/2"	7'-11"	2'-11 1/2"	5'-1 1/4"	13'-4"		7'-5 1/2"	8'-1 1/2"	9'-1 1/2"

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FULTON COUNTY STANDARD DETAIL 511

DROP INLET DIMENSIONS

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML

APPROVED: TM

DATE: 01-21-2026

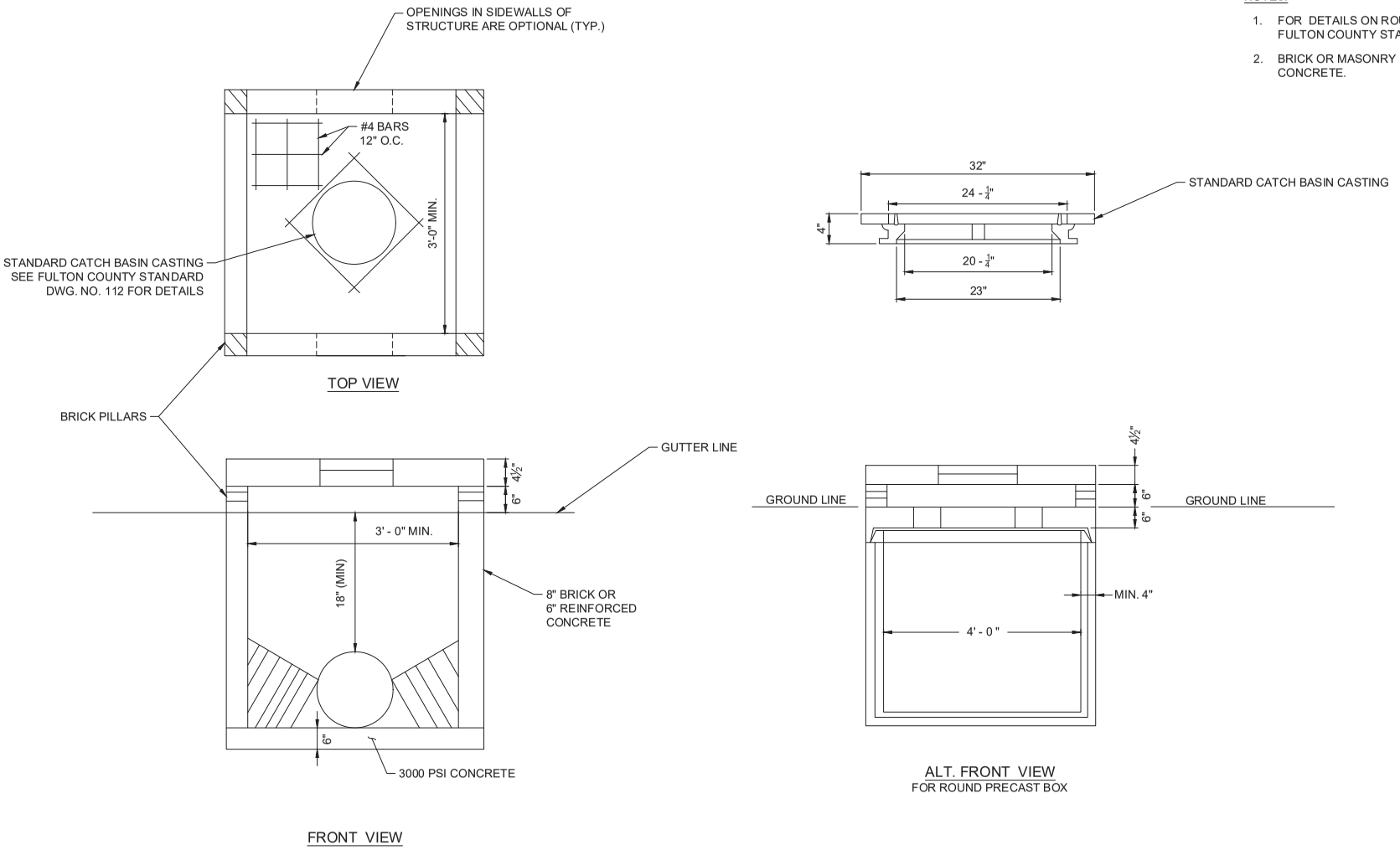
FULTON COUNTY PUBLIC WORKS
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404-612-7400 FAX: 404-224-0498

DRAWING NO.

511

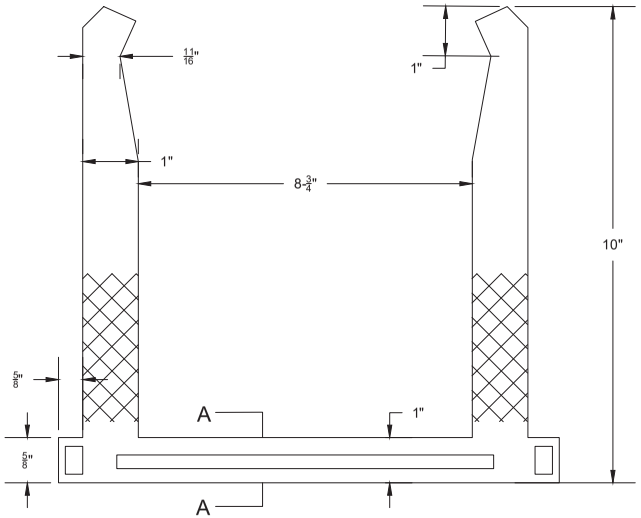
NOTES:

1. FOR DETAILS ON ROUND TO SQUARE ADAPTER, SEE FULTON COUNTY STANDARD DWG. NO. 507.
2. BRICK OR MASONRY INVERT REQUIRED (ROWLOCK), OR CONCRETE.

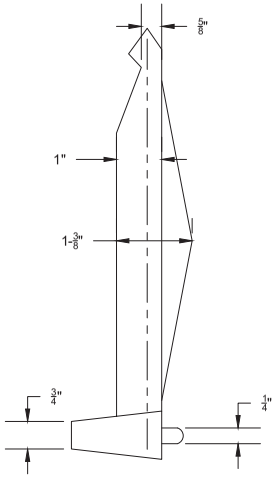


FULTON COUNTY STANDARD DETAIL 512 DROP INLETS (WEIR TYPE)		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 512

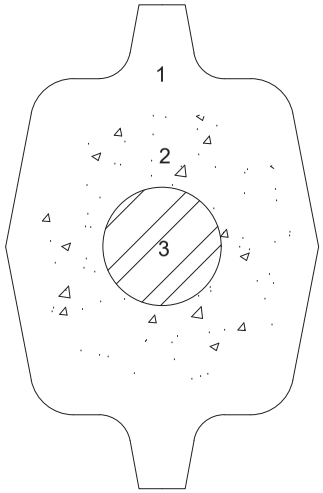
512-S.dwg December 08, 2025 - 2:43pm



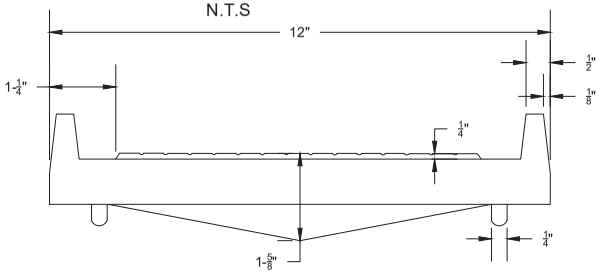
PLAN VIEW
N.T.S



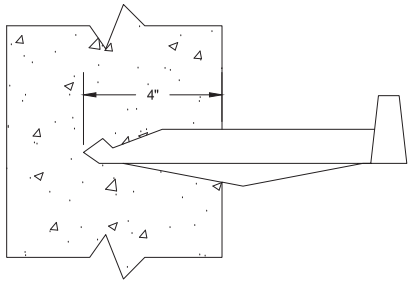
SIDE VIEW
N.T.S



SECTION VIEW A-A
N.T.S



FRONT VIEW
N.T.S

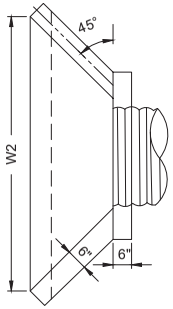


NOTES:

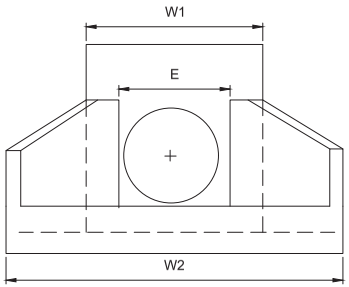
1. POLYPROPYLENE PLASTIC SOLID OUTER SHELL
2. POLYPROPYLENE PLASTIC POROUS MASS
3. 3/8" STEEL REINFORCING ROD, GRADE 60 MEETING ASTM A-615

FULTON COUNTY STANDARD DETAIL 513 REINFORCED PLASTIC STEP		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 513

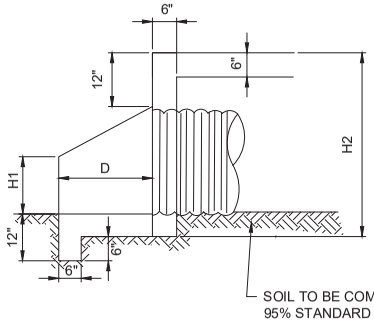
513-S.dwg December 08, 2025 - 2:43pm



PLAN VIEW

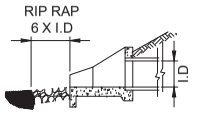


FRONT ELEVATION

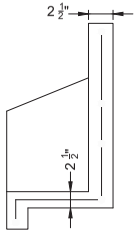


SIDE VIEW

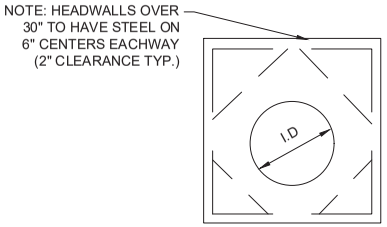
INLET HEADWALL



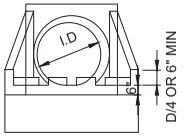
RIP - RAP - DETAIL



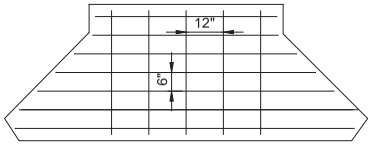
BASE & WALL SECTION



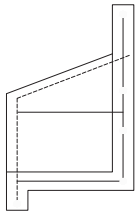
WALL SECTION



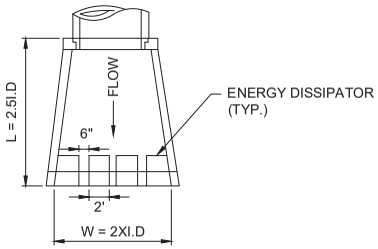
FRONT ELEVATION



BASE SECTION
N.T.S.



WING SECTION



PLAN VIEW

OUTLET HEADWALL

NOTES:

1. ALL CONC. SHALL BE 4000 P.S.I.
2. REINFORCEMENT STEEL SHALL BE INTERMEDIATE GRADE.
3. CHAMFER ALL EXPOSED EDGES.
4. ENERGY DISSIPATOR REQ. ON PIPES OVER 30" DIA.
5. IF EXIT VELOCITY >6 F.P.S. RIP RAP TO BE PLACED AT OUTLET, LENGTH TO BE 6xD, WIDTH TO BE 3xD.
6. FOR PIPES LARGER THAN 54" USE FULTON CO. STD. #515 OR G.D.O.T. STD. #1125.
7. AN ALTERNATE DESIGN FOR THE ENERGY DISSAPATOR WOULD BE ACCEPTABLE ONCE APPROVED BY FULTON COUNTY.

TABLE 514-1
STONE & FILTER MATERIAL: RIP RAP

VELOCITY	STONE SIZE	FILTER MATERIAL
<6 FT/SEC 6 TO 8 FT/SEC 8 TO 10 FT/SEC	10 - 50 LBS. 20 - 100 LBS. 25 - 250 LBS.	1.5' 3" 4.5"
STONE OR DURABLE MATERIAL WEIGHING 150 LBS/FT^3		

TABLE 514-2

HEADWALL DIMENSION FOR METAL PIPE*

INSIDE DIA. OF PIPE	W1	W2	H1	H2	D	E	WT	SQ. FT. IN BASE AREA
18"	3' - 2"	4' - 3"	1' - 3"	3' - 2"	1' - 3"	1' - 9"	1,550	7.34
21", 24"	3" - 8"	5' - 3"	1' - 9"	3' - 8"	1' - 6"	2' - 7"	2,100	9.9
30"	4' - 2"	6' - 5"	2' - 0"	4' - 2"	1' - 10"	2' - 9"	2,850	13.5
36"	4' - 8"	7' - 7"	2' - 4"	4' - 8"	2' - 2"	3' - 3 "	3,700	17.65
42", 48"	5' - 8"	10' - 1"	3' - 3"	5' - 8"	2' - 11"	4' - 3"	5,600	28.6
54"	6' - 8"	11' -11"		6' - 8"	3' - 4"	5' - 3"	7,500	35.6

FULTON COUNTY STANDARD DETAIL 514

PRECAST CONCRETE HEADWALL SYSTEMS
(INLET & OUTLET HEADWALLS)

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

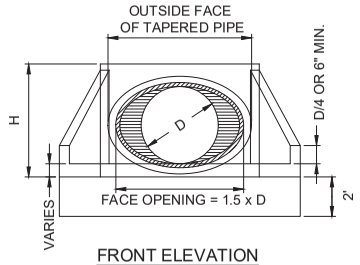
FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

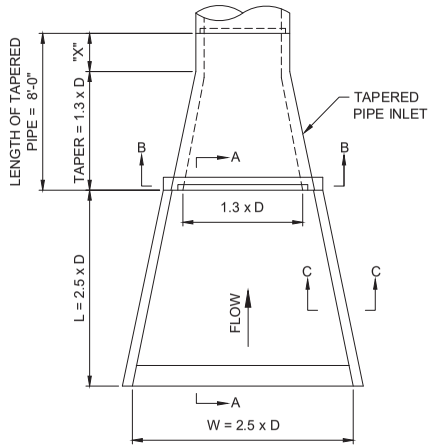
DRAWING NO.
514

514-S.dwg December 08, 2025 - 2:43pm

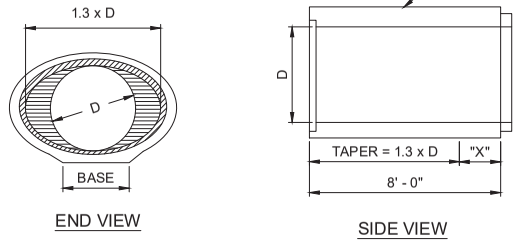
INLET HEADWALL WITH TAPERED PIPE



FRONT ELEVATION
N.T.S.



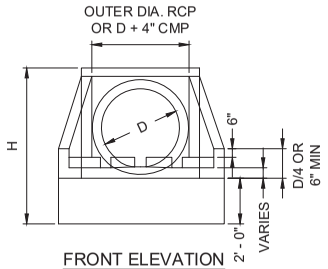
PLAN VIEW



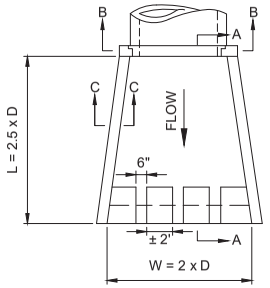
END VIEW

SIDE VIEW

OUTLET HEADWALL

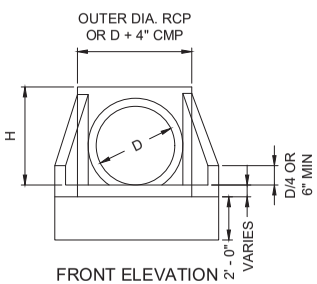


FRONT ELEVATION
N.T.S.

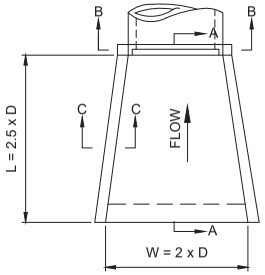


PLAN VIEW

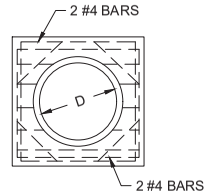
INLET HEADWALL



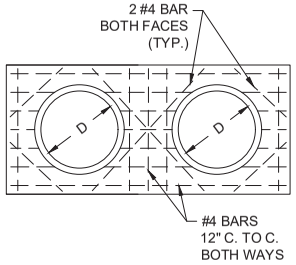
FRONT ELEVATION
N.T.S.



PLAN VIEW



SECTION B-B
(SINGLE PIPE LINE)



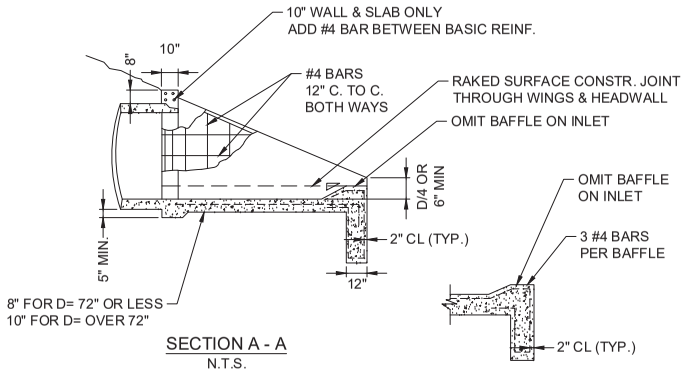
SECTION B-B
(MULTIPLE PIPE LINE)

NOTES:

1. ALTERNATE DESIGN FOR PIPES LARGER THAN 54" USE G.D.O.T STANDARD #1125.
2. RUBBLE MASONRY CONSTRUCTION NOT ALLOWED ON PIPES OVER 54".
3. AN ALTERNATE DESIGN FOR THE ENERGY DISSIPATOR WOULD BE ACCEPTED ONCE APPROVED BY FULTON COUNTY. SEE STANDARD #516.
4. CONCRETE TAPERED PIPE: STRUCTURAL REQUIREMENTS WILL BE ACCORDING TO ASTM C307 FOR CLASS HE-1 HORIZONTAL ELLIPTICAL PIPE.
5. CORRUGATED METAL PIPE (CMP): MATERIAL REQUIRED TO MEET SEC. 844 (STEEL PIPE) OR SEC. 840 (ALUMINUM PIPE). CMP WILL CONFORM TO THE SAME LINES AND DIMENSIONS SHOWN, DETAILS ARE SHOWN FOR CONCRETE.
6. FOR DETAILS,
   D = INSIDE DIAMETER OF PIPE
   H = D + PIPE WALL THICKNESS + 8" (FOR RCP)
   H = D + 10" MIN (FOR CMP)

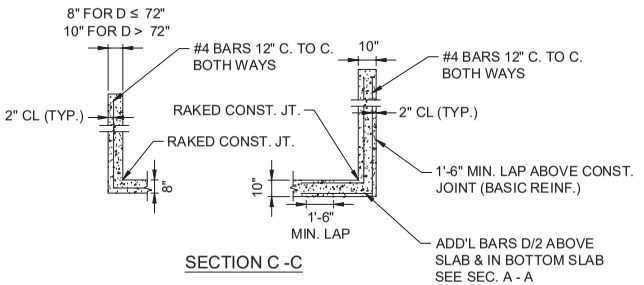
TABLE 515-1
TAPERED PIPE DIMENSIONS

D	1.3 x D	"X"	MIN. THICKNESS (IN.)		
			CORRUGATED STEEL		CORRUGATED ALUMINUM
			2⅔" x ½" CORR.	3" x 1" CORR.	----
24"	2'-8"	5'-4"	0.064	----	0.060
30"	3'-4"	4'-8"	0.064	0.064	0.073
36"	4'-0"	4'-0"	0.109	0.064	0.133
42"	4'-8"	3'-4"	0.109	0.064	0.133
48"	5'-4"	2'-8"	0.138	0.064	0.164
54"	6'-0"	2'-0"	0.168	0.064	----
60"	6'-8"	1'-4"	----	0.075	----



SECTION A - A
N.T.S.

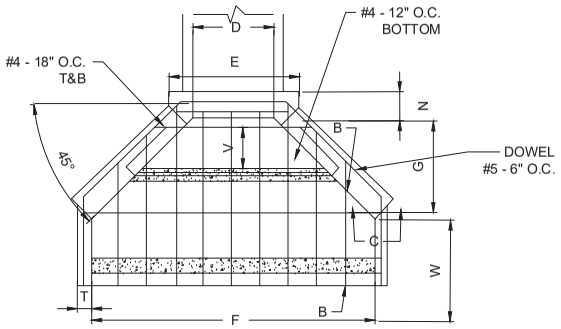
10" SLAB
N.T.S.



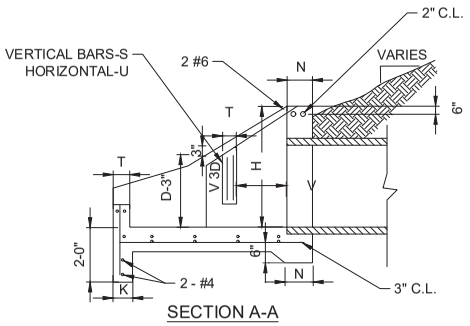
SECTION C -C

FULTON COUNTY STANDARD DETAIL 515 INLET & OUTLET HEADWALLS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 515

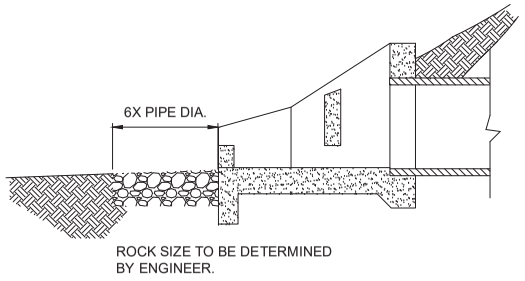
515-S.dwg December 08, 2025 - 2:43pm



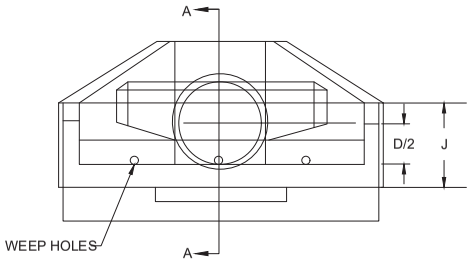
PLAN



SECTION A-A

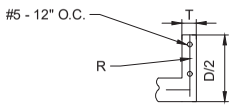


ROCK SIZE TO BE DETERMINED
BY ENGINEER.

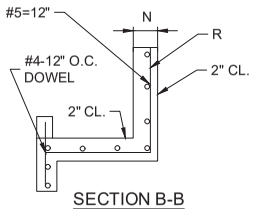


FRONT ELEVATION

2 DENOTES 3" X 1" OR (1) 23mm X 23mm CORRUGATION



SECTION C-C



SECTION B-B

NOTES:

1. HEADWALL PARALLEL TO CENTER LINE OF HIGHWAY WITHIN RIGHT OF WAY SHALL BE FLARED-END (SEE G.D.O.T. STD #1120).
2. CONCRETE SHALL BE 3,000 PSI 28 DAY STR.
3. WEEP HOLES SHALL BE 3" DIA. AT F/4 O.C.
4. RANDOM RUBBLE 3" TO 12" IN DIA.

TABLE 516-1

ALTERNATIVE ENERGY DISSIPATOR DIMENSIONS

D	E	F	G	H	J	K	L	N	V	W	T	R	S	U
18"	3'-0"	7'-6'	3'-0"	3'-0"	2'-0"	8"	8"	8"	2'-0"	1'-0"	6"	# 5 - 12" O.C	# 4 - 12" O.C	# 4 - 8" O.C
21"	3'-4"	7'-9"		3'-3"					2'-0"					
24"	3'-8"	8'-0"	"	3'-6"	"	"	"	"	2'-0"	1'-6"	"	"	"	"
27"	3'-11"	8'-3"	"	4'-0"	"	"	"	"	2'-0"	2'-0"	"	"	"	"
30"	4'-2"	8'-6'	"	4'-0"	2'-1"	"	"	10"	2'-0"	2'-0"	"	"	"	"
36"	4'-8"	10'-0"	3'-6"	4'-6"	2'-3"	"	10"	"	2'-3"	2'-6"	"	"	"	"
42"	5'-3"	11'-6"	4'-6"	5'-0"	2'-9"	"	"	"	2'-4"	3'-0"	8"	"	"	# 5 - 8" O.C.
48"	5'-10"	13'-0"	4'-6"	5'-6"	3'-0"	"	"	12"	2'-6"	3'-6"	"	"	# 5 - 12" O.C.	"
54"	6'-5"	14'-6"	5'-0"	6'-0"	3'-6"	9"	12"	"	2'-8"	5'-0"	"	# 6 - 8" O.C.	"	"
60"	7'-0"	16'-0"	5'-6"	6'-6"	4'-3"	"	"	"	2'-11"	"	"	"	"	"
66"	7'-7"	17'-6"	6'-0"	7'-0"	4'-6"	"	"	14"	3'-0"	"	"	"	"	"
72"	8'-2"	19'-0"	6'-6"	7'-0"	5'-8"	"	"	"	3'-2"	5'-6"	"	"	"	"

FULTON COUNTY STANDARD DETAIL 516

ENERGY DISSIPATOR (ALTERNATE)

DATE	REVISIONS	DATE	REVISIONS

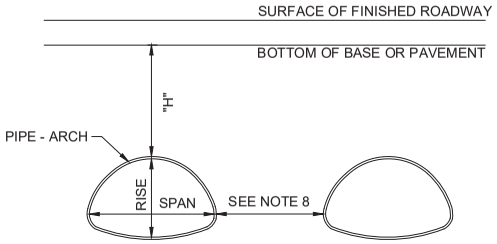
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

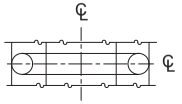
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
516

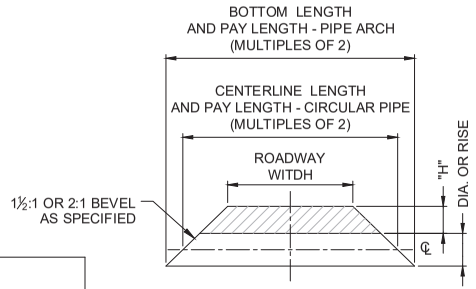
516-S.dwg December 08, 2025 - 2:43pm



PIPE-ARCH CULVERT
STRUCTURAL PLATE
N.T.S.

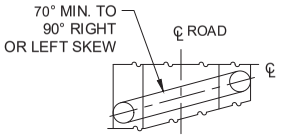


PLAN

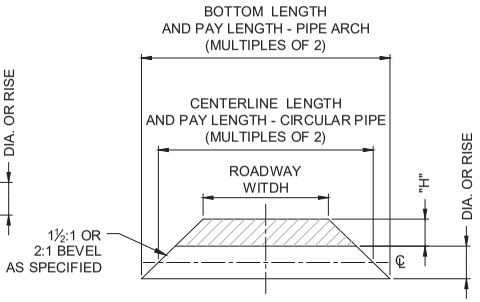


ELEVATION

BEVELED END FINISH



PLAN



ELEVATION

COMBINATION
SKEWED & BEVELED ENDS

NOTES:

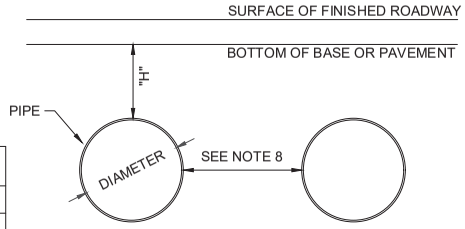
1. SPECIFICATIONS - GEORGIA STANDARD
2. DESIGN DATA: H-20 LIVE LOAD
3. GAGES SHOWN ARE MINIMAL STRUCTURAL REQUIREMENTS FOR USE WITH ADEQUATE BACKFILL.
4. FOR END FINISH SHAPE OR CONDITION OTHER THAN SHOWN, SEE SPECIFIC DESIGN.
5. GAGES SHOWN ION ABOVE TABLE ARE FOR STRUCTURAL PLATE PIPE ASSEMBLED WITH 4 BOLTS PER FOOT OF LONGITUDINAL SEAM AND VERTICALLY ELONGATED 5% BY SHOP FORMING, EXCEPT AS NOTED IN NO.2..
6. BEYOND HEIGHTS OF COVER FOR 4 BOLTS AND TO HEIGHTS OF COVER SHOWN FOR 6 BOLTS, IN COLUMN AT RIGHT, NO.1 GAGE STRUCTURAL PLATE PIPE WITH 6 BOLTS PER FOOT OF LONGITUDINAL SEAM AND VERTICALLY ELONGATED 5% BY SHOP FORMING SHALL BE USED.
7. ONLY R.C.P ALLOWED UNDER COUNTY ROADS.
8. MINIMUM CLEAR SPACE BETWEEN MULTIPLE LINES = $\frac{1}{8}$ DIAMETER FOR DIAMETERS 96 IN. OR LESS, AND 4 FEET FOR DIAMETERS GREATER THAN 96 IN. SUBSTITUTE SPAN FOR DIAMETER FOR PIPE-ARCH.

TABLE 518-1
DIMENSIONS FOR STRUCTURAL PLATE PIPE-ARCH

SPAN (FT - IN)	RISE (FT - IN)	HEIGHT OF COVER (FEET)												
		1	2	3	4	5-7	8	9	10	11	12	13	14	15
		MINIMUM THICKNESS - US STD GAGE												
5'-8"	6-6	12	12	12	12	12	12	12	12	12	12	12	12	12
5'-10"	7-8	12	12	12	12	12	12	12	12	12	12	12	12	12
6-1	4-7	12	12	12	12	12	12	12	12	12	12	12	12	12
6-4	4-9	12	12	12	12	12	12	12	12	12	12	12	12	10
6-9	4-11	10	12	12	12	12	12	12	12	12	12	12	10	10
7-0	5-1	10	12	12	12	12	12	12	12	12	12	12	10	10
7-3	5-3	10	10	12	12	12	12	12	12	12	12	10	10	10
7-6	5-5	10	10	12	12	12	12	12	12	12	12	10	10	10
7-11	5-7	10	10	10	12	12	12	12	12	12	10	10	10	10
8-2	5-9	10	10	10	12	12	12	12	12	12	10	10	10	10
8-7	5-11	10	10	10	10	10	10	10	10	10	10	10	10	8
8-10	6-1	10	10	10	10	10	10	10	10	10	10	10	8	8
9-4	6-3	8	10	10	10	10	10	10	10	10	10	8	8	8
9-6	6-5	8	10	10	10	10	10	10	10	10	10	8	8	8
9-9	6-7	8	8	10	10	10	10	10	10	10	8	8	8	7
10-3	6-9	8	8	10	10	10	10	10	10	10	8	8	8	7
10-8	6-11	8	8	8	10	10	10	10	10	10	8	8	8	7
10-11	7-1	8	8	8	10	10	10	8	8	8	8	7	7	5
11-5	7-3	7	8	8	8	10	10	8	8	8	8	7	7	5
11-7	7-5	7	8	8	8	10	10	8	8	8	8	8	7	5
11-10	7-7	7	8	8	8	8	8	8	8	8	7	5	5	3
12-4	7-9	7	7	8	8	8	8	8	8	7	7	5	5	3
12-6	7-11	7	7	8	8	8	8	8	8	7	7	5	5	3
12-8	8-1	7	7	8	8	8	8	8	8	8	7	7	5	5	3
12-10	8-4	5	7	8	8	8	8	8	7	7	5	5	3	1
13-5	8-5	5	5	7	8	8	8	7	7	5	5	5	3	1
13-11	8-7	5	5	7	7	8	7	7	5	5	3	3	1	1
14-1	8-9	5	5	7	7	8	7	7	5	5	3	3	1	1
14-3	8-11	3	5	5	7	7	7	5	5	5	3	3	1	1
14-10	9-1	3	5	5	7	7	7	5	3	3	1	1		
15-4	9-3	3	3	5	7	7	7	5	3	3	1	1		
15-6	9-5	3	3	5	5	7	7	5	3	3	1	1		
15-8	9-7	3	3	5	5	7	7	5	3	3	1	1		
15-10	9-10	1	3	5	5	7	5	3	3	1	1			
16-5	9-11	1	3	3	5	5	5	3	1	1				
16-7	10-1	1	3	3	5	5	5	3	1	1				

TABLE 518 - 2
DIMENSIONS FOR STRUCTURAL PLATE PIPE

DIA. (IN.)	HEIGHT OF COVER, "H" (FT.)																1 GAGE, 6 BOLTS
	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-70	71-80	81-90	91-100	
	MINIMUM THICKNESS - U.S STD GAGE - 4 BOLTS																
72							12	12	10	10	8	8	7	5	3	1	165'
78						12	12	10	10	8	8	8	5	3	1	NOTE 6	130'
84					12	12	12	10	10	8	8	7	5	3	1	NOTE 6	140'
90	12	12	12	12	12	12	10	10	8	8	7	5	3	1	NOTE 6	NOTE 6	130'
96	12	12	12	12	12	10	10	10	8	7	7	5	3	1	NOTE 6	NOTE 6	125'
102	12	12	12	12	10	10	10	8	8	7	5	3	1	NOTE 6	NOTE 6	NOTE 6	115'
108	12	12	10	10	10	10	10	8	7	5	5	3	1	NOTE 6	NOTE 6	NOTE 6	110'
114	10	12	10	10	10	10	8	8	7	5	5	3	1	NOTE 6	NOTE 6	NOTE 6	105'
120	10	12	10	10	10	10	8	7	5	5	3	1	NOTE 6	NOTE 6	NOTE 6	NOTE 6	100'
126	10	12	10	10	10	10	8	7	5	3	3	1	NOTE 6	NOTE 6	NOTE 6	NOTE 6	93'
132	10	10	10	10	10	8	8	7	5	3	1	1	NOTE 6	NOTE 6	NOTE 6	NOTE 6	90'
138	10	10	10	10	10	8	7	5	3	3	1	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	85'
144	10	10	10	10	8	8	7	5	3	1	1	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	80'
150	10	10	8	8	8	8	7	5	3	1	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	80'
156	10	10	8	8	8	8	5	3	1	1	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	75'
162	10	10	8	8	8	7	5	3	1	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	70'
168	10	10	8	8	8	7	5	3	1	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	70'
174	8	10	8	8	8	7	5	3	1	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	65'
180	8	10	8	8	8	5	3	1	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	NOTE 6	65'



PIPE CULVERT
STRUCTURAL PLATE
N.T.S.

FULTON COUNTY STANDARD DETAIL 518

STRUCTURAL PLATE PIPE
ARCH CULVERT

DATE	REVISIONS	DATE	REVISIONS

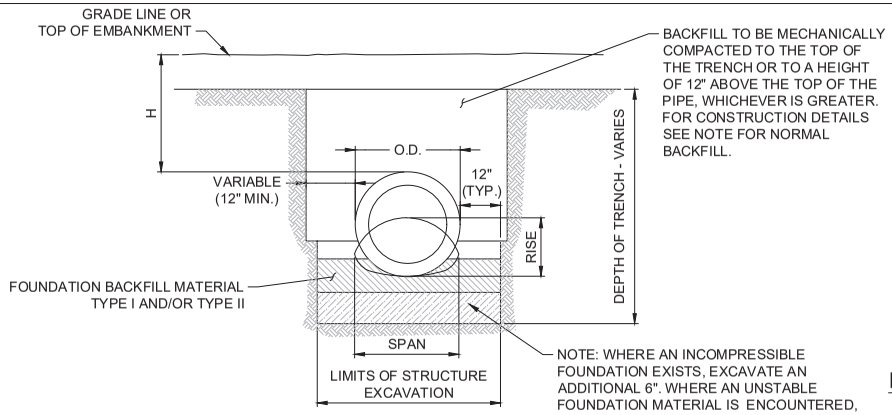
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

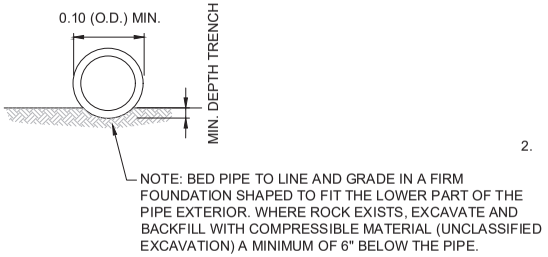
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141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
518

518-S.dwg December 08, 2025 - 2:43pm



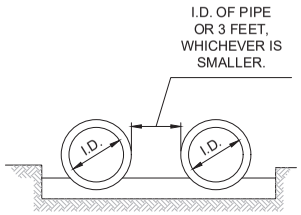
DETAIL OF TRENCH CONSTRUCTION
N.T.S.



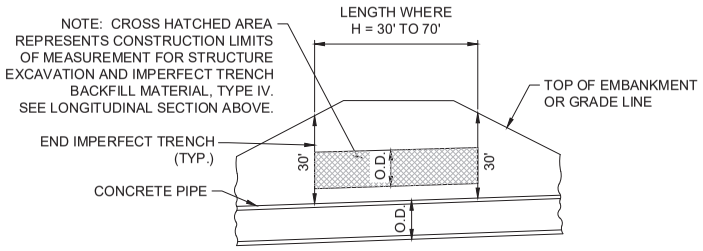
DETAIL OF TRENCH CONSTRUCTION FOR SIDE DRAIN AND MEDIAN DRAIN PIPE
N.T.S.

NOTES:

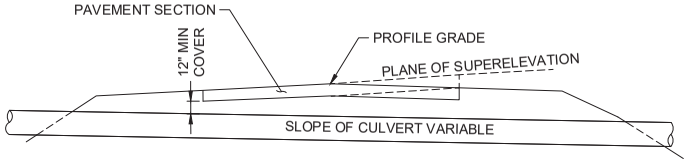
1. PE PIPE IS ALLOWABLE FOR THE FOLLOWING CONDITIONS:
   - A. PE PIPE MAY BE USED AS AN ALTERNATE TO LONGITUDINAL PIPE UNDER ALLOWABLE FILL SHOWN, FOR NON- TRAFFIC BEARING AND LOCAL ROAD BEARING APPLICATIONS.
   - B. PIPE MAY BE USED AS AN ALTERNATE TO PERFORATED UNDERDRAIN PIPE.
   - C. PE PIPE IS ALLOWABLE IN ALL SIDE DRAIN AND SLOPE DRAIN APPLICATIONS.
2. FOR PIPE-ARCH CULVERTS, SUBSTITUTE SPAN AND RISE FOR OUTSIDE DIAMETER OF PIPE IN HORIZONTAL AND VERTICAL DIMENSIONS SPECIFIED IN DETAIL.



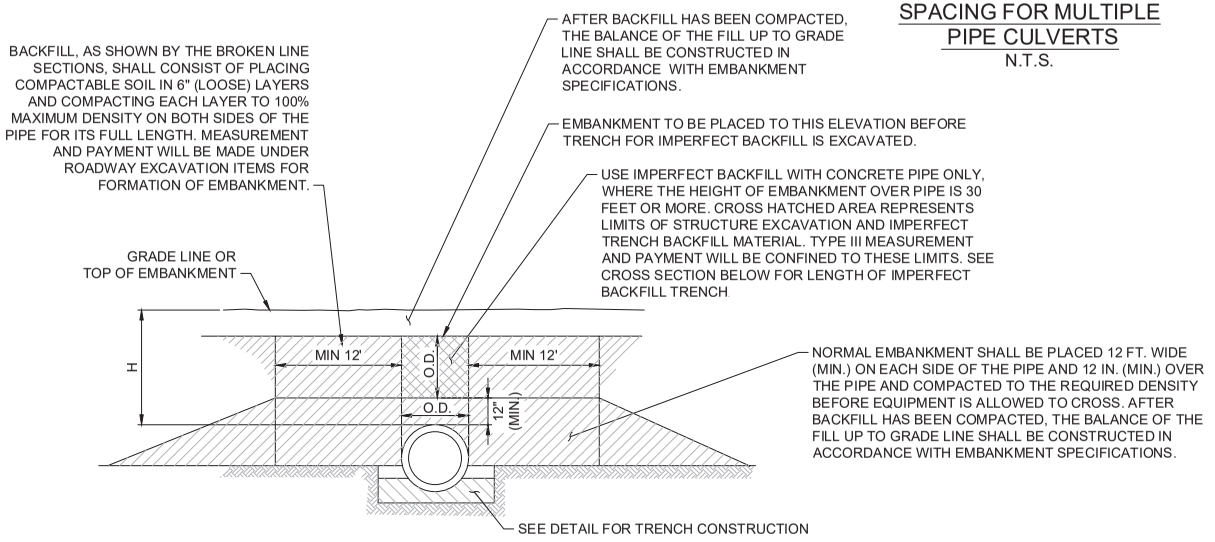
SPACING FOR MULTIPLE PIPE CULVERTS
N.T.S.



CROSS SECTION OF IMPERFECT TRENCH BACKFILL
N.T.S.



DETAIL SHOWING MINIMUM COVER FOR PIPE CULVERTS
N.T.S.



LONGITUTIONAL SECTION OF IMPERFECT BACKFILL AND BACKFILL METHODS
N.T.S.

FULTON COUNTY STANDARD DETAIL 519A STANDARD PIPE CULVERTS SHEET 1 OF 3		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 519A

519 A-S.dwg December 08, 2025 - 2:43pm

TABLE 519B - 1
GAUGE OF CORRUGATED STEEL/ THICKNESS OF CORRUGATED ALUMINUM PIPE-ARCH
FOR VARIOUS HEIGHTS OF FILL ABOVE THE TOP OF THE PIPE-ARCH

DIA.* (IN.)	SPAN (IN.)	RISE (IN.)	TYPE OF PIPE	HEIGHT OF FILL IN FEET				
				1 - 2	3 - 10	11 - 15	16 - 20	21 - 25
15	18	11	STEEL	16 GA.	16 GA.	16 GA.	16 GA.	16 GA.
			ALUM	0.060"	0.060"	0.060"	0.060"	0.060"
18	22	13	STEEL	16 GA.	16 GA.	16 GA.	16 GA.	16 GA.
			ALUM	0.060"	0.060"	0.060"	0.060"	0.073"
21	25	16	STEEL	16 GA.	16 GA.	16 GA.	16 GA.	16 GA.
			ALUM	0.060"	0.060"	0.060"	0.060"	NP
24	29	18	STEEL	14 GA.	14 GA.	14 GA.	14 GA.	14 GA.
			ALUM	0.073"	0.075"	0.075"	0.105"	NP
30	36	22	STEEL	14 GA.	14 GA.	14 GA.	14 GA.	NP
			ALUM	0.073"	0.075"	0.075"	0.105"	NP
34	43	27	STEEL	12 GA.	12 GA.	12 GA.	12 GA.	NP
			ALUM	0.105"	0.105"	0.105"	0.135"	NP
42	50	31	STEEL	12 GA.	12 GA.	12 GA.	10 GA.	NP
			ALUM	0.105"	0.105"	0.105"	NP	NP
48	56	34	STEEL	10 GA.	12 GA.	10 GA.	10 GA.	NP
			ALUM	0.135"	0.105"	0.135"	NP	NP
54	65	40	STEEL	10 GA.	12 GA.	10 GA.	8 GA.	NP
60	72	44	STEEL	8 GA.	10 GA.	8 GA.	NP	NP

* DIAMETER OF PIPE OF EQUAL PERIPHERY.
FOR SIZES LARGER THAN SHOWN ABOVE, USE STRUCTURAL PLATE PIPE - ARCH, GA. STD. 20IIA. (SEE TABLE NO. 519B-2 FOR CIRCULAR PIPE)

TABLE 519B - 2
HEIGHT OF FILL OVER TOP OF PIPE,
CLASS OF CONCRETE PIPE AND TYPE OF BACKFILL

HEIGHT OF FILL (H) (FT.)	CLASS OF PIPE	TYPE OF BACKFILL
1 to 15	III	NORMAL
15 to 20	IV	NORMAL
20 to 30	V	NORMAL
30 to 50	V	IMPERFECT
50 to 70	V	IMPERFECT

519 B-S.dwg December 08, 2025 - 2:43pm

FULTON COUNTY STANDARD DETAIL 519B

PIPE CULVERTS
SHEET 2 OF 3

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
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TABLE 519C - 1
TABLE SHOWING CLASSES OF CONCRETE PIPE, GAUGES OF CORRUGATED STEEL PIPE AND THICKNESS IN INCHES OF CORRUGATED ALUMINUM PIPE FOR VARIOUS HEIGHTS OF FILL ABOVE TOP OF PIPE

DIAM. (IN.)	TYPE OF PIPE	+ Height of Fill in Feet Above Top of Pipe**										
		1-10	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80
15	CONCRETE	III	III	IV	V	V	V	V	V	V	V	V
	CORR. STEEL	16	16	16	16	16	16	16	16	14	14	10
	CORR. ALUM.	0.06	0.06	0.06	0.06	0.06	0.075	0.105	NP	NP	NP	NP
18	CONCRETE	III	III	IV	V	V	V	V	V	V	V	V
	CORR. STEEL	16	16	16	16	16	16	16	14	14	12	10
	CORR. ALUM.	0.06	0.06	0..06	0.06	0.075	0.105	NP	NP	NP	NP	NP
24	CONCRETE	III	III	IV	V	V	V	V	V	V	V	V
	CORR. STEEL	16	16	16	16	16	12	12	10	8	0	0
	CORR. ALUM.	0.075	0.075	0.075	0.075	0.105	0.135	NP	NP	NP	NP	NP
30	CONCRETE	III	III	IV	V	V	V	V	V	V	V	V
	CORR. STEEL	16	16	16	14	12	14	12	8	0	0	0
	CORR. ALUM.	0.075	0.075	0.075	0.105	0.135	0.164	NP	NP	NP	NP	NP
36	CONCRETE	III	III	IV	V	V	V	V	V	V	V	V
	CORR. STEEL	16	16	16	10	14	12	10	10	8	10	0
	CORR.ALUM.	0.105	0.105	0.105	0.105	0.135	0.164	NP	NP	NP	NP	NP
42	CONCRETE	III	III	IV	V	V	V	V	V	V	V	NP
	CORR. STEEL	16	16	14	16	14	14	12	8	0	0	0
	CORR. ALUM.	0.105	0.105	0.105	0.135	0.135	NP	NP	NP	NP	NP	NP
48	CONCRETE	III	III	IV	V	V	V	V	V	V	V	V
	CORR.STEEL	16	16	12	16	14	14	12	12	0	0	0
	CORR,ALUM.	0.105	0.105	0.105	0.135	0.164	NP	NP	NP	NP	NP	NP
54	CONCRETE	III	III	IV	V	V	V	V	V	V	V	V
	CORR. STEEL	14	14	14	14	14	8	8	0	0	0	0
	CORR. ALUM.	0.105	0.105	0.105	0.135	0.164	NP	NP	NP	NP	NP	NP
60	CONCRETE	III	III	IV	V	V	V	V	V	V	V	V
	CORR. STEEL	12	12	12	12	12	10	8	NP	NP	NP	NP
	CORR. ALUM.	0.135	0.135	0.164	0.164	NP	NP	NP				
66	CONCRETE	III	III	IV	V	V	V	V	V	V	V	V
	CORR. STEEL	12	12	12	12	10	10	NP	NP	NP	NP	NP
	CORR. ALUM.	0.135	0.135	0.164	NP	NP	NP					
72	CONCRETE	III	III	IV	V	V	V	V	V	V	V	V
	CORR. STEEL	10	10	10	10	8	NP	NP	NP	NP	NP	NP
	CORR. ALUM.	0.135	0.135	0.164	NP	NP						

TABLE 519C - 2
TABLE SHOWING CLASSES OF CONCRETE PIPE, GAUGES OF CORRUGATED STEEL PIPE AND THICKNESS IN INCHES OF CORRUGATED ALUMINUM PIPE FOR VARIOUS HEIGHTS OF FILL ABOVE TOP OF PIPE

DIAMETER (IN.)	TYPE OF PIPE	+ Height of Fill in Feet Above Top of Pipe**										
		1-10	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80
78	CONCRETE	III	III	IV	V	V	V	V	V	V	V	V
	CORR. STEEL	8	8	8	8	USE	STRU	CTUR	AL	PLA	TE	PIPE
	CORR. ALUM.	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
84	CONCRETE	III	III	IV	V	V	V	V	V	V	NP	NP
	CORR. STEEL	8	8	8	USE	STRU	CTUR	AL	PLA	TE	PIPE	
	CORR. ALUM.	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
90	CONCRETE	III	III	IV	V	V	NP	NP	NP	NP	NP	NP
	CORR. STEEL			USE	STRU	CTUR	AL	PLA	TE	PIPE		
	CORR. ALUM.	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
96	CONCRETE	III	III	IV	V	V	NP	NP	NP	NP	NP	NP
	CORR. STEEL			USE	STRU	CTUR	AL	PLA	TE	PIPE		
	CORR. ALUM.	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
102	CONCRETE	III	III	IV	V	V	NP	NP	NP	NP	NP	NP
	CORR. STEEL			USE	STRU	CTUR	AL	PLA	TE	PIPE		
	CORR.ALUM.	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
108	CONCRETE	III	III	IV	V	V	NP	NP	NP	NP	NP	NP
	CORR. STEEL			USE	STRU	CTUR	AL	PLA	TE	PIPE		
	CORR. ALUM.	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP

NP= NOT PERMITTED
= PIPE SHALL BE SHAPE II CIRCULAR CROSS SECTION FACTORY ELONGATED

NOTES:

1. ALL STEEL AND ALUMINUM PIPE SHALL BE LOCK-SEAM OR WELDED-SEAM (HELICAL) CONSTRUCTION.
2. MINIMUM COVER VALUES APPLY TO HS-20 LIVE LOAD. MINIMUM COVER NEEDED FOR CONSTRUCTION VEHICLES MAY BE GREATER AND IS THE RESPONSIBILITY OF THE CONTRACTOR.
3. TABLE VALUES FOR ALUMINUM CORRUGATED PIPE (OR ALUMINUM SPIRAL RIB PIPE) ARE COMPUTED BASED UPON ALCLAD ALLOY 3004-H34 HAVING MINIMUM YIELD STRENGTH, fy=24,000 PSI. IF ALUMINUM PIPE IS OTHERWISE FURNISHED AS 3004-H32 (fy=20,000 PSI). THE TABLE NO.1 ALLOWABLE FILL HEIGHTS SHALL BE ADJUSTED AS FOLLOWS:
   A. ALL MINIMUM COVER VALUES SHALL BE INCREASED BY 15 PERCENT. (EXAMPLE: 12 INCHES BECOMES 13.8 INCHES).
   B. ALL HEIGHT OF FILL VALUES SHALL BE DECREASED BY 15 PERCENT. (EXAMPLE: 35-40 FEET BECOMES 29.7-34.0 FEET).

TABLE 519C - 3

COR. METAL THICKNESS		EQUIVALENT GUAGE
STEEL	0.064	16
	0.079	14
	0.109	12
	0.138	10
	0.168	8
ALUMINUM	0.060	16
	0.075	14
	0.105	12
	0.135	10
	0.164	8

FULTON COUNTY STANDARD DETAIL 519C

PIPE CULVERTS
SHEET 3 OF 3

DATE	REVISIONS	DATE	REVISIONS

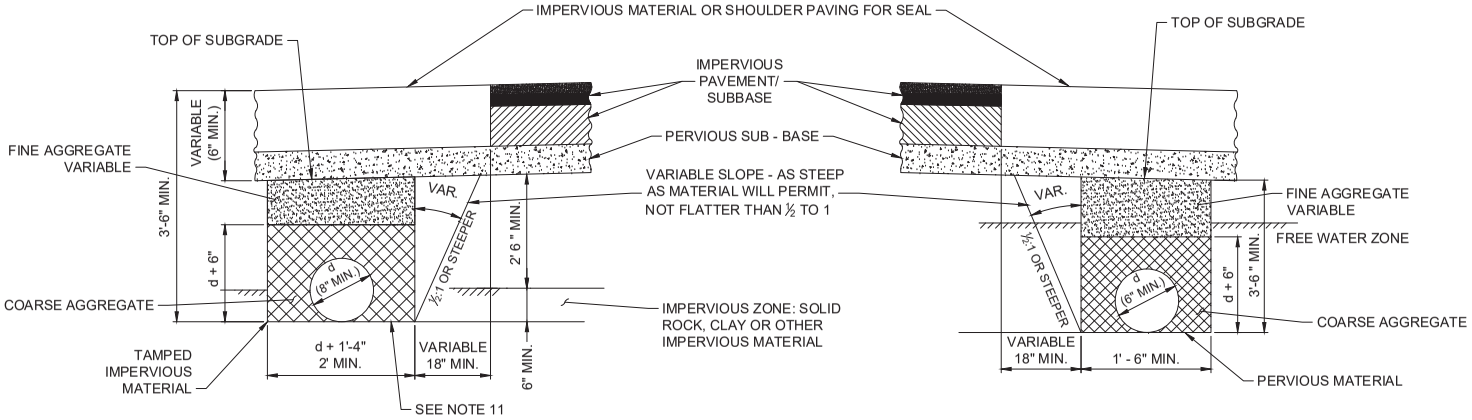
DGS/DRN/CHKD: MB/EB/ML
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FULTON COUNTY

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519C

519 C-S.dwg December 08, 2025 - 2:43pm

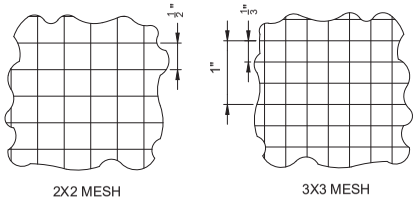


IMPERVIOUS TRENCH BOTTOM (INTERCEPTOR)

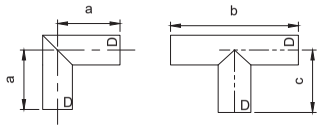
PERVIOUS TRENCH BOTTOM (TO LOWER WATER TABLE)

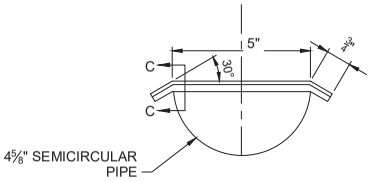
NOTES:

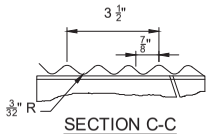
1. UNDERDRAINS MAY BE PLACED IN SHOULDER AREAS OR AS TRANVERSE DRAINAGE UNDER PAVEMENT. SEE SPECIAL SECTION AND PLAN AND PROFILE SHEETS FOR SPECIAL CONDITIONS.
2. TRENCH SHALL BE SHAPED WITH SIDES AS NEARLY VERTICAL AS IS PRACTICAL AND WITH A FLAT BOTTOM.
3. MINIMUM GRADIENT FOR UNDERDRAIN PIPE SHALL BE 0.15%.
4. THE LOWER ROW OF PERFORATIONS IN THE PIPE SHALL BE PLACED ABOVE THE BOTTOM OF THE TRENCH AS SHOWN.
5. DEAD ENDS OF PIPE SHALL BE CLOSED WITH METAL CAPS OR CONCRETE PLUGS. OUTFALL ENDS OF PIPE SHALL BE EQUIPPED WITH SCREEN.
6. LATERAL CONNECTIONS SHALL BE MADE WITH SUITABLE STANDARD FITTINGS (ELLS, WYES OR TEES AS DETAILED).
7. THE DIMENSIONS (A THRU G) SHOWN ABOVE ON THE LATERAL CONNECTIONS FOR THE VARIOUS KINDS AND SIZES OF PERFORATED UNDERDRAIN SHALL BE IN AGREEMENT WITH THE MANUFACTURER'S STANDARD PRACTICE.
8. MARKERS: EACH OUTLET END OF THE DRAINAGE SYSTEM SHALL BE MARKED WITH A 5'X4"X4". PERSERATIVE TREATED WOOD POST PLACED 3' IN THE GROUND IN A VERTICAL POSITION OF THE EXTREME OUTLET END AND ADJACENT TO THE SITE OF THE PIPE.
9. COURSE AGGREGATE FOR UNDERDRAIN TO BE COMPOSED OF NO.7 STONE. FINE AGGREGATE FOR UNDERDRAIN TO BE COMPOSED OF NO.20 SAND.
10. PERFORATED UNDERDRAIN PIPE WILL BE INSTALLED COMPLETE PRIOR TO PLACING PERVIOUS SUBBASE MATERIAL.
11. IF THE BOTTOM OF THE TRENCH IS EXCAVATED WITH A MACHINE OR ANY OTHER IMPLEMENT, LEAVING A ROUNDED BOTTOM THE AREA SO THE PIPE SHALL BE BACKFILLED WITH A STABLE MATERIAL, THOROUGHLY COMPACTED, LEAVING A FIRM FLAT SURFACE. EACH FINISHED TRENCH SHALL HAVE A FLAT BOTTOM.

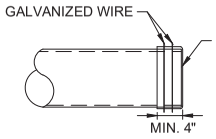


SCREEN TO BE GALVANIZED HARDWARE (WIRE) CLOTH 2X2 OR 3X3 MESH, MIN. 21 GAUGE.



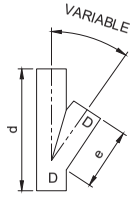


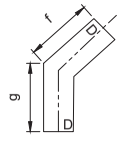


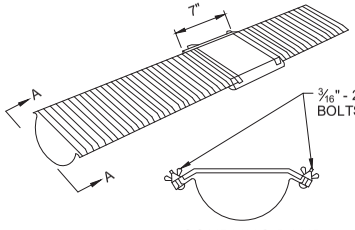


PLACE SCREEN OVER END OF PIPE AS SHOWN AND SECURE FIRMLY IN PLACE BY WRAPPING GALVANIZED WIRE AROUND PIPE AND SCREEN. OTHER METHODS FOR SECURING SCREEN FIRMLY OVER END OF PIPE MAY BE USED IF APPROVED BY THE ENGINEER.

SCREEN FOR UNDERDRAIN
N.T.S.








ROUND PIPE CONNECTION


END CAP


END SCREEN

SEMICIRCULAR UNDERDRAIN PIPE

FULTON COUNTY STANDARD DETAIL 520 STANDARD PERFORATED UNDERDRAIN		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 520

520-S.dwg December 08, 2025 - 2:44pm

TABLE 521-1 PIPE GAUGE AND THICKNESS					
THICKNESS	0.064"	0.079"	0.109"	0.138"	0.168"
GAGE	16	14	12	10	8

NOTES:

1. ALL C.M.P PIPE SHALL BE HALF-COATED WITH A PAVED INVERT, EXCEPT AS FOLLOWS: FULLY COATED PIPE WITH A PAVED INVERT MAY BE USED UNDER THE FOLLOWING CONDITIONS:
   - 1.1. A SMALL PIECE OF ONE OF THE PIPES IN EACH SIZE CATEGORY WILL BE CHOSEN AT RANDOM BY A FULTON COUNTY INSPECTOR.
   - 1.2. THIS PIPE IS TO BE TESTED FOR GAUGE AND COMPOSITION BY AN INDEPENDENT TESTING LABORATORY.
   - 1.3. IF, AFTER TESTING, THE TEST REPORT INDICATES THAT THE PIPE DOES NOT MEET COUNTY SPECIFICATIONS, THE CONTRACTOR MUST IMMEDIATELY REMOVE ALL PIPE ON THE JOB AND TEST EACH PIECE.
   - 1.4. COST OF ALL TESTS ARE TO BE BORN BY THE DEVELOPER.
   - 1.5. CONC. PIPE REQUIRED UNDER ALL ROADWAYS & ON CROSS DRAINS.

TABLE 521 - 2
PIPE GAUGE AND CLASS BY PIPE DIAMETER (INCHES)

HEIGHT OF FILL IN FEET ABOVE TOP OF PIPE**	15		18		24		30		36		42		48		54		60		66		72		78		84		90		96		102		108	
	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S
1-10	III	16	III	16	III	16	III	16	III	16	III	16	III	16	III	14	III	12	III	12	III	10	III	8	III	8	III	USE STRUCTURAL PLATE PIPE	III	USE STRUCTURAL PLATE PIPE	III	USE STRUCTURAL PLATE PIPE	III	USE STRUCTURAL PLATE PIPE
10-15	III	16	III	16	III	16	III	16	III	16	III	16	III	16	III	14	III	12	III	12	III	10*	III	8	III	8	III		III		III		III	
15-20	IV	16	IV	16	IV	16	IV	16	IV	16	IV	14	IV	12	IV	10*	IV	8*	IV	12*	IV	10*	IV	8*	IV	8*	IV		IV		IV		IV	
20-25	V	16	V	16	V	16	V	14	V	10	V	16*	V	16*	V	14*	V	12*	V	12*	V	10*	V	8*	V	STRUCT. PLATE	V		V		V		V	
25-30	V	16	V	16	V	16	V	10	V	14*	V	14*	V	14*	V	14*	V	12*	V	10*	V	8*	V	STRUCT. PLATE	V		V		V		V		V	
30-35	V	16	V	16	V	12	V	8*	V	12*	V	14*	V	14*	V	12*	V	10*	V	10*	V	STRUCT. PLT	V		V		NP		NP		NP		NP	
35-40	V	16	V	16	V	12	V	12*	V	10*	V	12*	V	12*	V	8*	V	8*	V	STRUCT. PLT.	V		V		V		NP		NP		NP		NP	
40-50	V	16	V	14	V	10	V	8*	V	10	V	8*	V	0*	V	0	V	STR. PLT.	V		V		V		V		NP		NP		NP		NP	
50-60	V	16	V	12	V	Φ	V	Φ	V	8	V	0	V	0	V	0	V		V		V		V		V		NP		NP		NP		NP	
60-70	V	14	V	12	V	Φ	V	Φ	V	10*	V	0	V	0	V	0	V		V		V	PLT	V		NP		NP		NP		NP		NP	
70-80	V	12	V	10	V	Φ	V	Φ	V	0	V	0	V	0	V	0	V		V		NP		V		NP		NP		NP		NP		NP	

* PIPE SHALL BE CIRCULAR CROSS-SECTION, FACTORY ELONGATED.
** WHERE H=10', 15', 20' ETC. USE GAUGE THICKNESS IN INCHES OR CLASS OF PIPE SPECIFIED FOR NEXT HIGHEST INCREMENTS OF HEIGHT OF FILL
NP NOT PERMITTED
C REINFORCED CONCRETE PIPE
S CORRUGATED METAL PIPE
Φ USE 60" STRUCTURAL PLATE PIPE

521-S.dwg December 08, 2025 - 2:44pm

FULTON COUNTY STANDARD DETAIL 521

PIPE GAUGE AND CLASS
(CONCRETE & CORRUGATED STEEL PIPE)

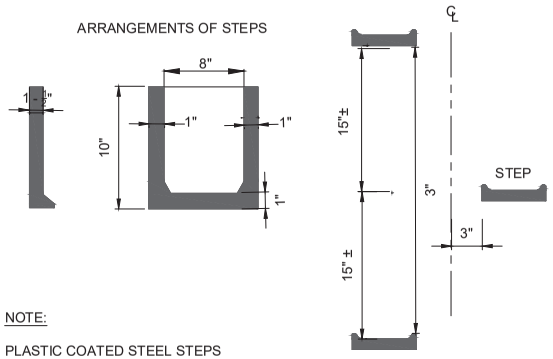
DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO. 521

ARRANGEMENTS OF STEPS

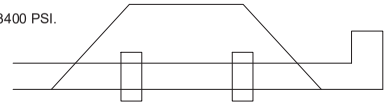


NOTE:

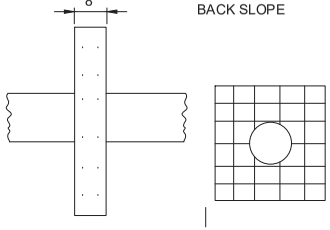
PLASTIC COATED STEEL STEPS
ARE REQUIRED ON THE OUTSIDE OF
THE CONTROL STRUCTURE AS SHOWN.

ANTI - SEEP COLLARS

1. MUST BE FORMED
2. CLASS A CONCRETE, 3400 PSI.
3. MUST BE INSPECTED PRIOR TO POURING CONCRETE.



COLLAR
8"

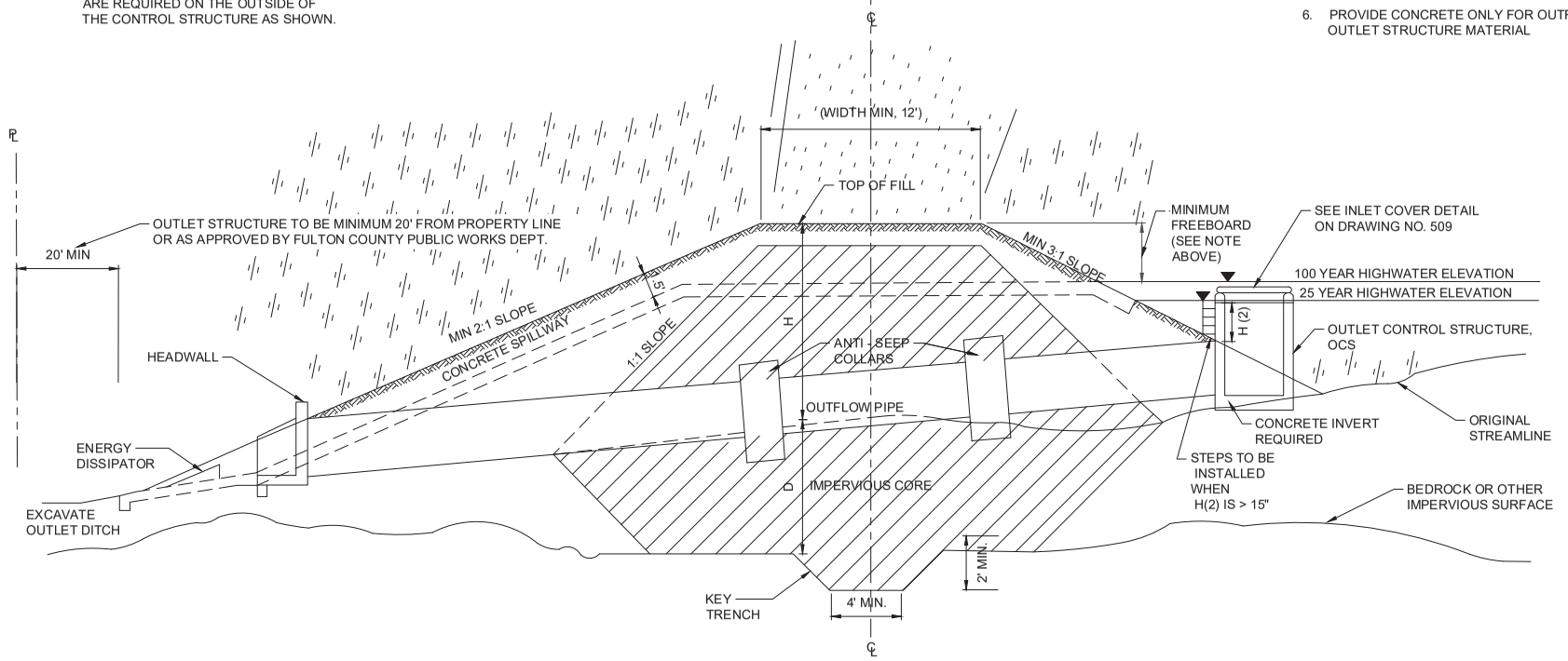


2 COLLARS
LOCATION - ONE AT TOP OF FRONT SLOPE & ONE AT TOP OF BACK SLOPE

= OUTSIDE OD + 2'
2 MATS OF #5 ON 8" CENTER

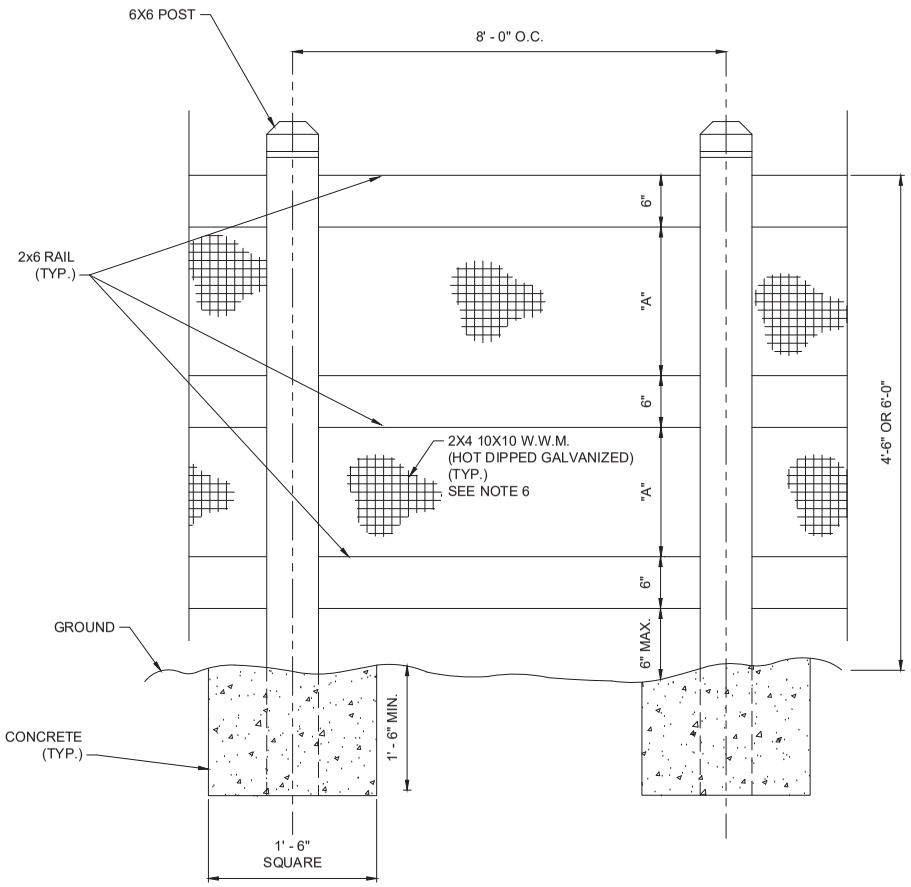
NOTES:

1. IT IS PREFERABLE TO HAVE A FREEBOARD OF 2 FEET MINIMUM. FOR SMALL DETENTION FACILITIES, AN ABSOLUTE MINIMUM FREEBOARD OF 1 FOOT SHALL BE PROVIDED. REFERENCE PAGE 172 OF MANUAL ON DRAINAGE DESIGN FOR FULTON COUNTY, JANUARY 1983.
   A SMALL DETENTION FACILITY IS 3 FEET OR LESS TO THE 25 YEAR ELEVATION.
2. SLOPES SHOWN ARE STEEPEST ALLOWABLE.
   CORE TO BE CLAY OR OTHER IMPERVIOUS MATERIAL.
   D, DEPTH OF CORE, MUST BE TO IMPERVIOUS MATERIAL OR A MINIMUM DEPTH EQUAL TO H.
   CORE TO BE PLACED IN 6" LAYERS & COMPACTED TO 95% STANDARD PROCTOR.
   WIDTH = (H/5) + 12.
3. EMERGENCY SPILLWAYS ARE TO BE CUT IN NATURAL GROUND WHERE APPLICABLE.
4. EMERGENCY SPILLWAYS ARE TO BE CUT IN NATURAL GROUND WHERE APPLICABLE.
5. ALTERNATE DESIGNS MAY BE APPROVED OR WILL BE CONSIDERED BY FULTON COUNTY PUBLIC WORKS.
6. PROVIDE CONCRETE ONLY FOR OUTFLOW PIPE AND OUTLET STRUCTURE MATERIAL

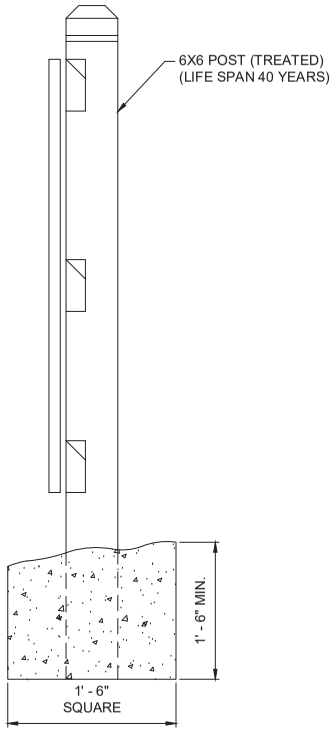


FULTON COUNTY STANDARD DETAIL 522 EARTH FILL DAM FOR DETENTION PONDS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 522

522-S.dwg December 08, 2025 - 2:44pm



ELEVATION
N.T.S.



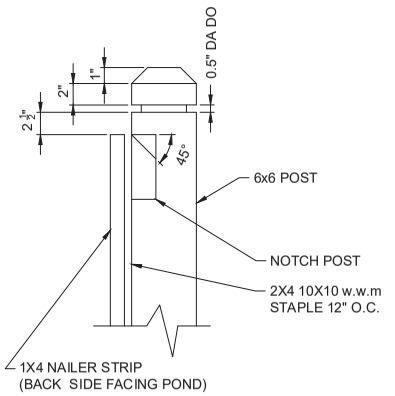
SECTION
N.T.S.

NOTES:

1. ALL FASTENERS TO BE IN COMPLIANCE WITH MANUFACTURER SPECIFICATIONS
2. 2x4 10x10 WELDED WIRE MESH (W.W.M.) TO BE HOT-DIPPED GALVANIZED.
3. CONCRETE SHALL BE 2500 P.S.I.
4. A 4' - 6" HIGH FENCE CAN BE ERECTED WHEN THE POND IS 3' - 0" OR LESS TO THE 25 YEAR STORM ELEVATION.
5. A FENCE IS ALWAYS REQUIRED.
6. OTHER WIRE GAUGES CAN BE ACCEPTED AS REQUIRED BY ENGINEER.
7. FENCE TO BE PLACED OUTSIDE OF ACCESS.
8. ACCESS ROAD TO BE 10' INSIDE OF FENCE.
9. FENCE TO BE PLACED AT 25 YEAR STORM ELEVATION.

TABLE 523 - 1
FENCE DIMENSIONS

TYPE	"A"
6'-0" HIGH FENCE	2'-0"
4'-6" HIGH FENCE	1'-3"



DETAIL
N.T.S.

FULTON COUNTY STANDARD DETAIL 523

FENCE DETAIL FOR DETENTION PONDS
SHEET 1 OF 2

DATE	REVISIONS	DATE	REVISIONS

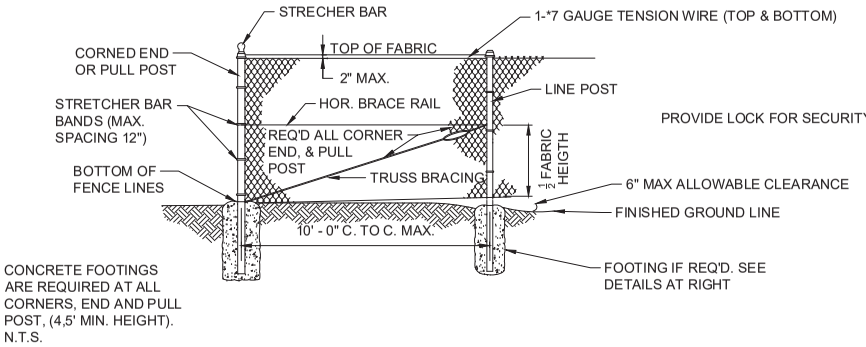
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

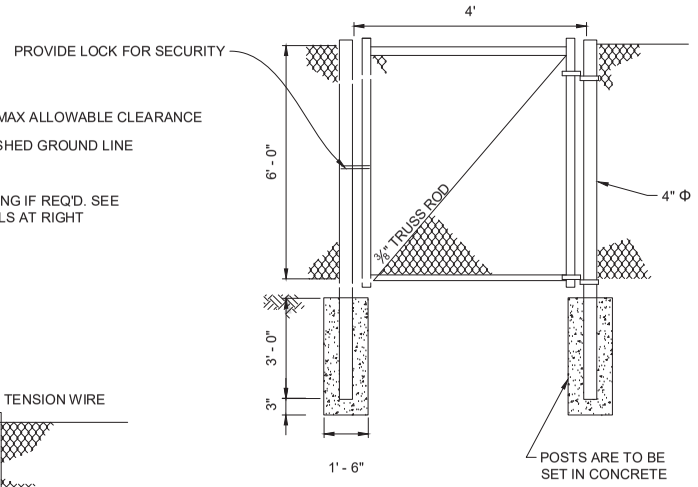
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
523

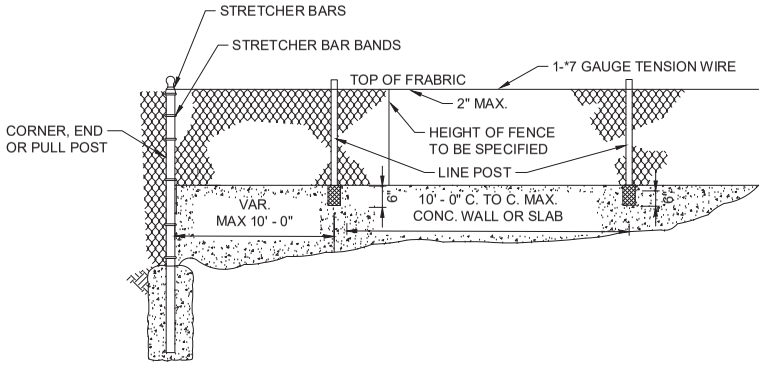
523-S.dwg December 08, 2025 - 2:44pm



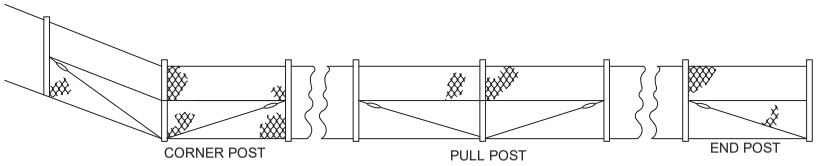
CONCRETE FOOTINGS ARE REQUIRED AT ALL CORNERS, END AND PULL POST, (4,5' MIN. HEIGHT).
N.T.S.



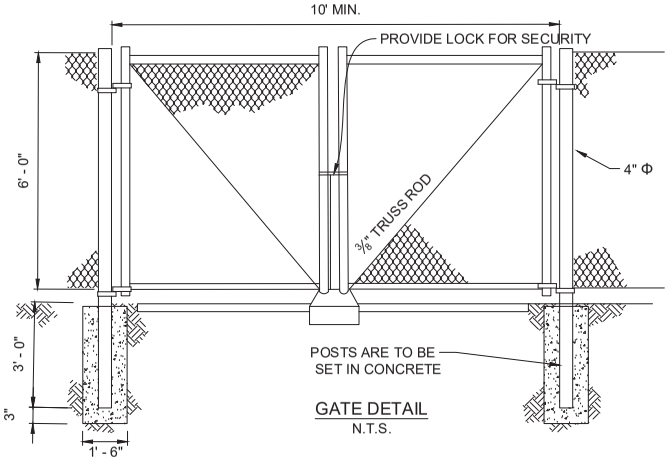
WALK GATE DETAIL
N.T.S.



METHOD OF INSTALLATION OVER CONCRETE WALL OR SLAB
AND ALSO WHERE HEIGHT OF FENCE CHANGES
N.T.S.



METHOD OF BRACING END, CORNER AND PULL POST
N.T.S



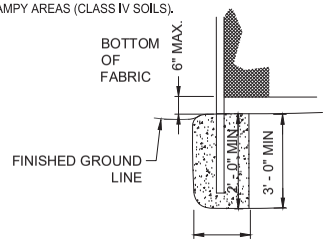
GATE DETAIL
N.T.S.

NOTES:

1. FABRIC SHALL BE FASTENED TO LINE POST AT INTERVALS NOT GREATER THAN 14".
2. TENSION WIRES SHALL BE TIED TO FABRIC WITH 9 GA. WIRE OR 11 GA. HOG RINGS AT 24" C. TO C. MAX SPACINGS.
3. WHERE A PROPERTY OWNERS CHAIN LINK WIRE FENCE HAS TO BE REPLACED BY THE DEPARTMENT AS PART OF THE CONSTRUCTION PROJECT, AND THE EXISTING FENCE HAD A TOP RAIL, THEN THE NEW REPLACEMENT FENCE SHALL ALSO HAVE A SIMILAR TYPE RAIL INSTEAD OF A TENSION WIRE AT THE TOP OF THE FENCE.
4. HORIZONTOAL BRACE RAILS AND TRUSS BRACING SHALL BE REQUIRED AT ALL CORNER, END AND PULL POSTS.
5. LINE POST SPECIFICATION IS 2" , 20 WT.
6. CORNER END AND PULL POST SPECIFICATION IS $2\frac{3}{8}$" , 20 WT.
7. FENCE FABRIC SPECIFICATION IS 11.5 GAUGE.
8. ALL CORNER, END AND PULL POSTS SHALL HAVE CONCRETE FOOTINGS AS SHOWN.
9. ALL ALTERNATE DESIGN(S) TO BE APPROVED BY FCPW DIRECTOR.
10. 4' WIDE WALK GATE TO BE LOCATED NEAR OUTLET CONTROL STRUCTURE.

*ALTERNATE:

TYPE "C" LINE POSTS OR $2\frac{3}{8}$"Ø TUBE LINE POSTS OR OTHER TYPE LINE POSTS APPROVED BY THE D.O.T. LABORATORY MAY BE DRIVEN TO A MINIMUM DEPTH OF THREE (3) FEET INSTEAD OF CONCRETE FOOTING SHOWN PROVIDING SOIL IS EITHER CLASS I, II, III, OR V SOIL. CONCRETE FOOTING REQUIRED FOR LINE POSTS INSTALLED IN MARSHY OR SWAMPY AREAS (CLASS IV SOILS).



18" DIA FOR END, CORNER AND PULL POST REQUIRED

12" DIA FOR LINE POST (IF CONCRETE FOOTING IS REQUIRED)

FOOTING DETAILS FOR FENCE POSTS
N.T.S.

FULTON COUNTY STANDARD DETAIL 524

FENCE DETAIL FOR DETENTION PONDS
SHEET 2 OF 2

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
524

524-S.dwg December 08, 2025 - 2:44pm

DWG. NO.	DESCRIPTION
600	INDEX AND GENERAL NOTES
601	3/8" & 5/8" RECLAIMED WATER METER INSTALLATION
602	1" RECLAIMED WATER METER INSTALLATION
603	1 1/2" RECLAIMED WATER METER INSTALLATION
604	2" RECLAIMED WATER METER INSTALLATION
605	LARGE RECLAMED WATER METER AND VAULT
606	BRASS FITTINGS FOR METER INSTALLATION ON NPRL
607	RECLAIMED WATER METER LOCATIONS 3/4" TO 2"
608	RECLAIMED WATER VALVE COVER MARKINGS / VALVE BOX
609	LINE / VALVE MARKER LABEL
610	CUSTOMER SIGNS
611	POLYETHYLENE ENCASEMENT INSTALLATION
612	CUL-DE-SAC FLUSH POINT DETAIL
613	IN-LINE FLUSH POINT DETAIL
614	NPRL TERMINATION CUL-DE-SAC
615	ROUND CONNECTION DETAIL

GENERAL NOTES

1. HDPE AND PVC PIPES TO BE USED WITH WASTEWATER APPLICATIONS ONLY.
2. DUCTILE IRON PIPES MAY BE USED FOR WASTEWATER APPLICATIONS ONLY WITH SPECIFIC APPROVAL BY THE FCPW.
3. MINIMUM THICKNESS FOR HDPE PIPES SHALL BE DR 17.
4. FOR SEWER INSTALLATIONS WITH NO LIVE LOAD AND NOT ALONG STREAM BANKS, THE STANDARD PIPE SHALL BE DR 26 PVC OR HDPE DR 17 IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 48-INCH WITH MAXIMUM BURY DEPTH OF 20 FEET.
5. FOR SEWER INSTALLATIONS WITH HS20/25 LIVE LOADS, OR WITH BURY DEPTH GREATER THAN 20 FEET AND NOT ALONG STREAM BANKS, THE STANDARD PIPE SHALL BE DR 18 PVC OR HDPE DR17 IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 30-INCH.
6. FOR FORCE MAINS, REGARDLESS OF BURY DEPTH, LIVE LOAD REQUIREMENTS AND NOT ALONG RIVERBANKS, THE STANDARD PIPE SHALL BE HDPE DR 11 IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 30-INCH.
7. FOR SEWER INSTALLATIONS WITH NO LIVE LOADS AND LOCATED ALONG STREAM BANKS, THE STANDARD PIPE SHALL BE DR 17 HDPE IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 48-INCH AND MAXIMUM BURY DEPTH OF 20 FEET.
8. ALL SEWER LINES, WATER LINES, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.

FULTON COUNTY STANDARD DETAIL 600

INDEX AND GENERAL NOTES

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML

APPROVED: TM

DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

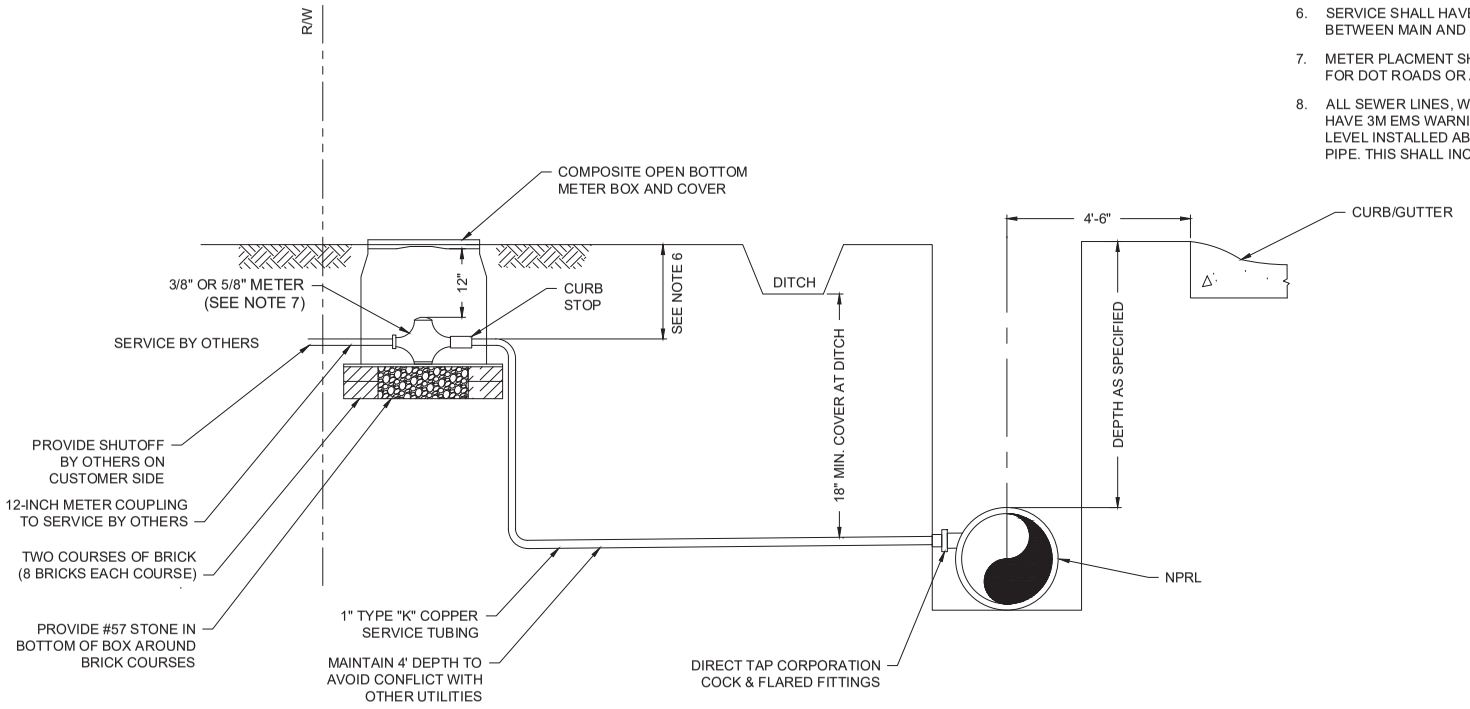
DRAWING NO.

600

600-S.dwg December 08, 2025 - 10:14am

NOTES:

1. SERVICE LINE SHALL BE ¾" DIAMETER FROM MAIN TO METER.
2. USE ALL FLARE JOINTS.
3. INSTALLATION SHALL ALLOW ADEQUATE ROOM TO REMOVE AND/OR REPAIR METER.
4. METER BOX SHALL BE APPROXIMATELY 12" X 18" X 18" DEEP.
5. TYPE K COPPER SERVICE LINE MUST BE CONTINUOUS FROM METER TO MAIN.
6. SERVICE SHALL HAVE 18 IN. MIN. COVER AT METER AND 30 IN. MIN. COVER BETWEEN MAIN AND METER.
7. METER PLACMENT SHALL BE INSIDE R/W FOR NON-DOT ROADS, OUTSIDE R/W FOR DOT ROADS OR AS REQUIRED BY LOCAL AUTHORITIES W/ JURISDICTION.
8. ALL SEWER LINES, WATER, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.



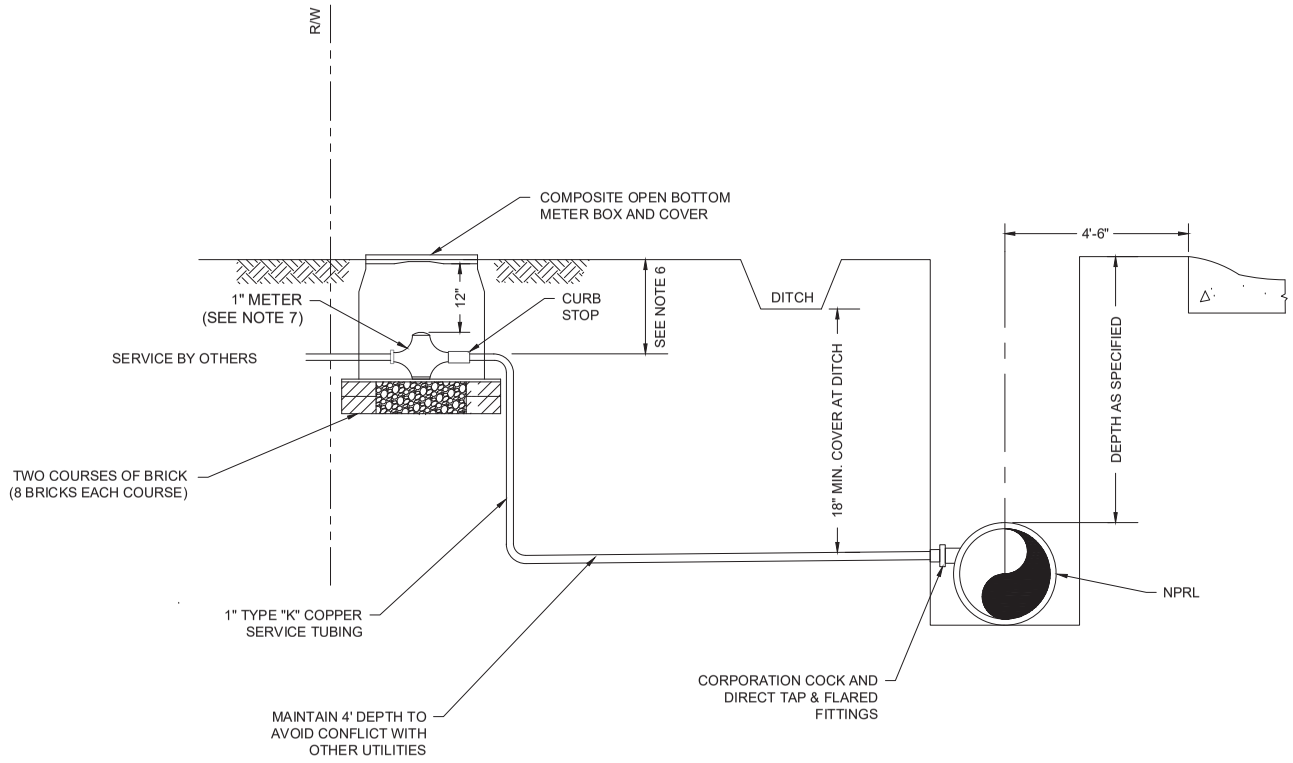
METER INSTALLATION ELEVATION DETAIL
NTS

FULTON COUNTY STANDARD DETAIL 601 ¾" & ⅝" RECLAIMED WATER METER INSTALLATION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 601

601-S.dwg December 08, 2025 - 10:14am

NOTES:

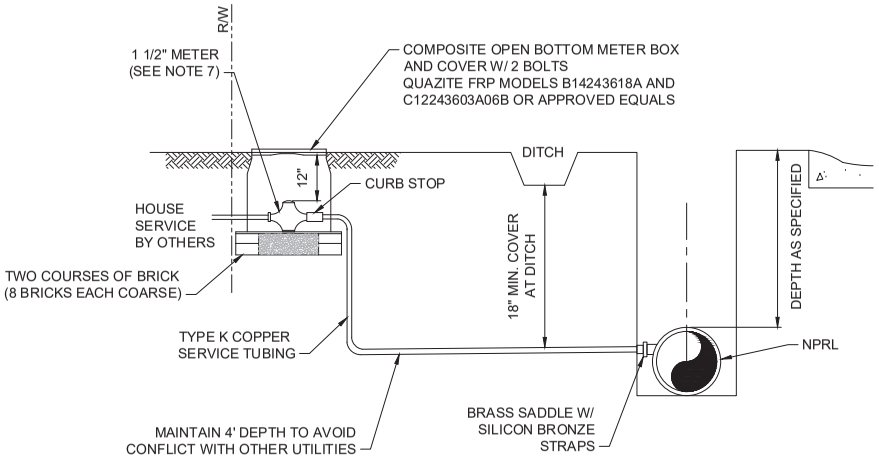
1. SERVICE LINE SHALL BE 1" DIAMETER FROM MAIN TO METER.
2. USE ALL FLARE JOINTS.
3. INSTALLATION SHALL ALLOW ADEQUATE ROOM TO REMOVE AND/OR REPAIR METER.
4. METER BOX SHALL BE APPROXIMATELY 18" x 24" X 18" DEEP.
5. TYPE K COPPER SERVICE LINE MUST BE CONTINUOUS FROM METER TO MAIN.
6. SERVICE SHALL HAVE 18" MIN. AT METER AND 30" MIN. COVER BETWEEN MAIN AND METER.
7. METER PLACEMENT SHALL BE INSIDE R/W FOR NON-DOT ROADS, OUTSIDE R/W FOR DOT ROADS OR AS REQUIRED BY LOCAL AUTHORITIES W/ JURISDICTION.
8. ALL SEWER LINES, WATER, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.



METER INSTALLATION ELEVATION DETAIL
N.T.S.

FULTON COUNTY STANDARD DETAIL 602 1" RECLAIMED WATER METER INSTALLATION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 602

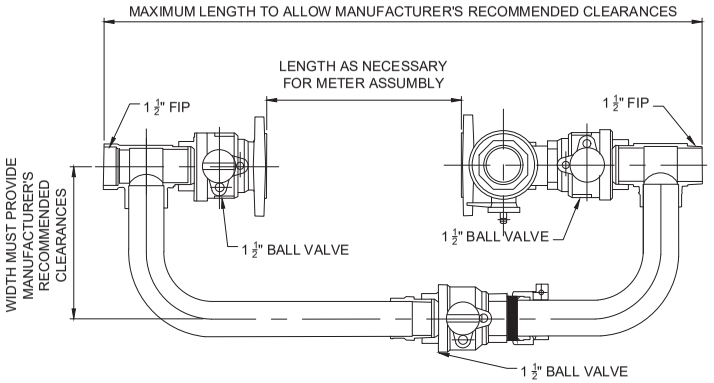
602-S.dwg December 08, 2025 - 10:15am



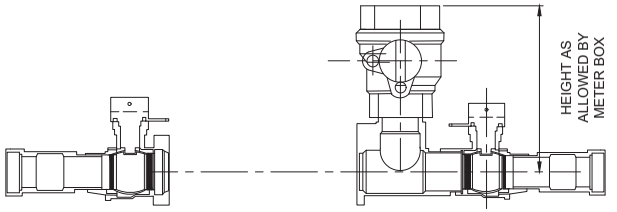
METER INSTALLATION ELEVATION DETAIL
N.T.S.

NOTES:

1. SERVICE LINE SHALL BE 1 1/2" FROM THE MAIN TO THE METER.
2. USE ALL COMPRESSION GRIP JOINTS.
3. INSTALLATION SHALL ALLOW ADEQUATE ROOM TO REMOVE AND/OR REPAIR METER.
4. METER BOX SHALL BE APPROXIMATELY 24" x 36" x 18" DEEP.
5. TYPE K COPPER SERVICE LINE MUST BE CONTINUOUS FROM METER TO MAIN.
6. SERVICE SHALL HAVE 18" MIN. AT METER, AND 30" MIN.COVER BETWEEN MAIN AND METER.
7. METER PLACEMENT SHALL BE INSIDE R/W FOR NON-DOT ROADS, OUTSIDE R/W FOR DOT ROADS OR AS REQUIRED BY LOCAL AUTHORITIES W/ JURISDICTION.
8. ALL SEWER LINES, WATER, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.



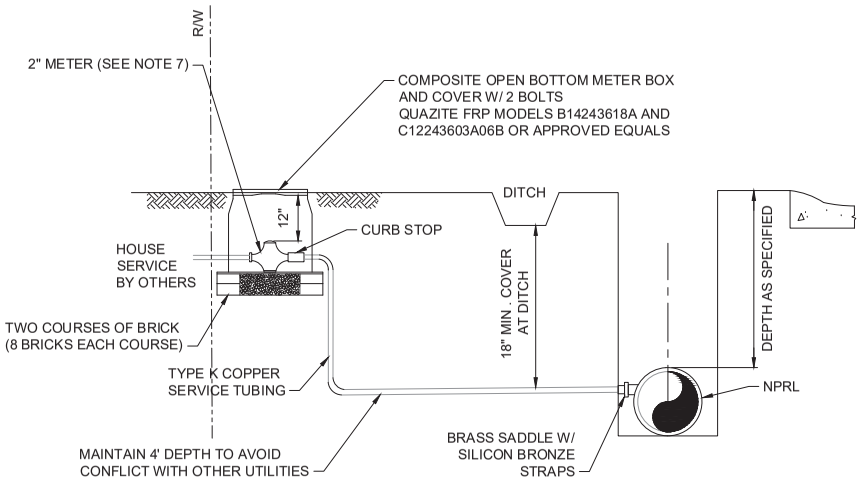
TYPICAL BYPASS DETAIL - PLAN
N.T.S.



TYPICAL BYPASS DETAIL - ELEVATION
N.T.S.

FULTON COUNTY STANDARD DETAIL 603 1 1/2" RECLAIMED WATER METER INSTALLATION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 603

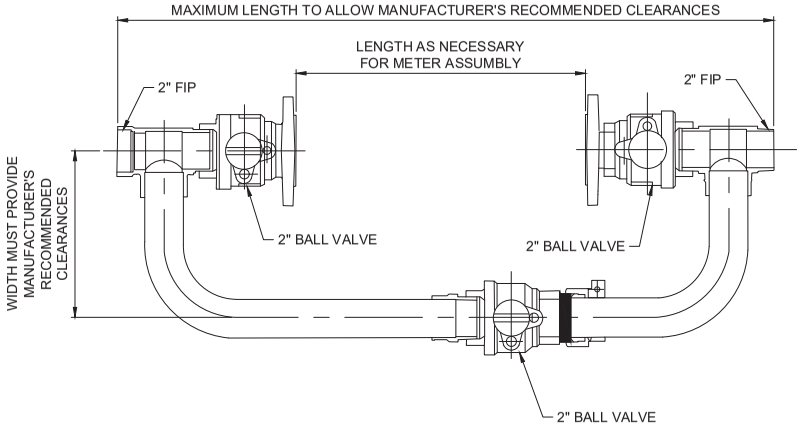
603-S.dwg December 08, 2025 - 10:15am



METER INSTALLATION ELEVATION DETAIL
N.T.S.

NOTES:

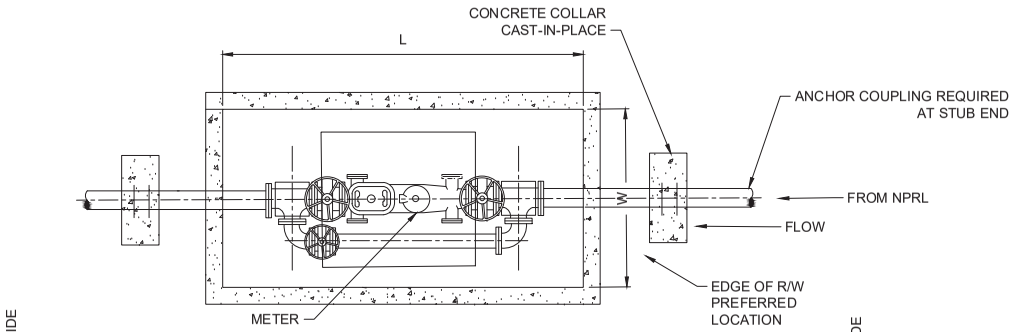
1. SERVICE LINE SHALL BE 2" FROM THE MAIN TO THE METER.
2. USE ALL COMPRESSION GRIP JOINTS.
3. INSTALLATION SHALL ALLOW ADEQUATE ROOM TO REMOVE AND/OR REPAIR METER.
4. METER BOX SHALL BE APPROXIMATELY 24" x 36" x 18" DEEP.
5. TYPE K COPPER SERVICE LINE MUST BE CONTINUOUS FROM METER TO MAIN.
6. SERVICE SHALL HAVE 18" MIN. COVER BETWEEN MAIN AND METER.
7. METER PLACEMENT SHALL BE INSIDE R/W FOR NON-DOT ROADS, OUTSIDE R/W FOR DOT ROADS OR AS REQUIRED BY LOCAL AUTHORITIES W/ JURISDICTION.
8. ALL SEWER LINES, WATER, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.



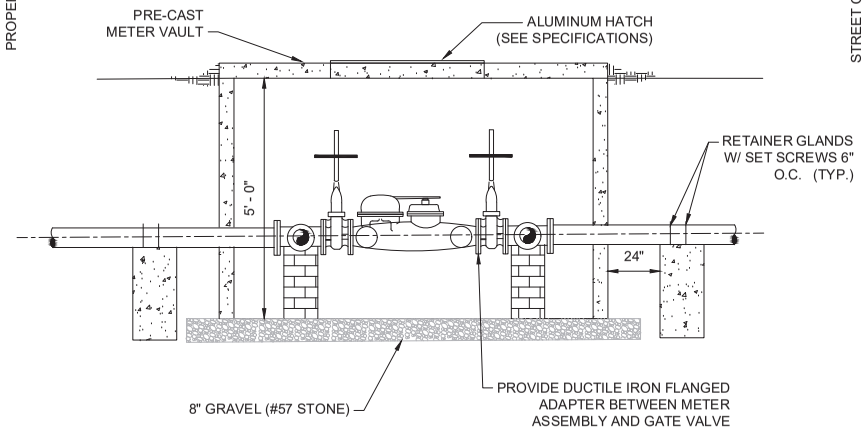
TYPICAL BYPASS DETAIL
N.T.S.

FULTON COUNTY STANDARD DETAIL 604 2" RECLAIMED WATER METER INSTALLATION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 604

604-S.dwg December 08, 2025 - 10:15am



VAULT PLAN VIEW



VAULT ELEVATION VIEW

NOTES:

1. BOXES EXCEEDING 5' DEPTH MUST BE APPROVED BY FULTON COUNTY.
2. WHEN METER BOX CANNOT BE LOCATED ENTIRELY ON R/W, A PERMANENT EASEMENT SHALL BE OBTAINED TO PREVENT FENCES OR OTHER OBSTRUCTIONS FROM BEING ERECTED AROUND THE METER BOX.
3. COVER OPENING TO BE PLACED NEAREST THE METER REGISTER.
4. THE METER MUST BE INSTALLED WITH AT LEAST 8 DIAMETERS OF STRAIGHT PIPE SAME SIZE AS METER ON THE INLET SIDE TO PERMIT ON-SITE MAINTENANCE AND CALIBRATION, A STRAINER MAY BE PROVIDED IN LIEU OF THE STRAIGHT PIPE IN ACCORDANCE WITH THE METER MANUFACTURER'S RECOMMENDATIONS, AN INLET AND OUTLET GATE VALVE WITH BYPASS LINE ARE REQUIRED (SEE ILLUSTRATION).
5. THESE BOXES ARE ARE NOT TO BE INSTALLED IN TRAFFIC AREAS WITHOUT PRIOR PERMISSION FROM FULTON COUNTY.
6. ALL VALVES AND FITTINGS INSIDE THE VAULT SHALL BE FLANGED.
7. ALL FITTINGS OUTSIDE THE VAULT SHALL BE PUSH-ON JOINT WITH AMERICAN 'FAST-GRIP' GASKETS OR APPROVED EQUAL.
8. ALL METERS SHALL COME EQUIPPED WITH A TOUCHREAD OR TOUCHLESS SENSOR COMPATIBLE WITH FULTON COUNTY'S METER READING EQUIPMENT.
9. THIS DETAIL ALSO AUTHORIZED FOR INSTALLAITONS OF 3" AND LARGER RE-USE METERS.
10. HATCH SHALL BE 4' X 6' , DOUBLE LEAF, FLUSH MOUNT, $\frac{1}{4}$" DIAMOND PLATE, ALIMINUM DOORS LOCKABLE WITH A $\frac{5}{8}$" ROD. HATCH SHALL BE BILCO #PDCM-3 OR PRE-APPROVED EQUAL FOR 6" & 8" METERS.
11. HATCH SHALL BE 3'6" X3'6" SINGLE LEAF FLUSH MOUNT $\frac{1}{4}$" DIAMOND PLATE, ALUMINUM LOCKABLE WITH $\frac{5}{8}$" ROD. HATCH SHALL BE B.LCO#PCM - 5 OR PRE-APPROVED EQUAL FOR 3" & 4" METERS.

TABLE 605-1
SANITARY SEWER DIMENSIONS

METER SIZE	VAULT			HATCH SIZE
	L	W	D	
3"	9'	5'	6'	3'6" X 3'6"
4"	9'	5'	6'	3'6" X 3'6"
6"	12'	6'	6'	4' X 6'
8"	12'	6'	6'	4' X 6'

FULTON COUNTY STANDARD DETAIL 605

LARGE RECLAIMED WATER METERS AND VAULT

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

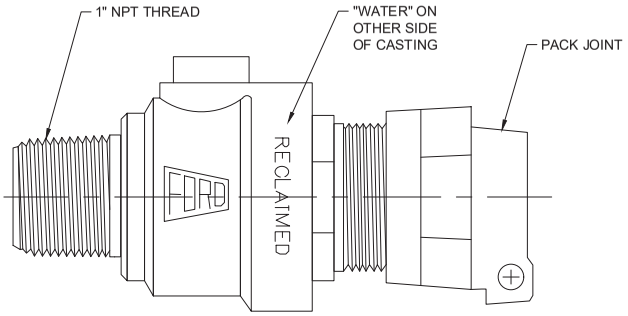
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

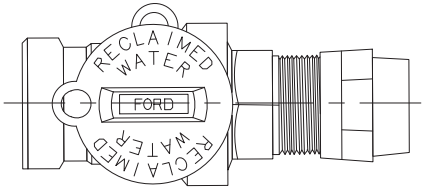
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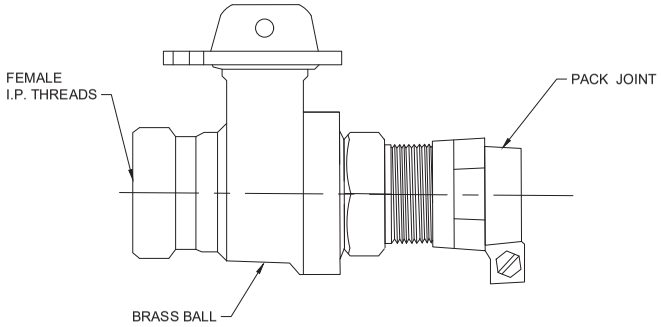
605-S.dwg December 08, 2025 - 10:15am

NOTES:

1. ALL FITTINGS TO BE BRASS MEETING AWWA C800 AND ASTM B62.

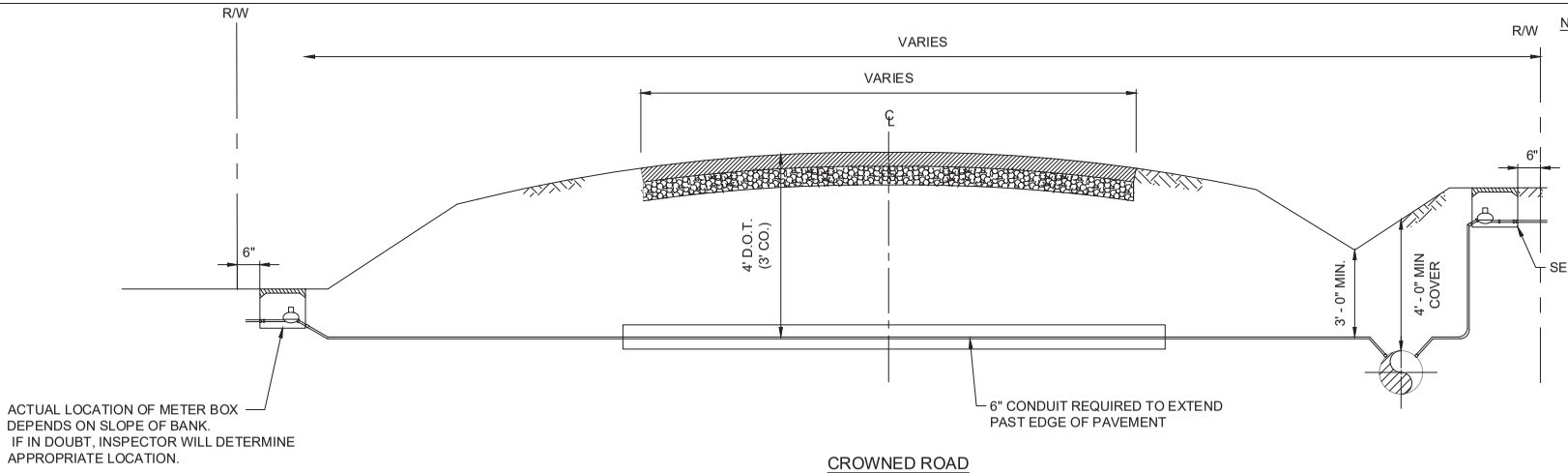






FULTON COUNTY STANDARD DETAIL 606 BRASS FITTINGS FOR METER INSTALLATION ON NPRL		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 606

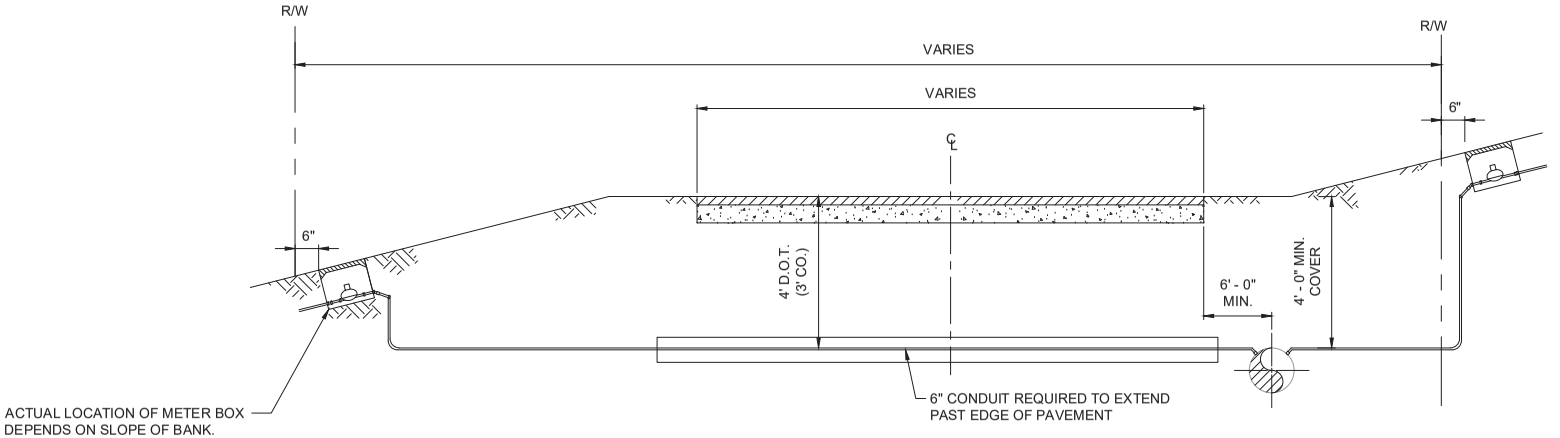
606-S.dwg December 08, 2025 - 10:15am



CROWNED ROAD
DITCH & EMBANKMENT

NOTES:

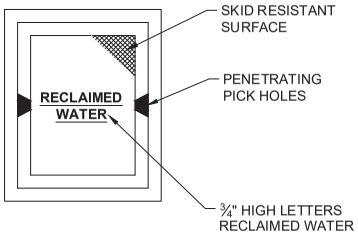
1. THIS METER LOCATION IS THE APPROVED STANDARD WHERE THE METER TO BE LOCATED OUTSIDE OF THE R/W WITHOUT PRIOR ENGINEERING APPROVAL.
2. ALL SEWER LINES, WATER, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.

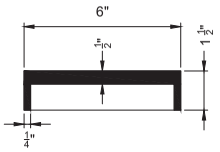


FLAT OR CONCRETE ROAD
SLIGHT DITCH & EMBANKMENT

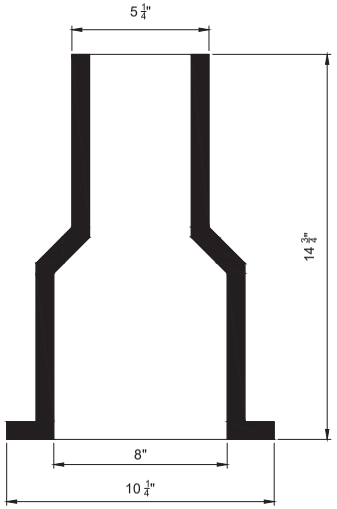
FULTON COUNTY STANDARD DETAIL 607 RECLAIMED WATER METER LOCATIONS: 3/4" - 2"		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 607

607-S.dwg December 08, 2025 - 10:15am

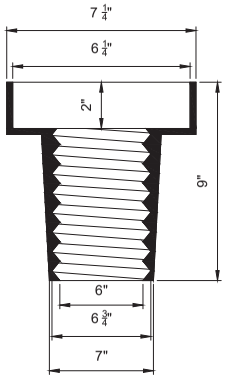




COVER



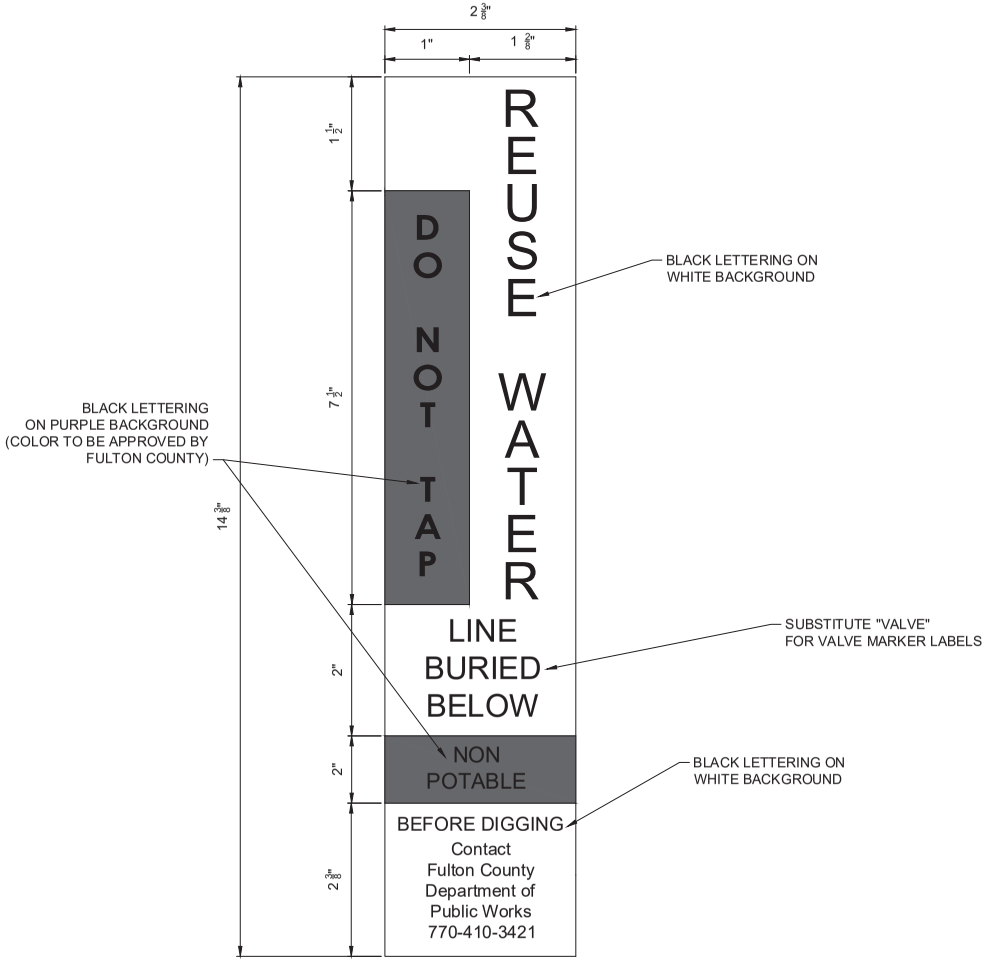
BOTTOM SECTION



TOP SECTION

FULTON COUNTY STANDARD DETAIL 608 RECLAIMED WATER VALVE COVER MARKINGS/ VALVE BOX		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 608

608-S.dwg December 08, 2025 - 10:15am



NOTES:

1. LABELS TO BE PROVIDED BY FULTON COUNTY INSPECTOR AND PROJECT MANAGER.
2. LABELS TO BE PLACED ON BOTH SIDES OF WHITE DRIVABLE MARKERS - CARSONITE #CIB-380.
3. MARKERS TO BE INSTALLED WITH EACH VALVE OR AS DIRECTED BY FULTON COUNTY.
4. LINE MARKERS TO BE INSTALLED AS DIRECTED BY FULTON COUNTY.

609-S.dwg December 08, 2025 - 10:15am

FULTON COUNTY STANDARD DETAIL 609

LINE/VALVE MARKER LABEL

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

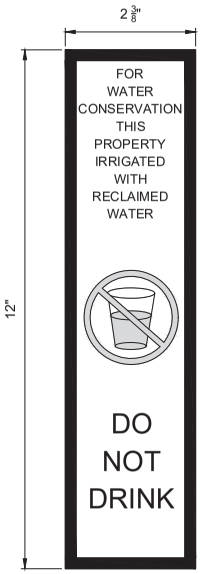
DRAWING NO.
609

NOTES

1. SIGNS ARE TO BE PLACED AT EACH USER OF RECLAIMED WATER NEAR THE RECLAIMED METER.
2. ALL SIGNS ARE WHITE WITH PURPLE LETTERING (COLOR TO BE APPROVED BY FULTON COUNTY).
3. STEEL OR PLASTIC SIGNS MAY BE AFFIXED TO OTHER POSTS OR STRUCTURES THAN THOSE PROVIDED BY FULTON COUNTY.
4. LABEL SIGNS MUST BE AFFIXED TO WHITE DRIVABLE MARKER #CIB-380 (MANUFACTURED BY CARSONITE INTERNATIONAL) AND PROTRUDE ABOVE FINISHED GRADE NO MORE THAN 36" AND NO LESS THAN 18".



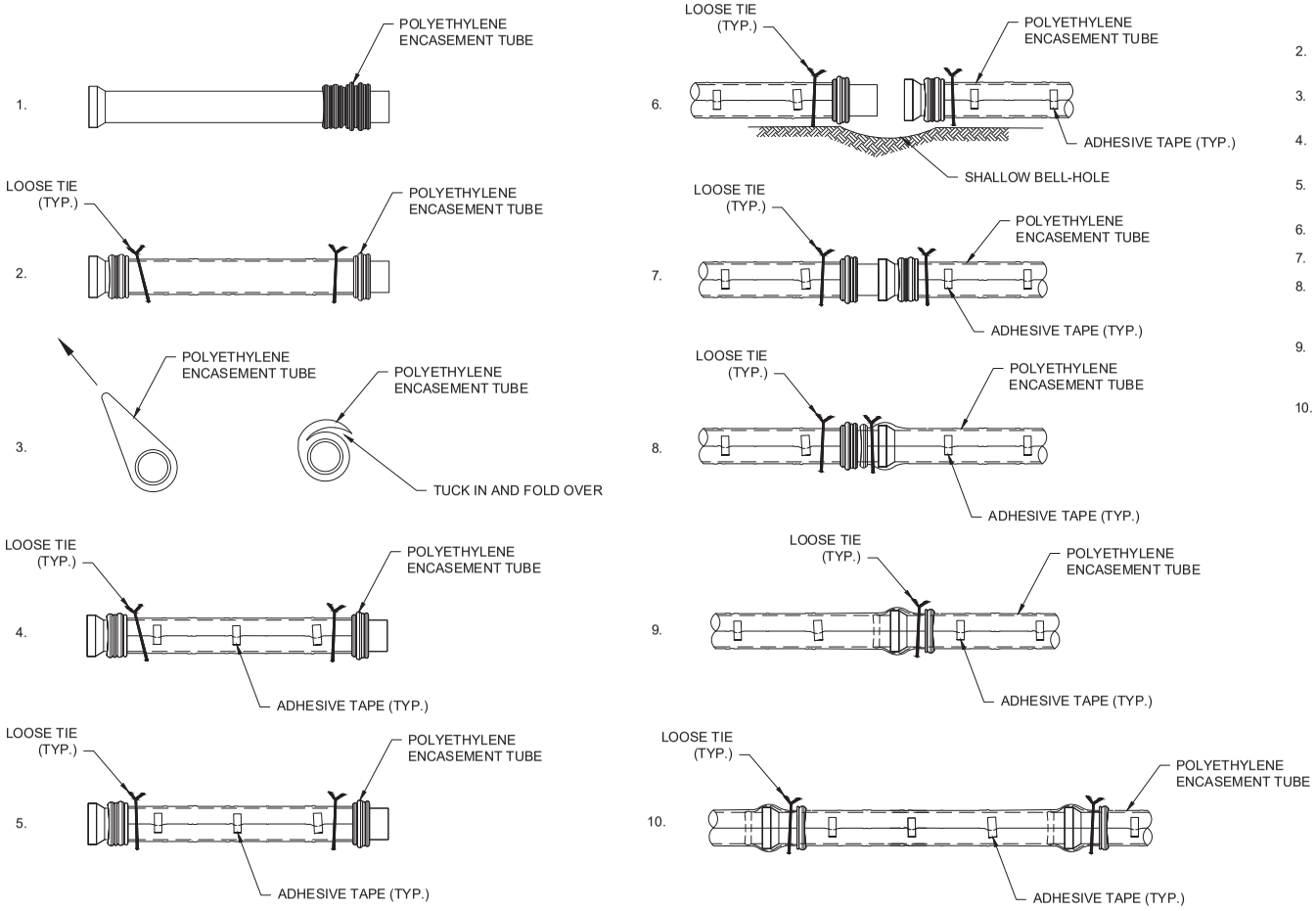
STEEL OR PLASTIC SIGNS
N.T.S.



LABEL SIGNS
N.T.S.

FULTON COUNTY STANDARD DETAIL 610 CUSTOMER SIGNS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 610

610-S.dwg December 08, 2025 - 10:15am

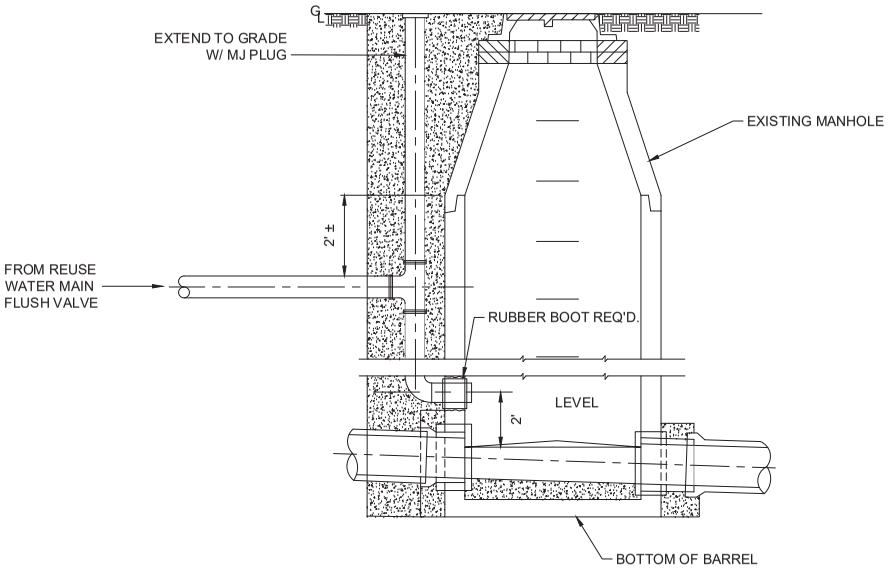


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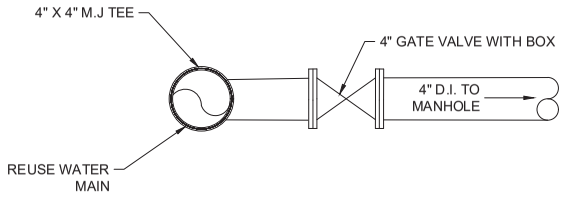
1. REMOVE ALL LUMPS OF CLAY, MUD, CINDERS, ETC. WHICH MAY HAVE ACCUMULATED ON THE SURFACE OF THE PIPE. A POLYETHYLENE TUBE SHOULD BE CUT SO THAT IT IS APPROXIMATELY TWO FEET LONGER THAN THE PIPE SECTION. SLIP THE TUBE ONTO THE PIPE. ALLOW APPROXIMATELY ONE FOOT OF THE TUBE TO OVERHANG EACH END OF THE PIPE.
2. PUSH BACK THE OVERHANG TUBE ENDS UNTIL THEY CLEAR THE PIPE ENDS.
3. TAKE UP THE SLACK IN THE TUBE TO MAKE A SNUG BUT NOT TIGHT FIT. FOLD EXCESS BACK OVER THE TOP OF PIPE.
4. SECURE THE FOLD WITH POLYETHYLENE COMPATIBLE ADHESIVE TAPE AT SEVERAL LOCATIONS ALONG THE PIPE BARREL.
5. DIG A SHALLOW BELL-HOLE IN THE TRENCH BOTTOM AT THE JOINT LOCATION.
6. PLACE PIPE INTO THE TRENCH.
7. ASSEMBLE THE JOINT.
8. PULL THE POLYETHYLENE TUBE END OF THE PREVIOUSLY INSTALLED PIPE OVER THE NEW PIPE AND SECURE WITH THE TIE STRAP FROM THE PRECEDING PIPE BELL.
9. OVERLAP THE SECURED TUBE END OF THE NEW PIPE SECTION. SECURE THE NEW TUBE END IN PLACE WITH THE SPIGOT END TIE STRAP.
10. REPAIR ALL RIPS, TEARS, OR OTHER TUBE DAMAGE WITH SUITABLE ADHESIVE TAPE. PIN POINT PUNCTURES NEED NOT BE REPAIRED.

FULTON COUNTY STANDARD DETAIL 611 POLYETHYLENE ENCASEMENT INSTALLATION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 611

611-S.dwg December 08, 2025 - 10:15am



MANHOLE CONNECTION DETAIL



CULC-DE-SAC
REUSE TAP AND VALVE DETAIL

612-S.dwg December 08, 2025 - 10:15am

FULTON COUNTY STANDARD DETAIL 612

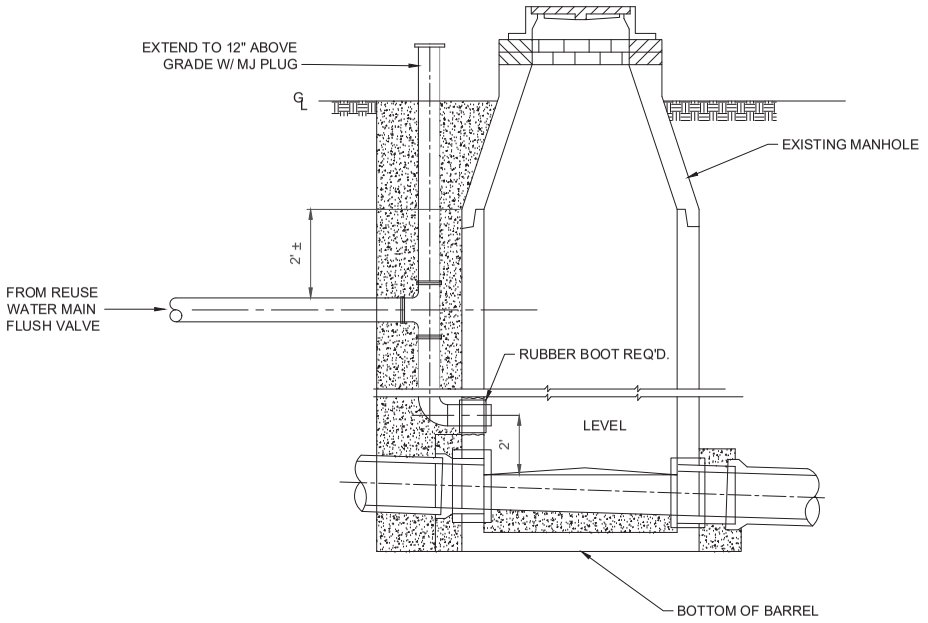
CUL-DE-SAC FLUSH POINT DETAILS

DATE	REVISIONS	DATE	REVISIONS

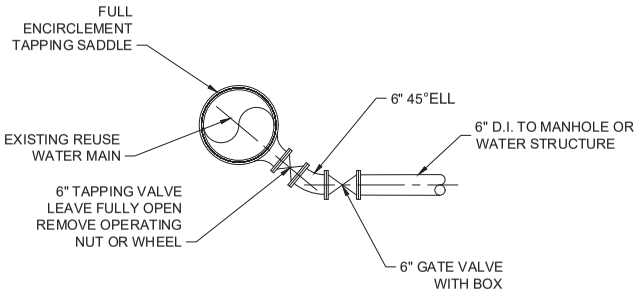
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DATE: 01-21-2026

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DRAWING NO.
612



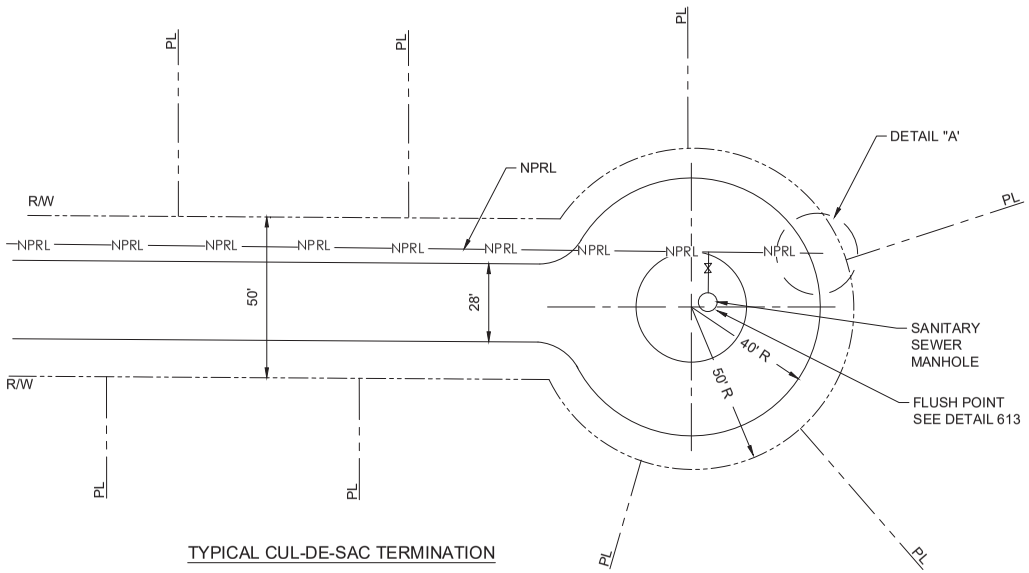
MANHOLE CONNECTION DETAIL



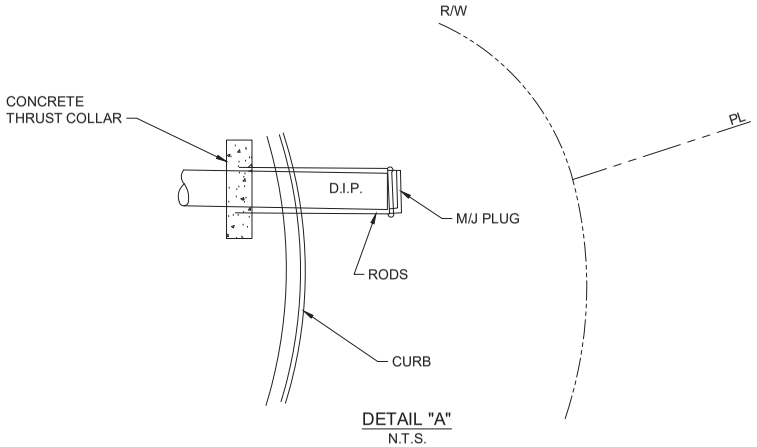
REUSE TAP AND VALVE DETAIL

FULTON COUNTY STANDARD DETAIL 613 IN-LINE FLUSH POINT DETAIL		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 613

613 - S.dwg December 08, 2025 - 10:16am



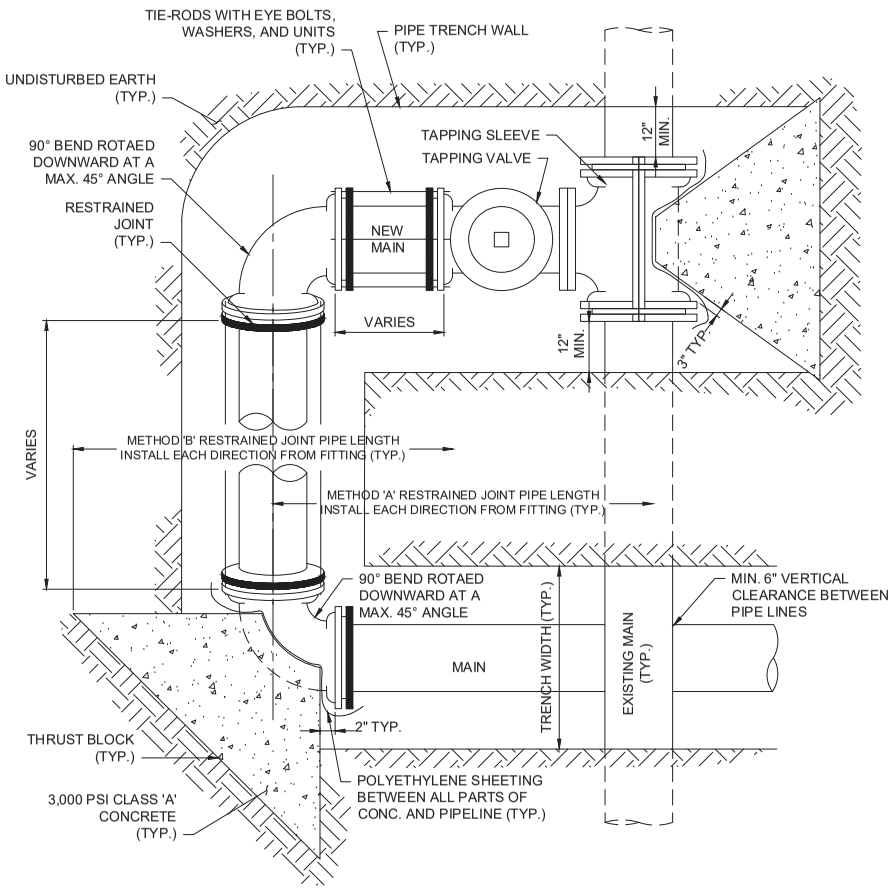
TYPICAL CUL-DE-SAC TERMINATION



DETAIL "A"
N.T.S.

FULTON COUNTY STANDARD DETAIL 614 NPRL TERMINATION CUL-DE-SAC		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 614

614-S.dwg December 08, 2025 - 10:16am



PLAN
N.T.S.

NOTES:

1. REFER TO TYPICAL HORIZONTAL THRUST BLOCK DRAWINGS FOR ADDITIONAL DETAILS.
2. REFER TO TYPICAL TAPPING SLEEVE AND VALVE INSTALLATION DRAWING FOR ADDITIONAL DETAILS.
3. RESTRAINED JOINT PIPE MAY BE USED IN LIEU OF THRUST BLOCKING AND TIE-RODS INDICATED, AS APPLICABLE.
4. RESTRAINED JOINT METHOD 'A': RESTRAINT JOINT PIPE AND FITTINGS.
5. RESTRAINED JOINT METHOD 'B': ONE (1) OF THE FOLLOWING DUAL (2) INDEPENDENT RESTRAINTS:
   A. MEGA-LUGS PLUS THRUST BLOCKING.
   B. MEGA-LUGS PLUS RODDING.

FULTON COUNTY STANDARD DETAIL 615

ROUND CONNECTION DETAIL

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

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DRAWING NO.
615

615-S.dwg December 08, 2025 - 10:16am

DWG. NO.	DESCRIPTION
700	INDEX AND GENERAL NOTES
701	GREASE / SOLIDS / OIL INTERCEPTOR FOUR TANKS IN SERIES
702	SINGLE TANKS
703	TRASH COMPACTOR AND DUMPSTER PAD DETAILS
704	SANITARY SEWER EASEMENT
705	STANDARD STRUCTURAL PLATE PIPE CULVERT
706	DETAIL OF OPTIONAL STEEL PIER
707	SEWER SERVICE CONNECTION TO NEW AND EXISTING SANITARY SEWER
709	CLEANOUT DETAIL
709A	SANITARY SEWER CLEANOUT BOX & LID FOR RESIDENTIAL DRIVEWAYS AND SIDEWALKS
710	WATERSTOP COLLAR
711	SEWER LATERAL INSTALLATION DETAILS FOR CURBED STREETS
712	STORM DRAIN LINE CROSSING ABOVE EXISTING SANITARY SEWER PIPE
713	DOGHOUSE MANHOLE DETAIL
714	FORCE MAIN CONNECTION DETAIL AT CLEANOUT
715	TYPICAL IN-LINE FLUSHING CONNECTION - LOW PRESSURE SEWER SYSTEM
716	TYPICAL END-OF-LINE FLUSHING CONNECTION - LOW PRESSURE SEWER SYSTEM
717	TYPICAL SERVICE CROSS SECTION - LOW PRESSURE SEWER SYSTEM
718	TYPICAL SERVICE CROSS SECTION - UTILITY LOCATION - LOW PRESSURE SEWER SYSTEM
719	TYPICAL DROP CONNECTION - LOW PRESSURE SEWER SYSTEM IN MANHOLE

NOTES:

1. HDPE AND PVC PIPES TO BE USED WITH WASTEWATER APPLICATIONS ONLY.
2. DUCTILE IRON PIPES MAY BE USED FOR WASTEWATER APPLICATIONS ONLY WITH SPECIFIC APPROVAL BY THE FCPW.
3. MINIMUM THICKNESS FOR HDPE PIPES SHALL BE DR 17.
4. FOR SEWER INSTALLATIONS WITH NO LIVE LOAD AND NOT ALONG STREAM BANKS, THE STANDARD PIPE SHALL BE DR 26 PVC OR HDPE DR 17 IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 48-INCH WITH MAXIMUM BURY DEPTH OF 20 FEET
5. FOR SEWER INSTALLATIONS WITH HS20/25 LIVE LOADS, OR WITH BURY DEPTH GREATER THAN 20 FEET AND NOT ALONG STREAM BANKS, THE STANDARD PIPE SHALL BE DR 18 PVC OR HDPE DR17 IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 30-INCH.
6. FOR FORCE MAINS, REGARDLESS OF BURY DEPTH, LIVE LOAD REQUIREMENTS AND NOT ALONG RIVERBANKS, THE STANDARD PIPE SHALL BE HDPE DR 11 IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 30-INCH.
7. FOR SEWER INSTALLATIONS WITH NO LIVE LOADS AND LOCATED ALONG STREAM BANKS, THE STANDARD PIPE SHALL BE DR 17 HDPE IN DUCTILE IRON PIPE SIZE (DIPS) FOR PIPE SIZES 8-INCH THROUGH 48-INCH AND MAXIMUM BURY DEPTH OF 20 FEET.
8. ALL SEWER LINES, WATER LINES, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.
9. ALL HDPE AND PVC PIPE SHALL BE IN DUCTILE IRON PIPE SIZE (DIPS)

700-S.dwg December 10, 2025 - 12:54pm

FULTON COUNTY STANDARD DETAIL 700

INDEX AND GENERAL NOTES

DATE	REVISIONS	DATE	REVISIONS

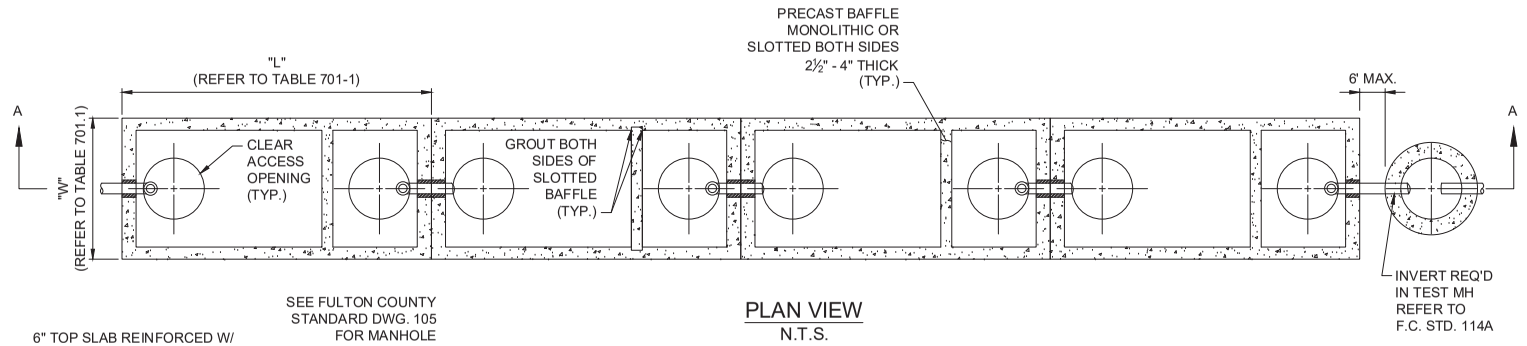
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

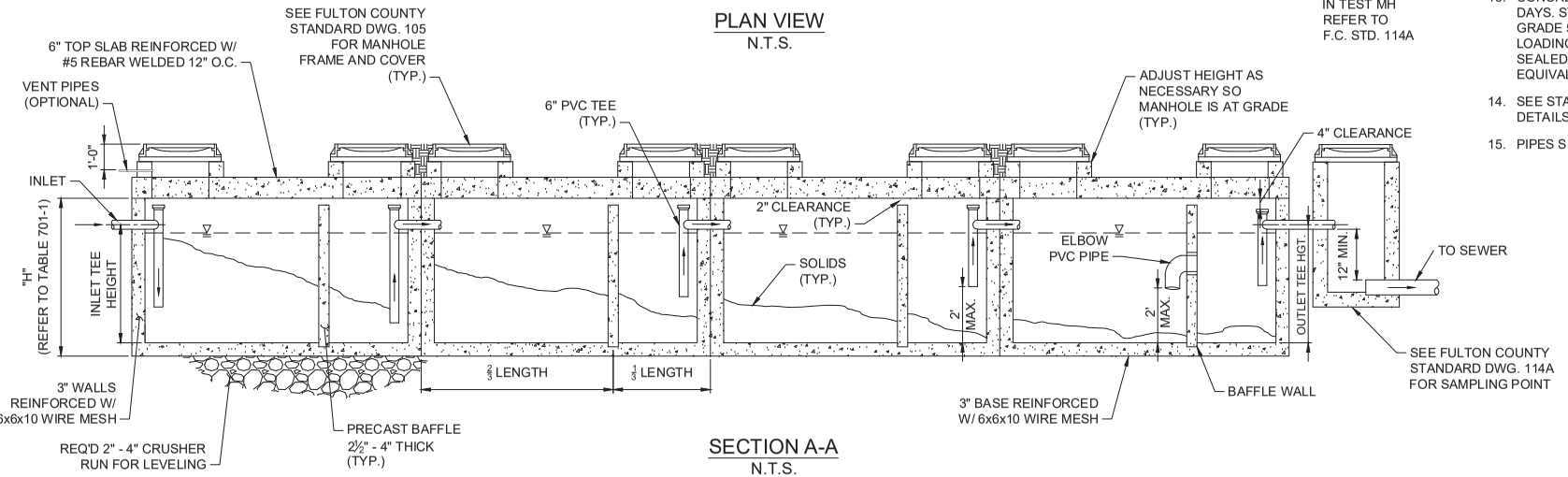
FULTON COUNTY PUBLIC WORKS
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DRAWING NO.
700

TABLE 701-1					
GALLON CAPACITY	*OUTSIDE DIMENSIONS			INLET TEE HGT.	OUTLET TEE HGT.
	LENGTH, "L"	WIDTH, "W"	HEIGHT, "H"		
1000	8'-6"	5'-8"	4'-11"	4'-4"	4'-2"
1500	11'-1 ½"	5'-7"	5'-6"	4'-11"	4'-8"
2000	13'-0"	7'-0"	5'-6"	4'-9"	4'-6"
2500	13'-0"	7'-0"	6'-6"	5'-9"	5'-6"
*DIMENSIONS OF PREFAB CONCRETE TANKS MAY VARY BASED ON MANUFACTURER, HOWEVER THE GALLON CAPACITY MUST BE EQUIVALENT TO THE TANK SIZE SPECIFIED FOR INSTALLATION.					



PLAN VIEW
N.T.S.



SECTION A-A
N.T.S.

NOTES:

1. ANY ALTERNATIVE PRETREATMENT SYSTEMS SHALL BE APPROVED BY WATER AND POLLUTION CONTROL SYSTEM PRIOR TO INSTALLATION
2. USE CONCRETE PREFAB TANKS.
3. NO INTERCEPTOR SHALL BE LESS THAN 1,000 GALLONS WHERE SEATING IS LESS THAN 50 AND NO SINGLE CHAMBER INTERCEPTOR SHALL BE GREATER THAN 3000 GALLONS.
4. FOR RESTAURANTS USE MINIMUM ONE 1515 GALLON TANK PER 100 SEATS.
5. MULTI-CHAMBERED TANKS SHALL BE CONNECTED BY 6" HDPE OR PVC PIPE.
6. SAMPLING MANHOLE SHALL BE INSTALLED UNLESS EXCLUDED BY W&PC.
7. ALL MANHOLES MUST ADJUST TO GRADE.
8. DISTANCE BETWEEN MULTIPLE TANKS NO GREATER THAN 12".
9. TEST MANHOLE NO GREATER THAN 6 FEET AFTER PRETREATMENT SYSTEM.
10. MULTIPLE TANKS MUST BE PLACED IN TANDEM (SINGLE LINE).
11. ALL PRETREATMENT SYSTEMS ARE REQUIRED TO BE INSPECTED PRIOR TO BACKFILLING CONTACT PUBLIC WORKS COMMERCIAL TREATMENT.
12. FINAL INSPECTIONS ARE REQUIRED ON ALL PRETREATMENT SYSTEMS PRIOR TO USE.
13. CONCRETE MINIMUM STRENGTH 4000 PSI AT 28 DAYS. STEEL REINFORCEMENT ASTM-A-515.75, GRADE 50, ONE INCH COVER MINIMUM DESIGN LOADING AASHO HS20-44. CONSTRUCTION JOINT SEALED WITH ONE INCH DIA. BUTYL RUBBER OR EQUIVALENT.
14. SEE STANDARD DWG 702 FOR BAFFLE WALL DETAILS.
15. PIPES SHALL BE DR26 PVC.

FULTON COUNTY STANDARD DETAIL 701

GREASE/SOLIDS/OIL INTERCEPTOR FOUR TANKS IN SERIES

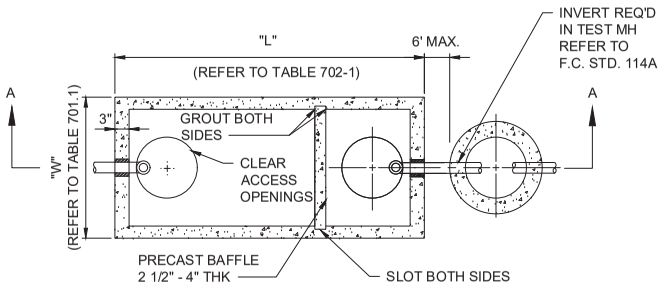
DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

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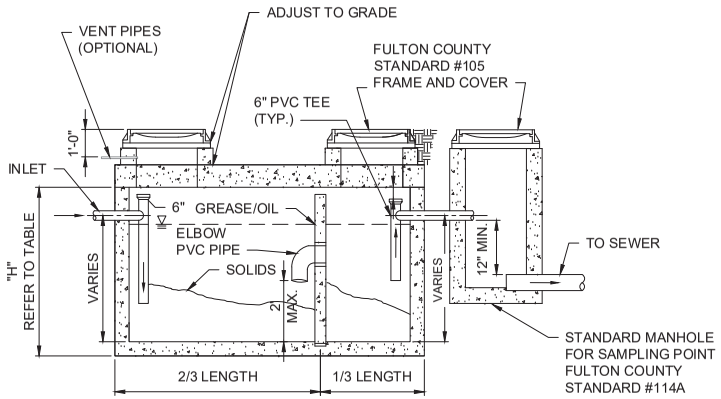
DRAWING NO.
701

701-S.dwg December 08, 2025 - 9:40am

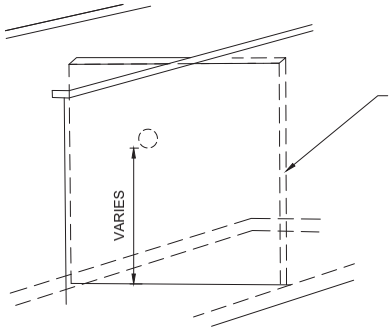


PLAN VIEW
N.T.S.

TABLE 701-1					
GALLON CAPACITY	*OUTSIDE DIMENSIONS			INLET TEE HGT.	OUTLET TEE HGT.
	LENGTH,	WIDTH	HEIGHT	VARIES BASED ON TANK SIZE	
3000	15'-7"	9'-7"	8'- 6.5"	5' - 2"	5'-0"
1500	11'-0"	6'-0"	4'-7"	3'-10"	4'-0"
1000	8'-6"	5'-3"	4'-6"	3'-10"	4'-0"
750	7'-0"	4'-8"	4'-6"	3'-10"	4'-0"
*DIMENSIONS OF PREFAB CONCRETE TANKS MAY VARY BASED ON MANUFACTURER, HOWEVER THE GALLON CAPACITY MUST BE EQUIVALENT TO THE TANK SIZE SPECIFIED FOR INSTALLATION.					



SECTION A-A
N.T.S.



BAFFLE STANDS 50" IN HEIGHT AND IS 2 1/2" IN THICKNESS REINFORCED W/ 6-6-10 WIRE MESH

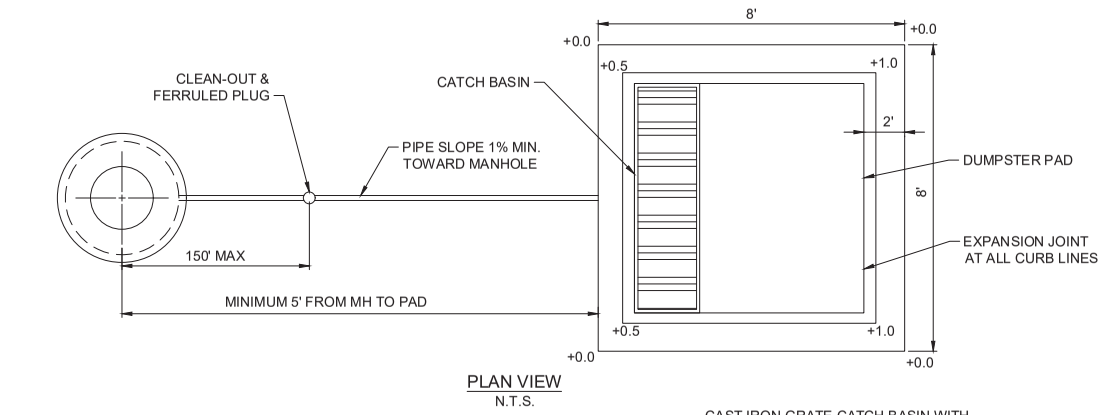
PIPE DIAMETER MAY VARY STANDARD 3" - 5" PVC PIPE REQ'D ON WALL WITH ELBOW TURNED DOWN MAX. 2' OFF TANK BOTTOM

* BAFFLE WALL OPTIONAL ON SINGLE TANK INSTALLATIONS.

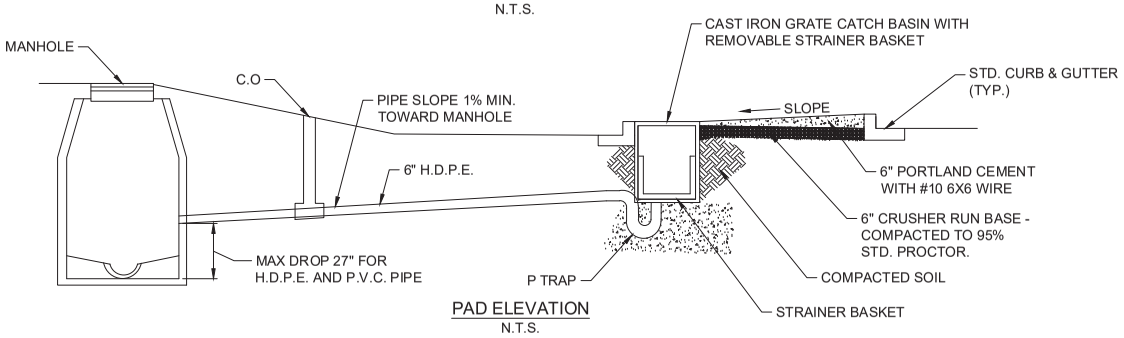
BAFFLE WALL *
N.T.S.

		DATE	REVISIONS	DATE	REVISIONS			
FULTON COUNTY STANDARD DETAIL 702 SINGLE TANKS						DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 702

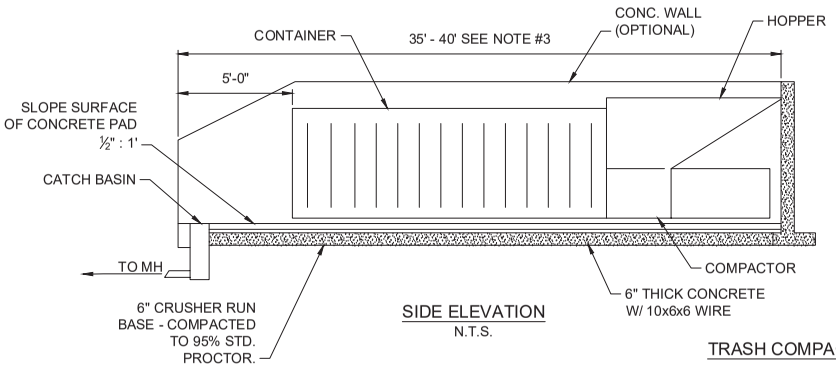
702-S.dwg December 08, 2025 - 9:40am



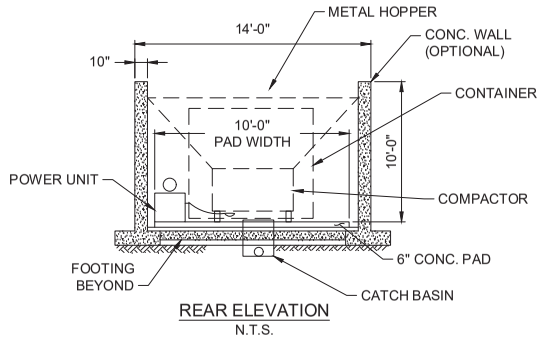
PLAN VIEW
N.T.S.



PAD ELEVATION
N.T.S.



SIDE ELEVATION
N.T.S.



REAR ELEVATION
N.T.S.

TRASH COMPACTOR

NOTE:

1. WATER BIBB REQUIRED WITHIN 50' OF PAD FOR CLEANSING.
2. APPROVAL FROM HEALTH DEPT. REQUIRED.
3. COMPACTOR PAD TO BE 10' - 0" WIDE AND A LENGTH OF 5' - 0" GREATER THAN THE COMBINED LENGTH OF THE COMPACTOR AND CONTAINER.
4. RUBBER BOOT REQUIRED FOR P.V.C. PIPE, (MANHOLE CONNECTOR) WATER BIBB TO HAVE BACK FLOW PREVENTER.
5. DO NOT CONNECT DRAIN TO GREASE TRAP. SURFACE WATER RUNOFF MUST BE SLOPED AWAY FROM PAD.
6. DO NOT ALLOW STORM WATER RUNOFF ON PAD.
7. 4.5 FOOT CHAIN LINK FENCE WITH 3-4 FOOT ACCESS GATE IS REQUIRED AROUND ALL COMPACTORS AND HOPPERS.
8. UNLESS OTHERWISE APPROVED, TRASH COMPACTOR AND DUMPSTER DRAIN TO HAVE A DEDICATED LINE TO MANHOLE.
9. ENCLOSURE IS REQUIRED. MATERIAL BASED ON PLAN DESIGN.
10. DIP ONLY ALLOW AS AUTHORIZED BY FULTON COUNTY FOR LATERAL ON A CASE BY CASE BASIS.

FULTON COUNTY STANDARD DETAIL 703

TRASH COMPACTOR AND DUMPSTER PAD DETAILS

DATE	REVISIONS	DATE	REVISIONS

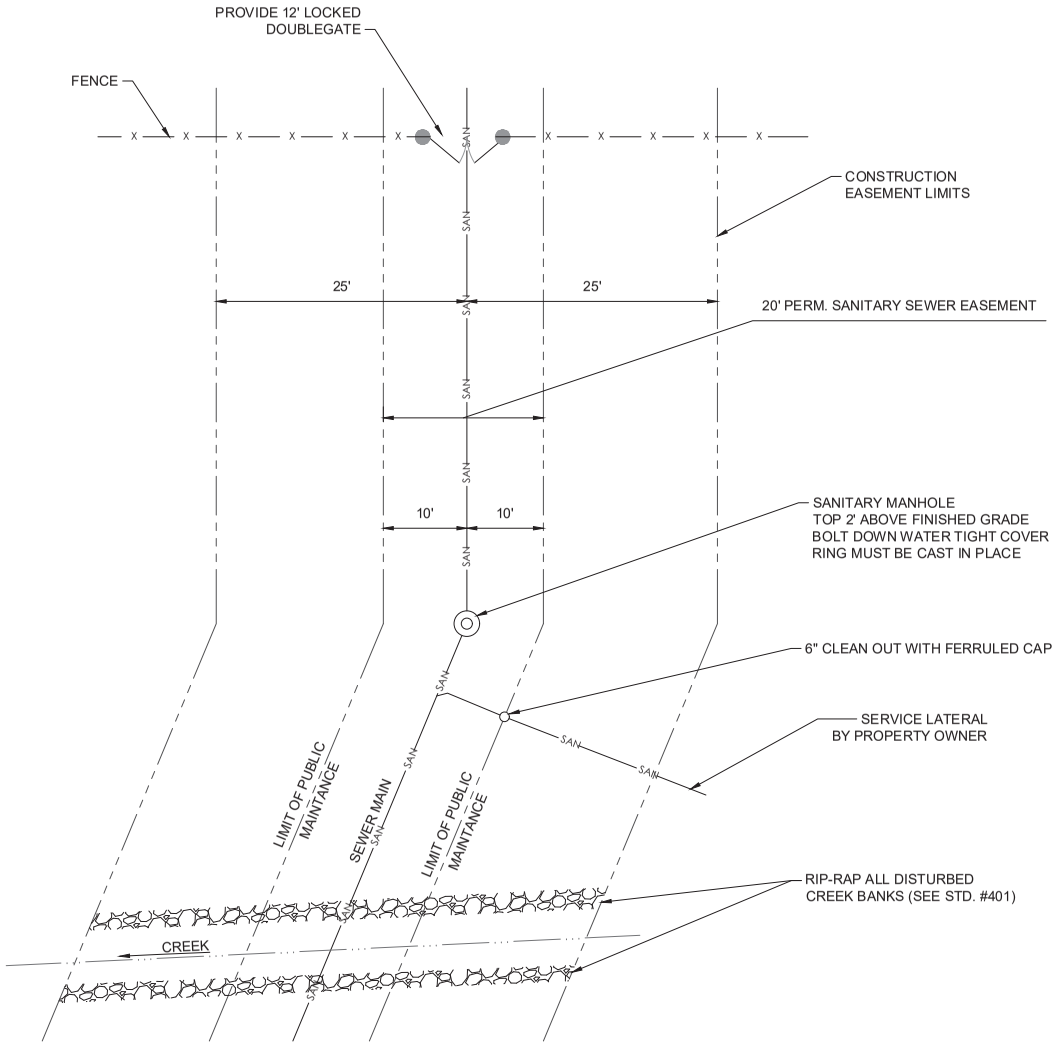
DGS/DRN/CHKD: MB/EB/ML
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DRAWING NO.
703

703-S.dwg December 08, 2025 - 11:44am



NOTES:

1. NO POOLS STRUCTURES DECKS, BRIDGES OR PATIOS MAY BE PLACED IN THE PERM.EASEMENT.
2. CLEAR ALL TREES IN PERM EASEMENT AND MAINTAIN CLEARANCE.
3. RESEED, FERTILIZE AND MULCH ALL DISTURBED AREAS PER EROSION CONTROL STANDARDS, MAINTAIN1% SLOPE DRAINAGE.
4. NO PERMANENT STRUCTURES INSIDE PERMANENT EASEMENT.
5. NO BURY PITS ALLOWED IN EASEMENT.
6. GATES REQUIRED FOR FENCES CROSSING SEWER LINES AT ALL SEWER EASEMENTS.

FULTON COUNTY STANDARD DETAIL 704 SANITARY SEWER EASEMENT		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 704

704-S.dwg December 08, 2025 - 9:40am

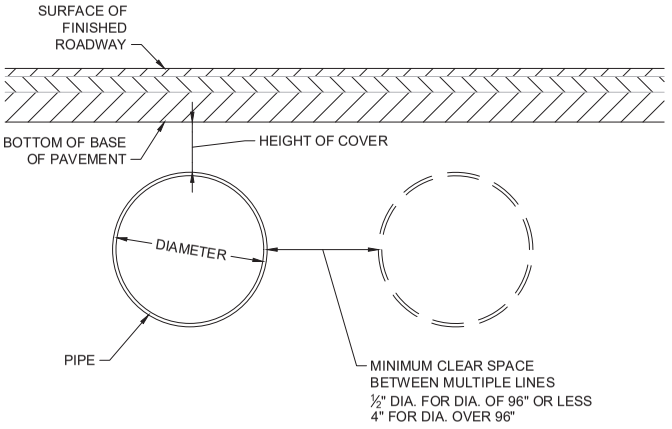
MINIMUM HEIGHT OF COVER

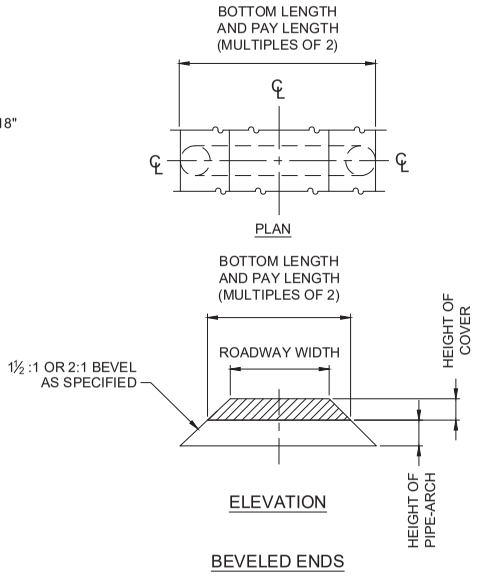
UNPAVED AND FLEXIBLE PAVEMENTS

⅓ DIA. FOR 72" DIA. TO 120" DIA.
NOT LESS THAN 24" FOR 120" DIA. AND OVER

RIGID PAVEMENTS

FOR 72" DIA. TO 120" DIA. - ½ DIA.
BUT NOT LESS THAN 12"
FOR 120" DIA. AND OVER - NOT LESS THAN 18"

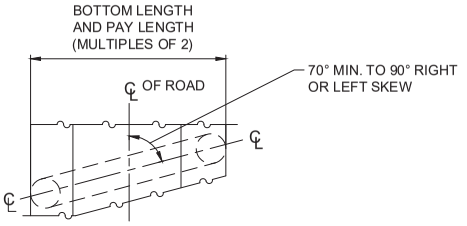


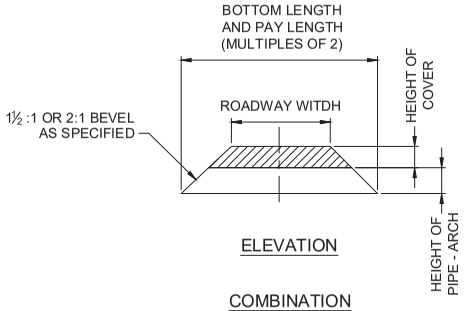


BEVELED ENDS

NOTES:

1. SPECIFICATIONS - GEORGIA STANDARD
2. DESIGN DATA - H-20 LIVE LOAD
3. GAUGES SHOWN ARE MINIMAL STRUCTURAL REQUIREMENTS FOR USE WITH ADEQUATE BACKFILL.
4. FOR END FINISH, SHAPE OR CONDITION OTHER THAN SHOWN, SEE SPECIAL DESIGN.
5. GAUGES SHOWN IN TABLE 705-1 ARE FOR STRUCTURAL PLATE PIPE ASSEMBLED WITH 4 BOLTS PER FOOT OF LONGITUDINAL SEAM AND VERTICALLY ELONGATED 5% BY SHOP FORMING, EXCEPT AS NOTED IN NOTE 6.
6. BEYOND HEIGHTS OF COVER FOR 4 BOLTS AND TO HEIGHTS OF COVER SHOWN FOR 6 BOLTS, NO.1 GAUGE STRUCTURAL PLATE PIPE WITH 6 BOLTS PER FOOT OF LONGITUDINAL SEAM AND VERTICALLY ELONGATED 3% BY SHOP FORMING SHALL BE USED.
7. ONLY R.C.P. ALLOWED UNDER COUNTY ROADS.





COMBINATION
SKEWED & BEVELED ENDS

TABLE 705 - 1

AREA SQ.FT.	DIA. INCHES	HEIGHT OF COVER (FEET)																	
		1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 70	71 - 80	81 - 90	91 - 100	1 GAUGE 6 BOLTS
		MINIMUM THICKNESS U.S. STD. GAUGE - 4 BOLTS																
28	72							12	12	10	10	8	8	7	5	3	1	165'
33	78						12	12	10	10	8	8	8	5	3	1		150'
38	84					12	12	12	10	10	8	8	7	5	3	1		140'
44	90	12	12	12	12	12	12	10	10	8	8	7	5	3	1			130'
50	96	12	12	12	12	12	10	10	10	8	7	7	5	3	1			125'
57	102	12	12	12	12	10	10	10	8	8	7	5	5	1				115'
64	108	12	12	12	10	10	10	10	8	7	5	5	3	1				110'
71	114	10	12	10	10	10	10	8	8	7	5	5	3	1				105'
79	120	10	12	10	10	10	10	8	7	5	5	3	1					100'
87	126	10	12	10	10	10	10	8	7	5	3	3	1					95'
95	132	10	10	10	10	10	8	8	7	5	3	1	1					90'
104	138	10	10	10	10	10	8	7	5	3	3	1						85'
113	144	10	10	10	10	8	8	7	5	3	1	1						80'
123	150	10	10	10	8	8	8	7	5	3	1							80'
133	156	10	10	10	8	8	8	5	3	1	1							75'
145	162	10	10	10	8	8	7	5	3	1								70'
154	168	10	10	10	8	8	7	5	3	1								70'
165	174	8	10	8	8	8	7	5	3	1								65'
177	180	8	10	8	8	8	5	3	1									65'

FOR STRUCTURES IN THIS ZONE, SEE NOTE 6.

705-S.dwg December 08, 2025 - 9:40am

FULTON COUNTY STANDARD DETAIL 705

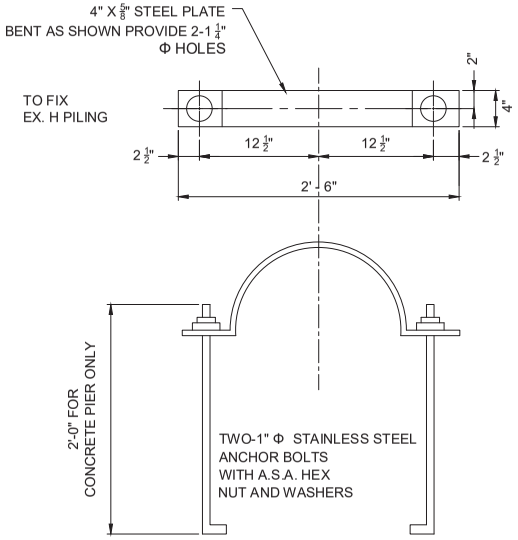
STANDARD STRUCTURAL PLATE PIPE CULVERT

DATE	REVISIONS	DATE	REVISIONS

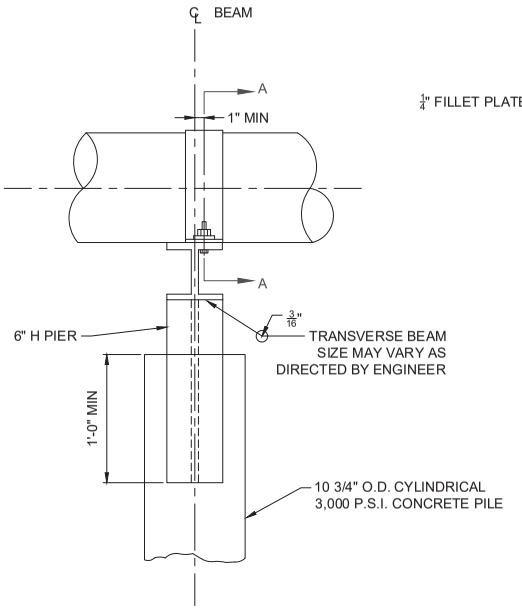
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

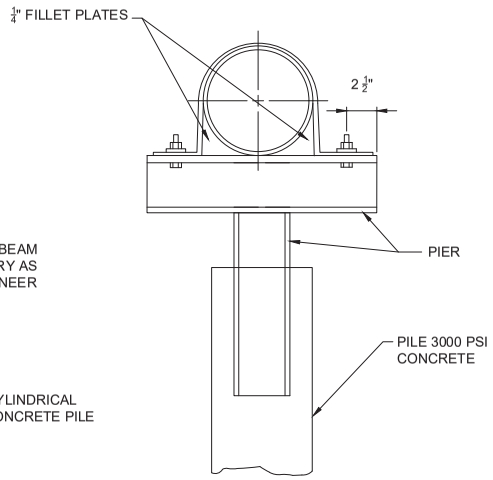
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO. 705



DETAIL OF CLAMP
N.T.S.

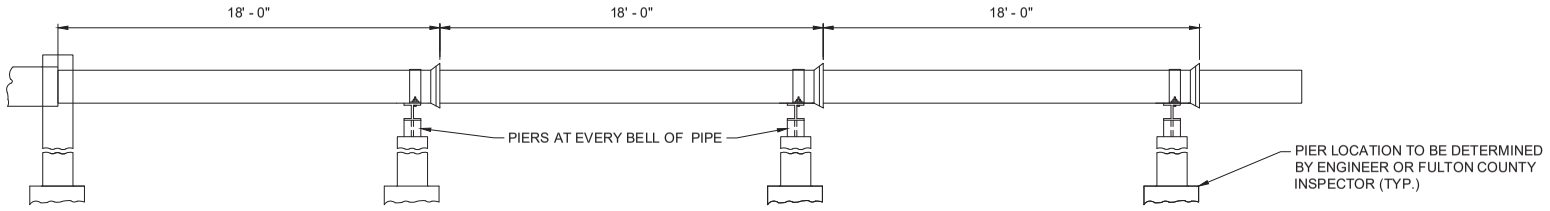




SECTION A-A
N.T.S.

NOTE:

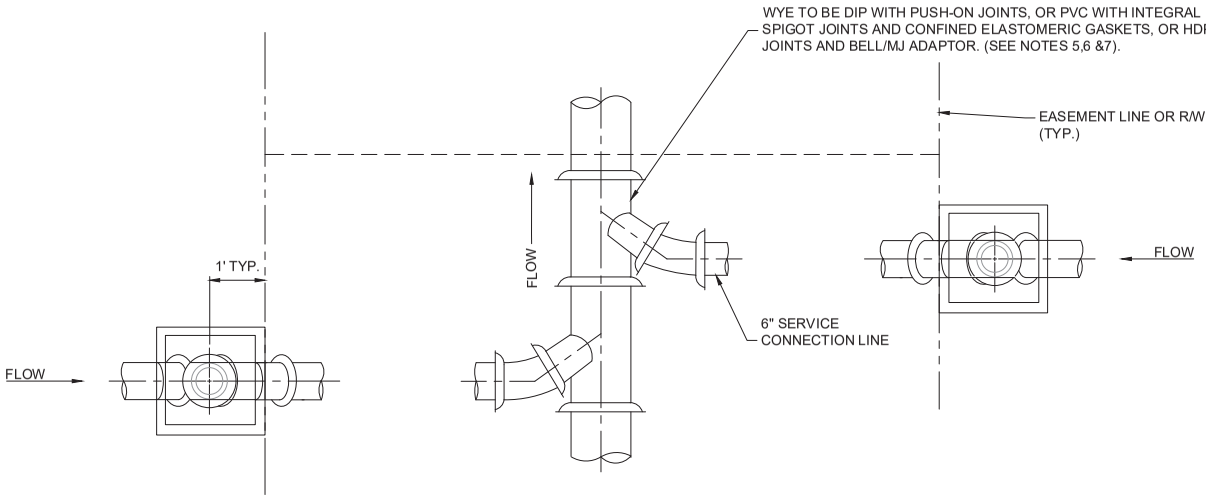
1. ENGINEER TO SUBMIT DESIGN.
2. PILE TO BE DRIVEN TO REFUSAL OR 10 TON BEARING MIN., THEN FILLED WITH 3000 P.S.I. CONCRETE. TRANSVERSE BEAM TO BE WELDED TO PIER BEFORE SETTING CONCRETE.



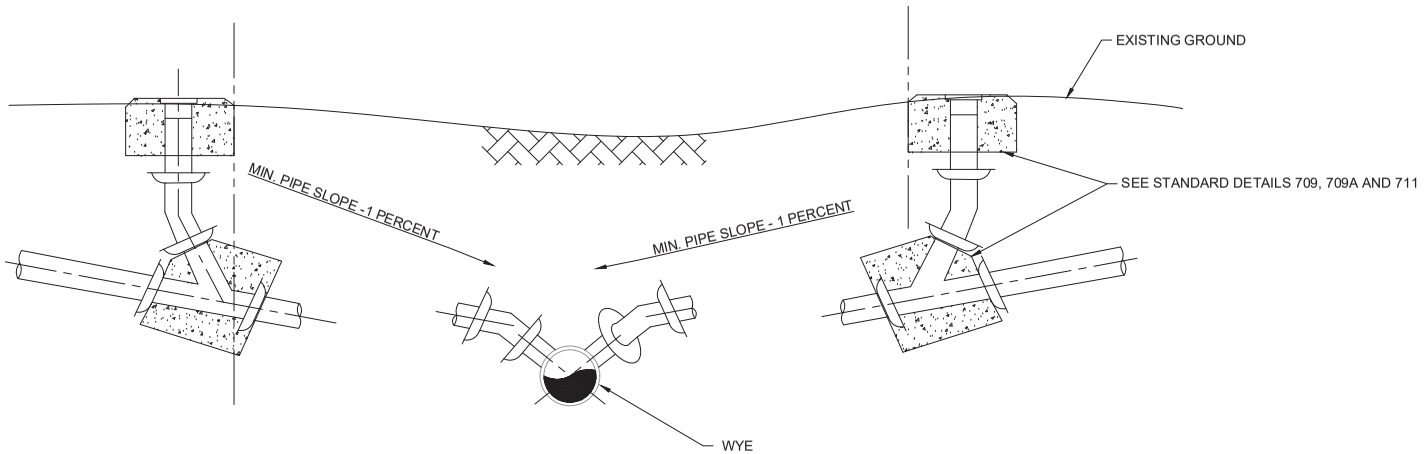
DETAIL OF OPTIONAL STEEL PIER
N.T.S.

FULTON COUNTY STANDARD DETAIL 706 DETAIL OF OPTIONAL STEEL PIER		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 706

706-S.dwg December 08, 2025 - 9:40am



PLAN
N.T.S.



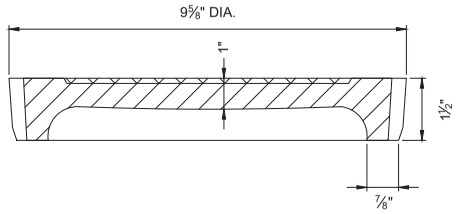
ELEVATION
N.T.S.

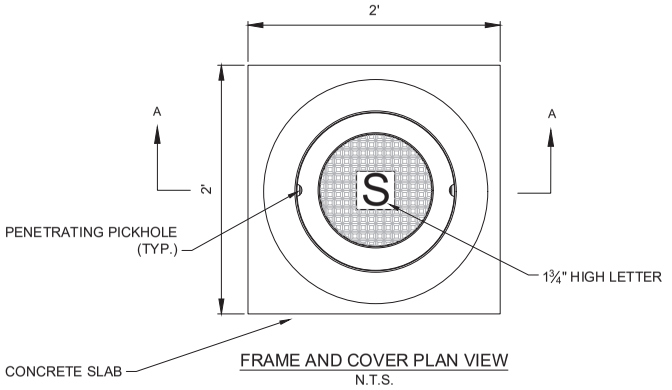
NOTES:

1. CONNECTIONS TO NEW SEWER SHALL BE WITH A WYE.
2. NO TEES WILL BE ALLOWED.
3. NO WYE CONNECTION WILL BE ALLOWED ON EXISTING SEWERS LARGER THAN 12". LATERALS MAY ONLY BE CONNECTED AT AN EXISTING OR NEW MANHOLE.
4. ALL CONNECTIONS TO EXISTING SEWERS SHALL BE MADE WITH A WYE.
5. WHERE SERVICE LINE CROSSES STATE HWY R/W, DI PIPE AND FITTINGS SHALL BE MJ JOINTS, HDPE PIPE AND FITTINGS SHALL BE PROVIDED WITH BELL/MJ ADAPTOR JOINED TO THE PLAIN END BY BUTT FUSION. TRENCHES SHALL BE BACKFILLED WITH CRUSHED STONE.
6. HDPE SERVICE LINE CROSSING STATE HWY R/W SHALL BE ENCASED IN STEEL CASING. REFER TO STANDARD DETAIL 107 FOR STEEL CASING REQUIREMENTS.
7. THE USE OF PVC IS ONLY ALLOWED IN LANSCAPE AREA.
8. DIP ONLY ALLOW AS AUTHORIZED BY FULTON COUNTY FOR LATERAL WITHIN PAVEMENT ON A CASE BY CASE BASIS.

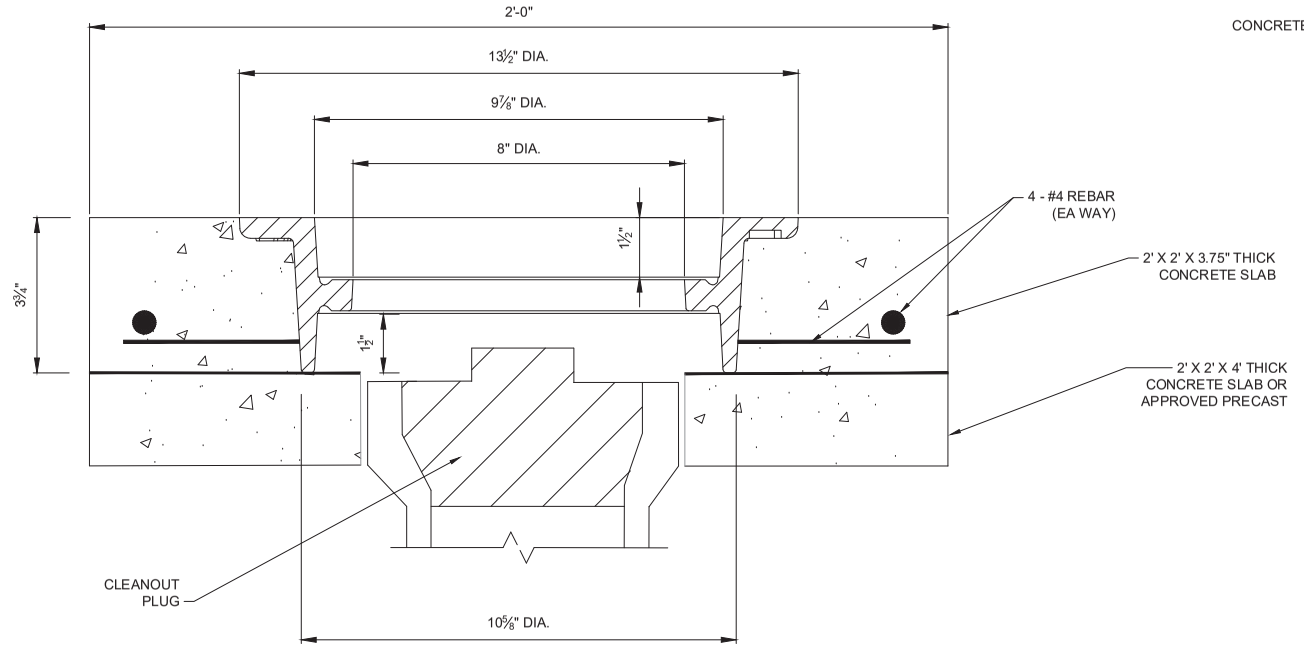
FULTON COUNTY STANDARD DETAIL 707 SEWER SERVICE CONNECTION TO NEW AND EXISTING SANITARY SEWER		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 707

707-S.dwg December 08, 2025 - 9:40am





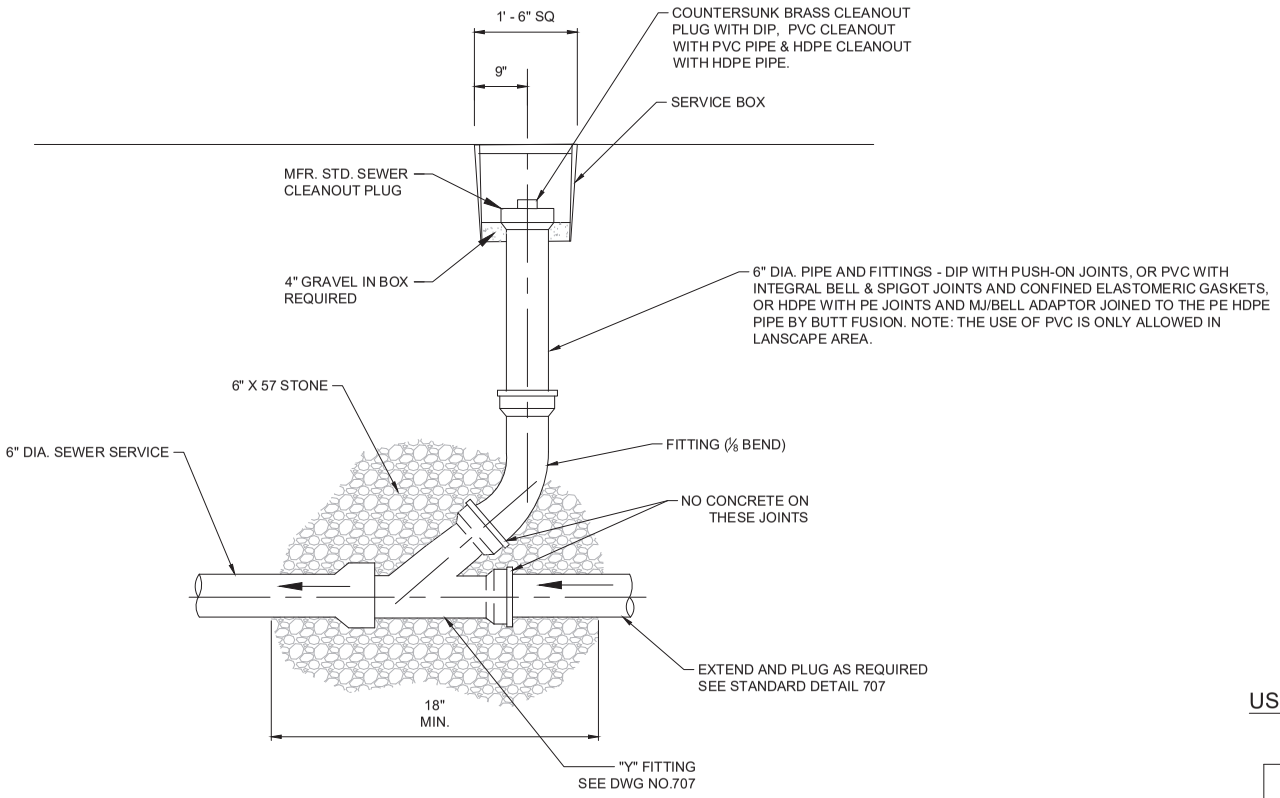
FRAME AND COVER PLAN VIEW
N.T.S.



SECTION A-A
N.T.S.

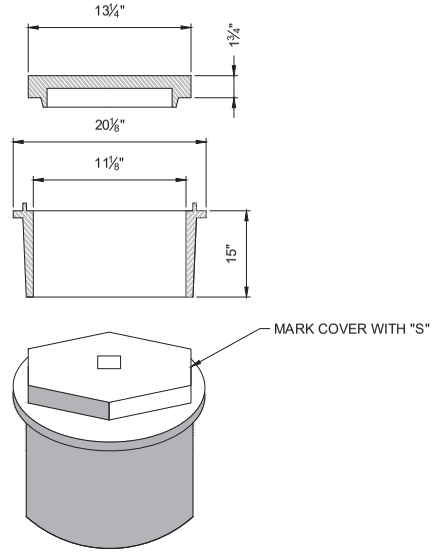
FULTON COUNTY STANDARD DETAIL 709A SANITARY SEWER CLEANOUT BOX & LID FOR RESIDENTIAL DRIVEWAYS AND SIDEWALKS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 709A

709A.dwg December 08, 2025 - 9:40am



NOTES:

1. TOP OF SERVICE BOX SHALL BE FLUSH WITH FINAL SURFACE IN SIDEWALKS AND PAVED AREAS.
2. HEAVY DUTY CLEANOUT BOX AND LID ARE REQUIRED IN PAVED AREAS.
3. CLEANOUTS IN PAVED AREA ARE TO BE 6-INCH DUCTILE IRON PIPE.
4. DIP ONLY ALLOW AS AUTHORIZED BY FULTON COUNTY FOR LATERAL WITHIN PAVEMENT ON A CASE BY CASE BASIS.
5. PLUG TO BE REMOVED BY THE PLUMBER UPON CONNECTION OF BUILDING SYSTEM TO PUBLIC SYSTEM.



USF 7635 SEWER VALVE BOX AND COVER

N.T.S.

TABLE 709 - 1			
COVER TYPE	LOAD RATING	COVER WEIGHT	TOTAL WEIGHT
FJ	HEAVY DUTY	55	230

FULTON COUNTY STANDARD DETAIL 709

CLEANOUT DETAIL

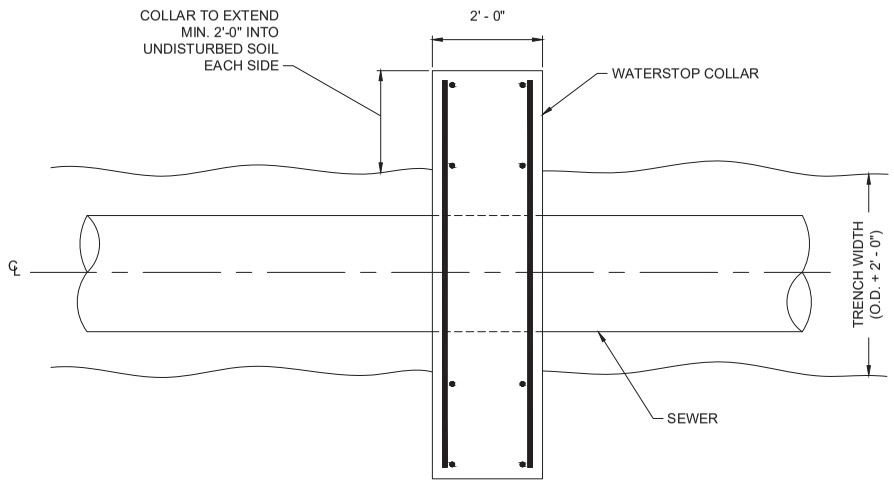
DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

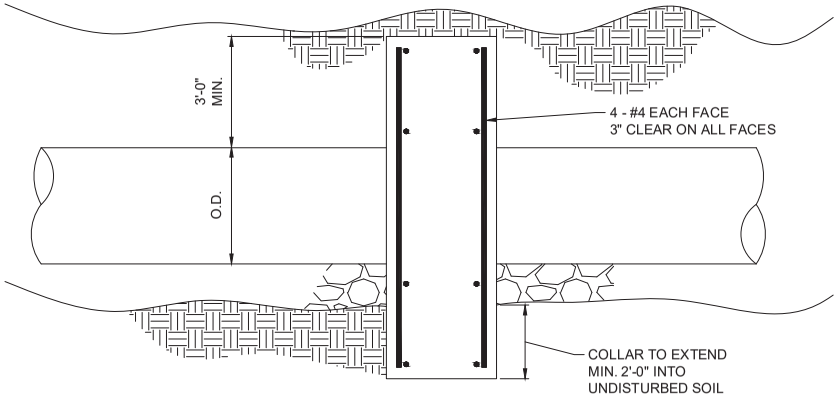
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO. 709

709-S.dwg December 08, 2025 - 9:40am



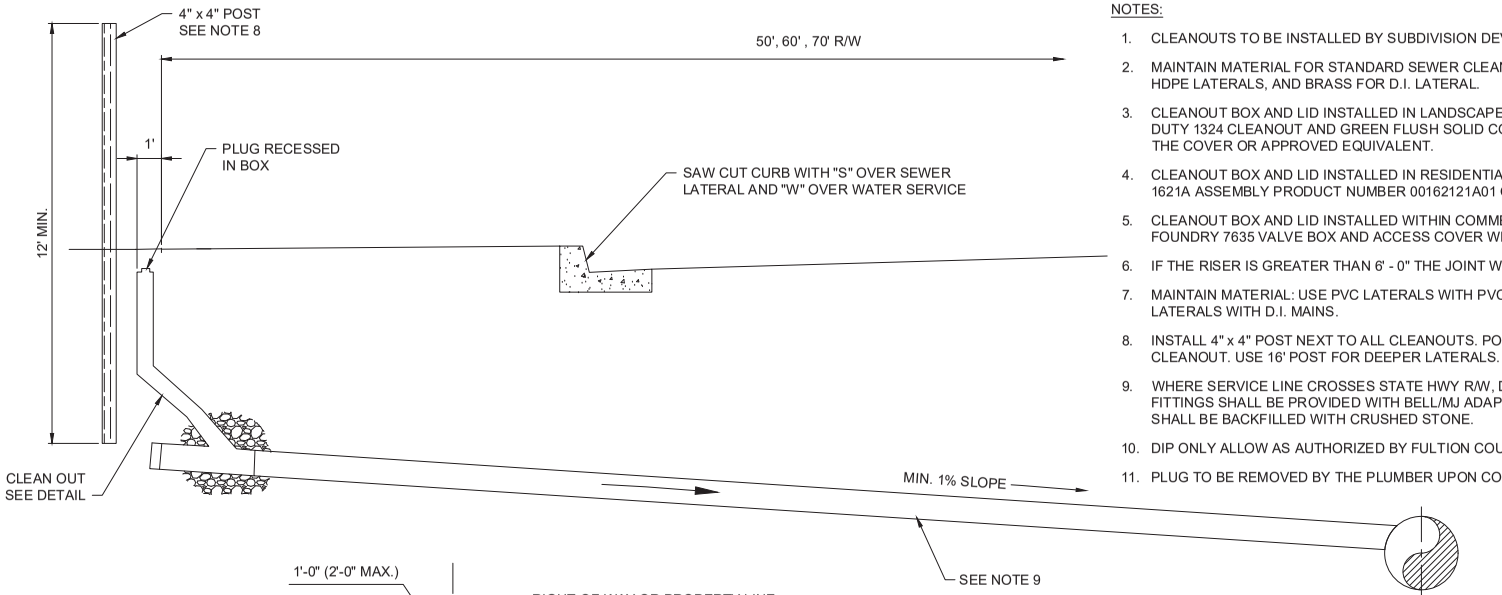
PLAN



SECTION

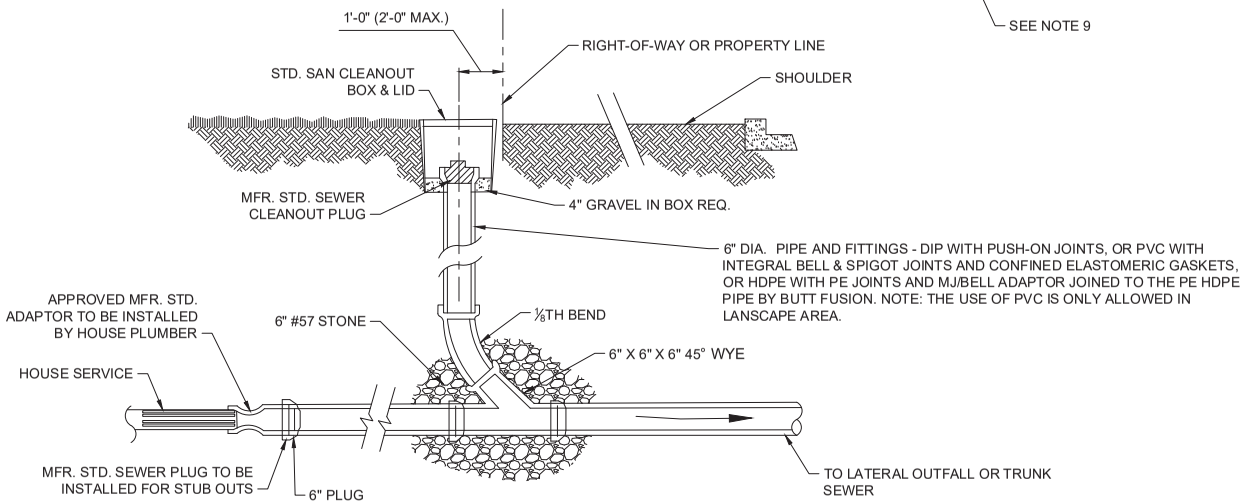
FULTON COUNTY STANDARD DETAIL 710 WATERSTOP COLLAR		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 710

710-S.dwg December 08, 2025 - 9:41am



NOTES:

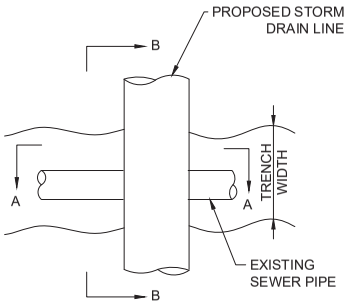
1. CLEANOUTS TO BE INSTALLED BY SUBDIVISION DEVELOPER.
2. MAINTAIN MATERIAL FOR STANDARD SEWER CLEANOUT PLUG. PLUGS TO BE PVC FOR PVC LATERALS, HDPE FOR HDPE LATERALS, AND BRASS FOR D.I. LATERAL.
3. CLEANOUT BOX AND LID INSTALLED IN LANDSCAPE AREAS TO BE OLDCASTLE GREEN FLUSH HDPE 13" X 24" LIGHT DUTY 1324 CLEANOUT AND GREEN FLUSH SOLID COVER WITH FULTON COUNTY LOGO AND "SEWER CLEANOUT" ON THE COVER OR APPROVED EQUIVALENT.
4. CLEANOUT BOX AND LID INSTALLED IN RESIDENTIAL DRIVEWAYS AND ALL SIDEWALKS TO BE EJ GROUP, INC. 1621Z 1621A ASSEMBLY PRODUCT NUMBER 00162121A01 OR APPROVED EQUIVALENT.
5. CLEANOUT BOX AND LID INSTALLED WITHIN COMMERCIAL PAVEMENT OR WITHIN THE STREET PAVEMENT TO BE US FOUNDRY 7635 VALVE BOX AND ACCESS COVER WITH COVER TYPE FU OR APPROVED EQUIVALENT.
6. IF THE RISER IS GREATER THAN 6' - 0" THE JOINT WILL BE ENCASED IN 6" OF 1:3.5 CONCRETE.
7. MAINTAIN MATERIAL: USE PVC LATERALS WITH PVC MAINS, USE HDPE LATERALS WITH HDPE MAINS, AND USE D.I. LATERALS WITH D.I. MAINS.
8. INSTALL 4" x 4" POST NEXT TO ALL CLEANOUTS. POST TO BE MIN. 12' LONG FOR PLUMBER TO DETERMINE DEPTH OF CLEANOUT. USE 16' POST FOR DEEPER LATERALS.
9. WHERE SERVICE LINE CROSSES STATE HWY R/W, DI PIPE AND FITTINGS SHALL BE MJ JOINTS, HDPE PIPE AND FITTINGS SHALL BE PROVIDED WITH BELL/MJ ADAPTOR JOINED TO THE PLAIN END BY BUTT FUSION. TRENCHES SHALL BE BACKFILLED WITH CRUSHED STONE.
10. DIP ONLY ALLOW AS AUTHORIZED BY FULTION COUNTY FOR LATERAL WITHIN PAVEMENT ON A CASE BY CASE BASIS
11. PLUG TO BE REMOVED BY THE PLUMBER UPON CONNECTION OF BUILDING SYSTEM TO PUBLIC SYSTEM.



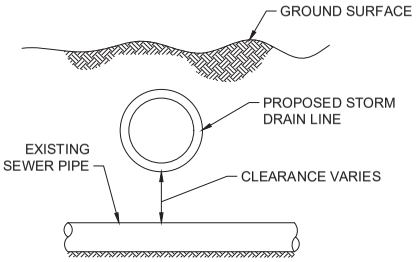
CLEANOUT DETAIL
N.T.S.

FULTON COUNTY STANDARD DETAIL 711 SEWER LATERAL INSTALLATION DETAILS FOR CURBED STREETS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 711

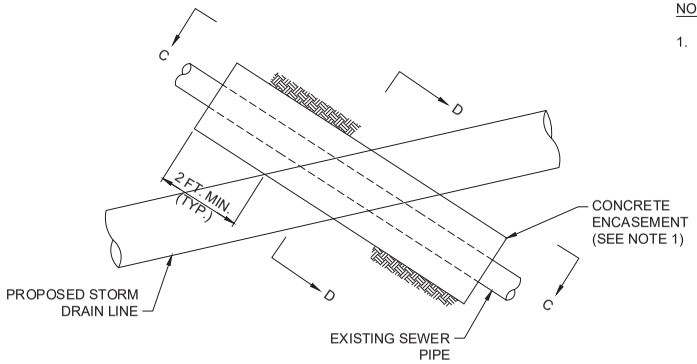
711-S.dwg December 08, 2025 - 9:41am



PLAN



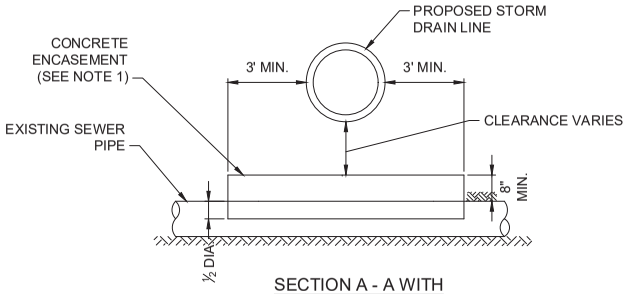
SECTION A - A



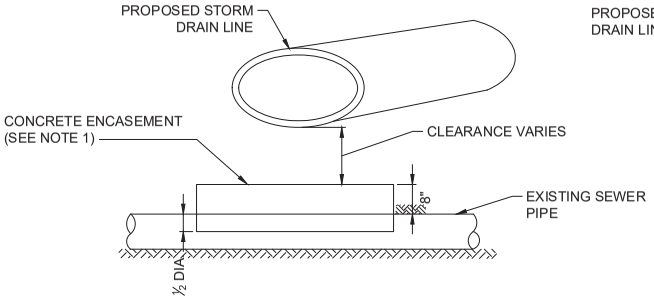
PLAN

NOTES:

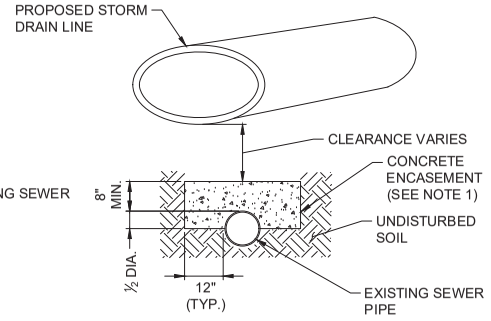
1. FOR ALL EXISTING SEWER PIPES, IF CLEARANCE BETWEEN THE STORM AND SEWER IS LESS THAN, OR EQUAL TO, 24 INCHES, THE EXISTING SEWER PIPE SHALL BE PROTECTED BY CONCRETE ENCASEMENT.



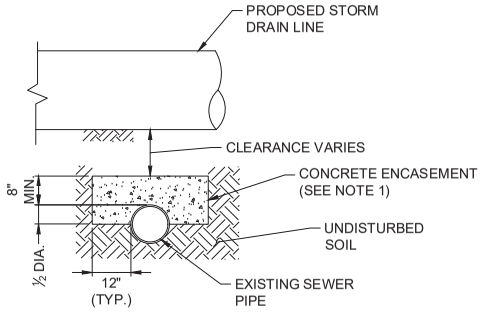
SECTION A - A WITH CONCRETE ENCASEMENT



SECTION C - C



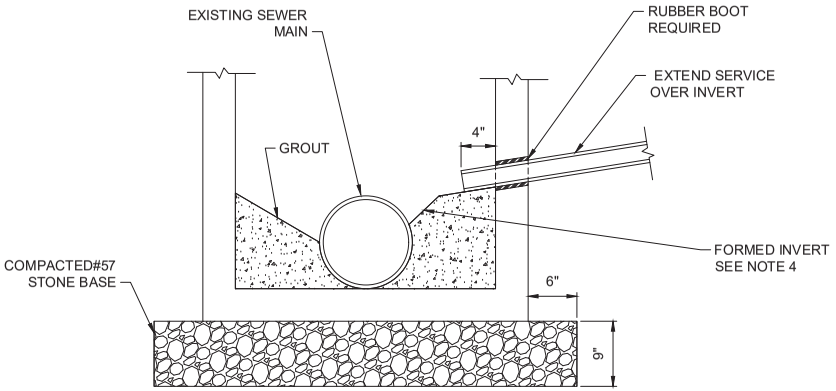
SECTION D - D



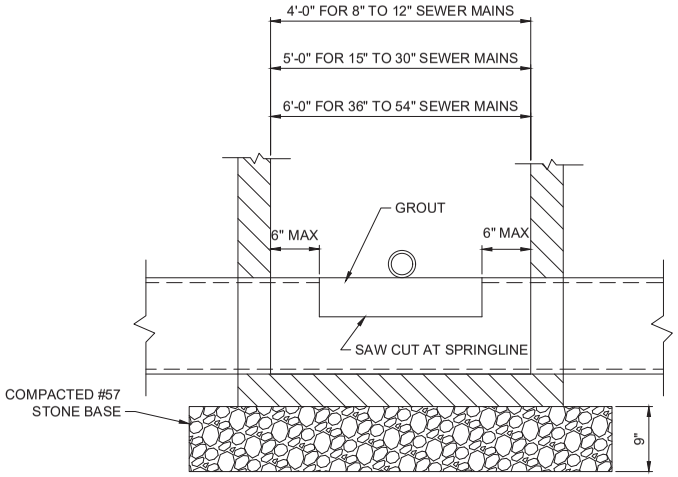
SECTION B - B WITH CONCRETE ENCASEMENT

FULTON COUNTY STANDARD DETAIL 601 STORM DRAIN LINE CROSSING ABOVE EXISTING SANITARY SEWER PIPE		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 712

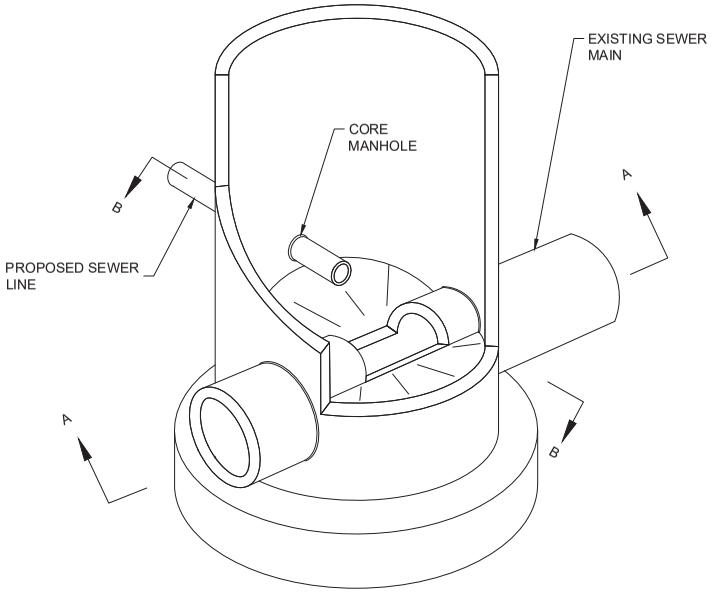
712-S.dwg December 08, 2025 - 9:41am



CROSS SECTION AT EXISTING SEWER MAIN (B-B)



SECTION ALONG CENTERLINE OF EXISTING SEWER MAIN (A-A)



NOTES:

1. FLOW SHALL BE MAINTAINED DURING DOGHOUSE MANHOLE CONSTRUCTION.
2. MANHOLE PAD TO REST UPON A MINIMUM OF 9" COMPACTED #57 STONE BASE.
3. REFER TO STANDARD DETAILS 113,114A THROUGH F, AND 115 FOR ADDITIONAL DETAILS OF MANHOLE.
4. A FORMED INVERT IS REQUIRED FROM THE NEW SERVICE TO THE EXISTING PIPE. REFER TO STANDARD DETAILS 113, 114, AND 115 FOR DETAILS OF THE INVERT.

FULTON COUNTY STANDARD DETAIL 713

DOGHOUSE MANHOLE DETAIL

DATE	REVISIONS	DATE	REVISIONS

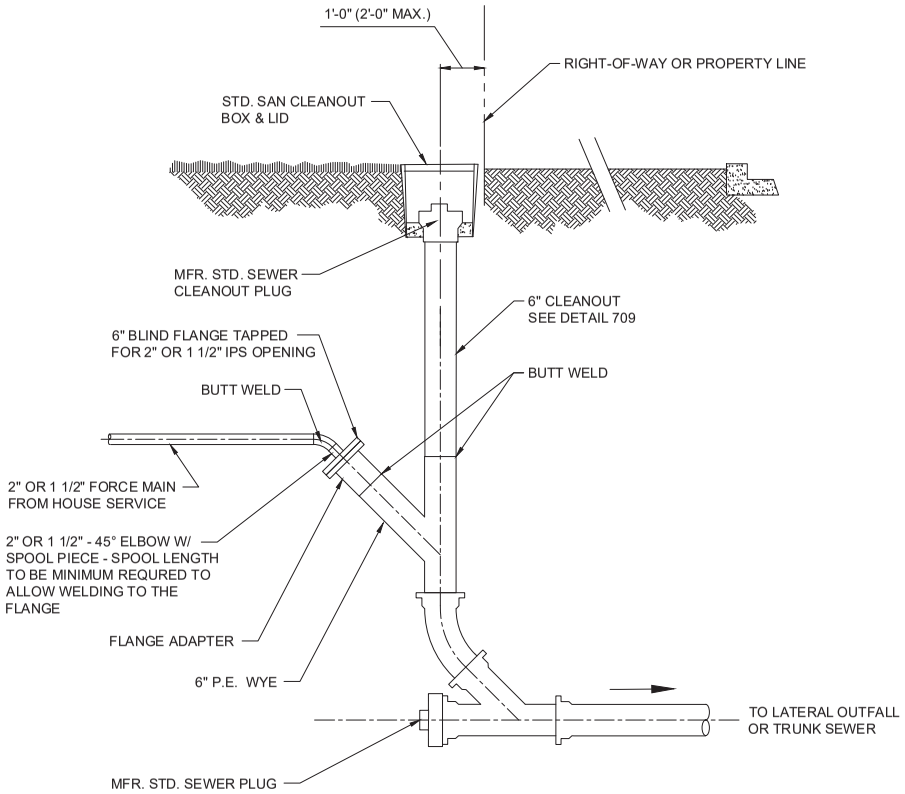
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
713

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FORCE MAIN

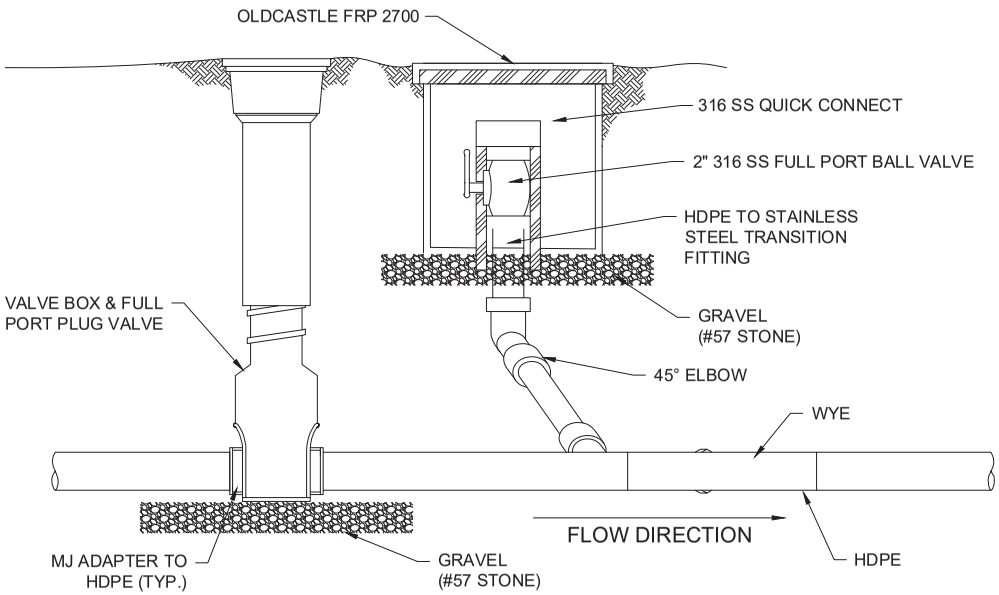
NTS

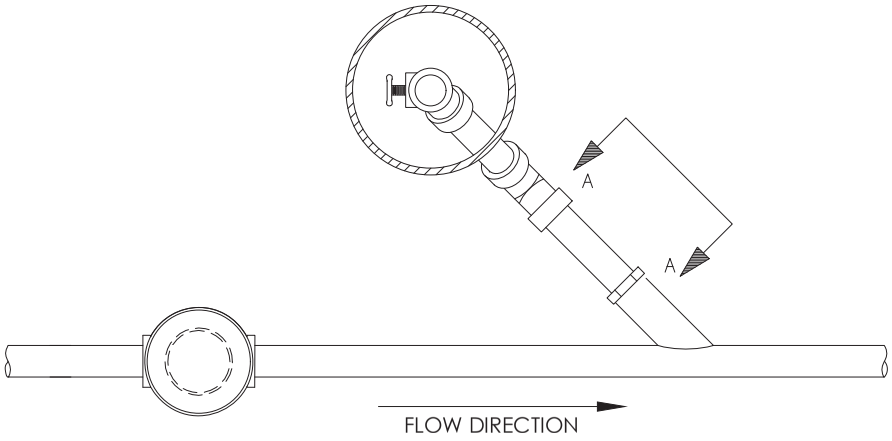
FULTON COUNTY STANDARD DETAIL 714 FORCE MAIN CONNECTION DETAIL AT CLEANOUT		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 714

714-S.dwg December 08, 2025 - 9:41am

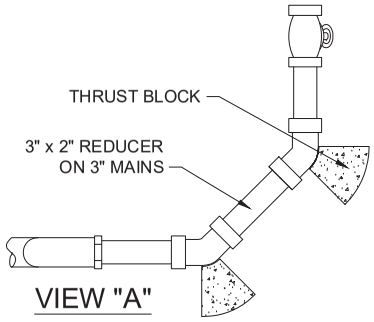
NOTES:

1. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL INSPECT TRENCH BEFORE INSTALLATION AND SUBMIT INSPECTION REPORT FOR COMPACTION OF TRENCH.
2. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL OBSERVE AND REPORT MARKING TAPE INSTALLATION.
3. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL STAMP AND SIGN ALL INSPECTION REPORTS.
4. 3M™ ELECTRONIC MARKING SYSTEM (EMS) CAUTION TAPE 7904, GREEN, 6 IN, WASTE WATER, SHALL BE INSTALLED AT A DEPTH OF 3-FEET FROM FINAL GRADE CENTERED OVER THE FORCEMAIN AND SERVICE LATERALS. THE ENCASEMENT AND MARKING TAPE SHALL BE INSTALLED ALONG THE PUBLIC SYSTEM FROM THE BACKFLOW CHECK VALVES TO DISCHARGE MANHOLE.
5. FINAL PLAT MUST SHOW AND RECORD A 15-FOOT EASEMENT TO BE DEDICATED TO FULTON COUNTY PUBLIC WORKS FOR THE COMMON LOW-PRESSURE FORCEMAIN. EASEMENT SHOULD EXTEND 7.5-FEET ON EACH SIDE OF THE COMMON FORCEMAIN CENTERLINE, AND 1-FOOT PAST THE BOX FOR THE FLUSHING CONNECTION. FULTON COUNTY MAINTENANCE RESPONSIBILITY STARTS AT THE PUBLIC MANHOLE AND ENDS 1-FOOT OUTSIDE OF THE BOX FOR THE FLUSHING CONNECTION ASSEMBLY.
6. EACH SYSTEM SHALL BE INDIVIDUALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS OR DESIGNEE.
7. ADDITIONAL CONDITIONS MAY BE ADDED TO THE SYSTEM BASED ON THE DESIGN AND TOPOGRAPHY





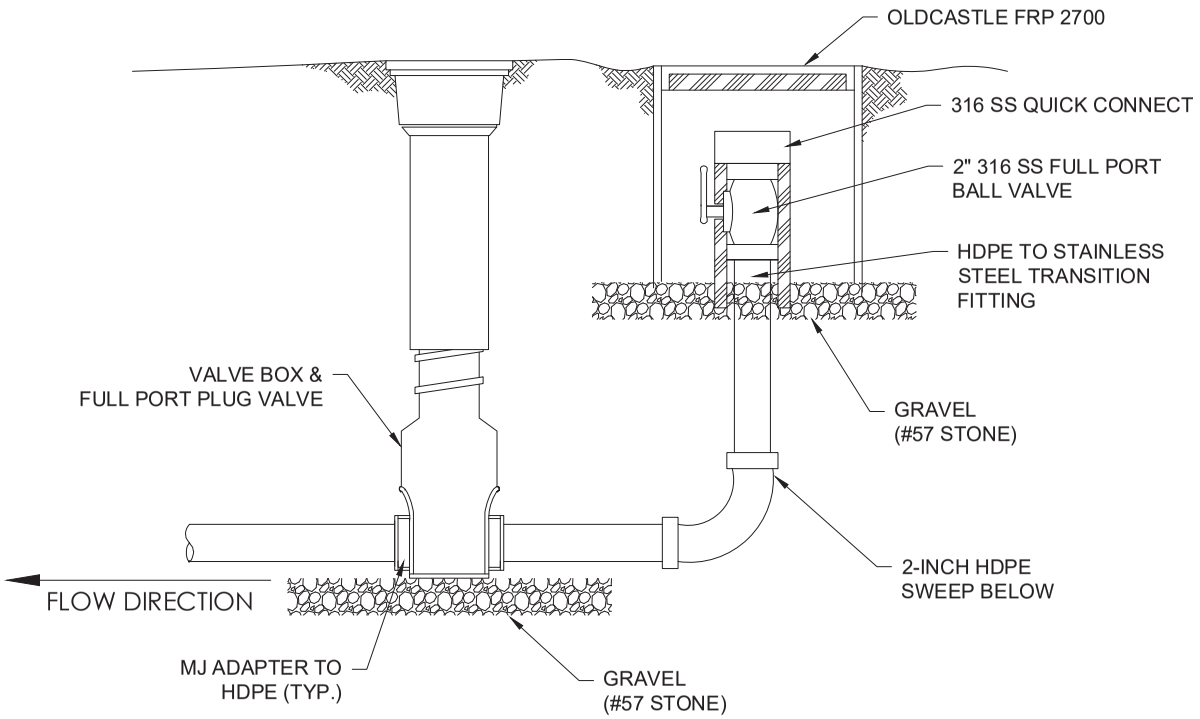
PLAN VIEW

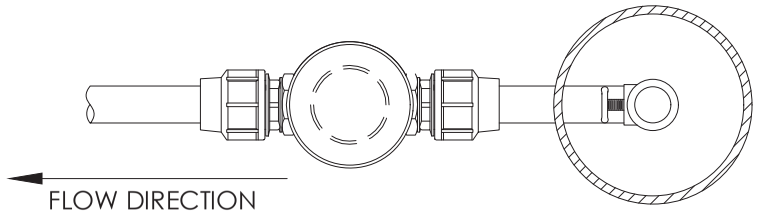


VIEW "A"

FULTON COUNTY STANDARD DETAIL 715 TYPICAL IN-LINE FLUSHING CONNECTION LOW PRESSURE SEWER SYSTEM		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: HM/HM/-- APPROVED: -- DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 715

715-S.dwg December 08, 2025 - 9:41am





PLAN VIEW

NOTES:

1. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL INSPECT TRENCH BEFORE INSTALLATION AND SUBMIT INSPECTION REPORT FOR COMPACTION OF TRENCH.
2. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL OBSERVE AND REPORT MARKING TAPE INSTALLATION.
3. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL STAMP AND SIGN ALL INSPECTION REPORTS.
4. 3M™ ELECTRONIC MARKING SYSTEM (EMS) CAUTION TAPE 7904, GREEN, 6 IN, WASTE WATER, SHALL BE INSTALLED AT A DEPTH OF 3-FEET FROM FINAL GRADE CENTERED OVER THE FORCEMAIN AND SERVICE LATERALS. THE ENCASEMENT AND MARKING TAPE SHALL BE INSTALLED ALONG THE PUBLIC SYSTEM FROM THE BACKFLOW CHECK VALVES TO DISCHARGE MANHOLE.
5. FINAL PLAT MUST SHOW AND RECORD A 15-FOOT EASEMENT TO BE DEDICATED TO FULTON COUNTY PUBLIC WORKS FOR THE COMMON LOW-PRESSURE FORCEMAIN. EASEMENT SHOULD EXTEND 7.5-FEET ON EACH SIDE OF THE COMMON FORCEMAIN CENTERLINE, AND 1-FOOT PAST THE BOX FOR THE FLUSHING CONNECTION.
6. EACH SYSTEM SHALL BE INDIVIDUALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS OR DESIGNEE.
7. ADDITIONAL CONDITIONS MAY BE ADDED TO THE SYSTEM BASED ON THE DESIGN AND TOPOGRAPHY

FULTON COUNTY STANDARD DETAIL 716

TYPICAL END-OF-LINE FLUSHING CONNECTION
LOW PRESSURE SEWER SYSTEM

DATE	REVISIONS	DATE	REVISIONS

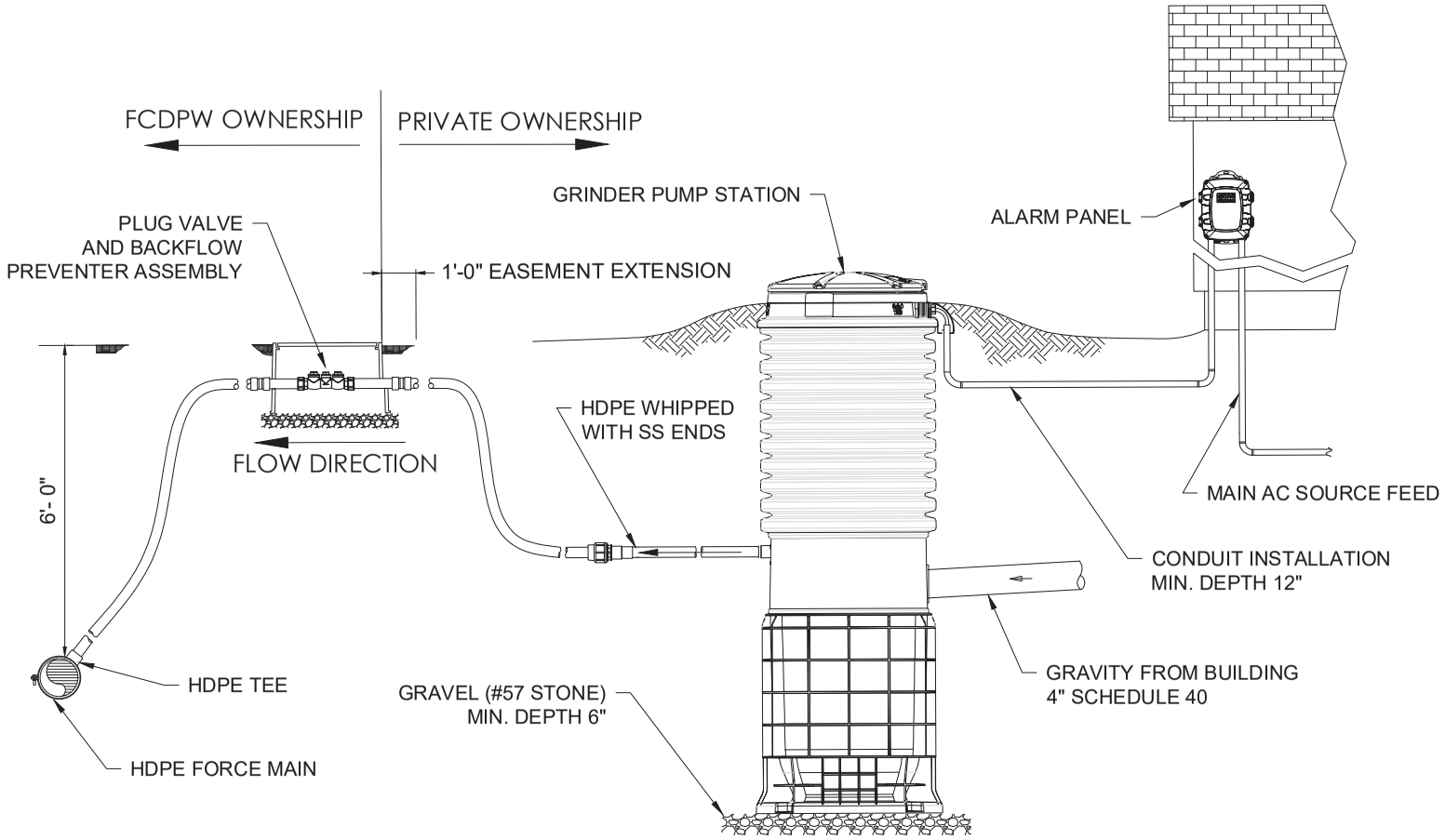
DGS/DRN/CHKD: HM/HM/KK
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
716

716-S.dwg December 10, 2025 - 5:08pm



NOTES:

1. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL INSPECT TRENCH BEFORE INSTALLATION AND SUBMIT INSPECTION REPORT FOR COMPACTION OF TRENCH.
2. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL OBSERVE AND REPORT MARKING TAPE INSTALLATION.
3. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL STAMP AND SIGN ALL INSPECTION REPORTS.
4. 3M™ ELECTRONIC MARKING SYSTEM (EMS) CAUTION TAPE 7904, GREEN, 6 IN, WASTE WATER, SHALL BE INSTALLED AT A DEPTH OF 3-FEET FROM FINAL GRADE CENTERED OVER THE FORCEMAIN AND SERVICE LATERALS. THE ENCASEMENT AND MARKING TAPE SHALL BE INSTALLED ALONG THE PUBLIC SYSTEM FROM THE BACKFLOW CHECK VALVES TO DISCHARGE MANHOLE.
5. FINAL PLAT MUST SHOW AND RECORD A 15-FOOT EASEMENT TO BE DEDICATED TO FULTON COUNTY PUBLIC WORKS FOR THE COMMON LOW-PRESSURE FORCEMAIN. EASEMENT SHOULD EXTEND 7.5-FEET ON EACH SIDE OF THE COMMON FORCEMAIN CENTERLINE. EASEMENTS SHALL ALSO EXTEND ALL THE WAY UP TO AND INCLUDE THE SERVICE CONNECTION AND VALVE BOX. THE EASEMENT SHOULD EXTEND 1-FOOT PAST THE BOX FOR THE PLUG VALVE AND BACKFLOW PREVENTER ASSEMBLY.
6. FULTON COUNTY PUBLIC WORKS WILL APPROVE THE PRIVATE LOW-PRESSURE SYSTEM PROVIDED THAT THE DEVELOPER/HOMEOWNERS ASSOCIATION (HOA) PROVIDES A SIGNED MAINTENANCE AGREEMENT WITH A QUALIFIED, LICENSED CONTRACTOR OR PLUMBER. FULTON COUNTY MAINTENANCE RESPONSIBILITY STARTS AT THE PUBLIC MANHOLE AND ENDS JUST OUTSIDE OF THE BOX FOR THE PLUG VALVE AND BACKFLOW PREVENTER ASSEMBLY.
7. EACH SYSTEM SHALL BE INDIVIDUALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS OR DESIGNEE.
8. ADDITIONAL CONDITIONS MAY BE ADDED TO THE SYSTEM BASED ON THE DESIGN AND TOPOGRAPHY.

FULTON COUNTY STANDARD DETAIL 717

TYPICAL SERVICE CROSS SECTION
LOW PRESSURE SEWER SYSTEM

DATE	REVISIONS	DATE	REVISIONS

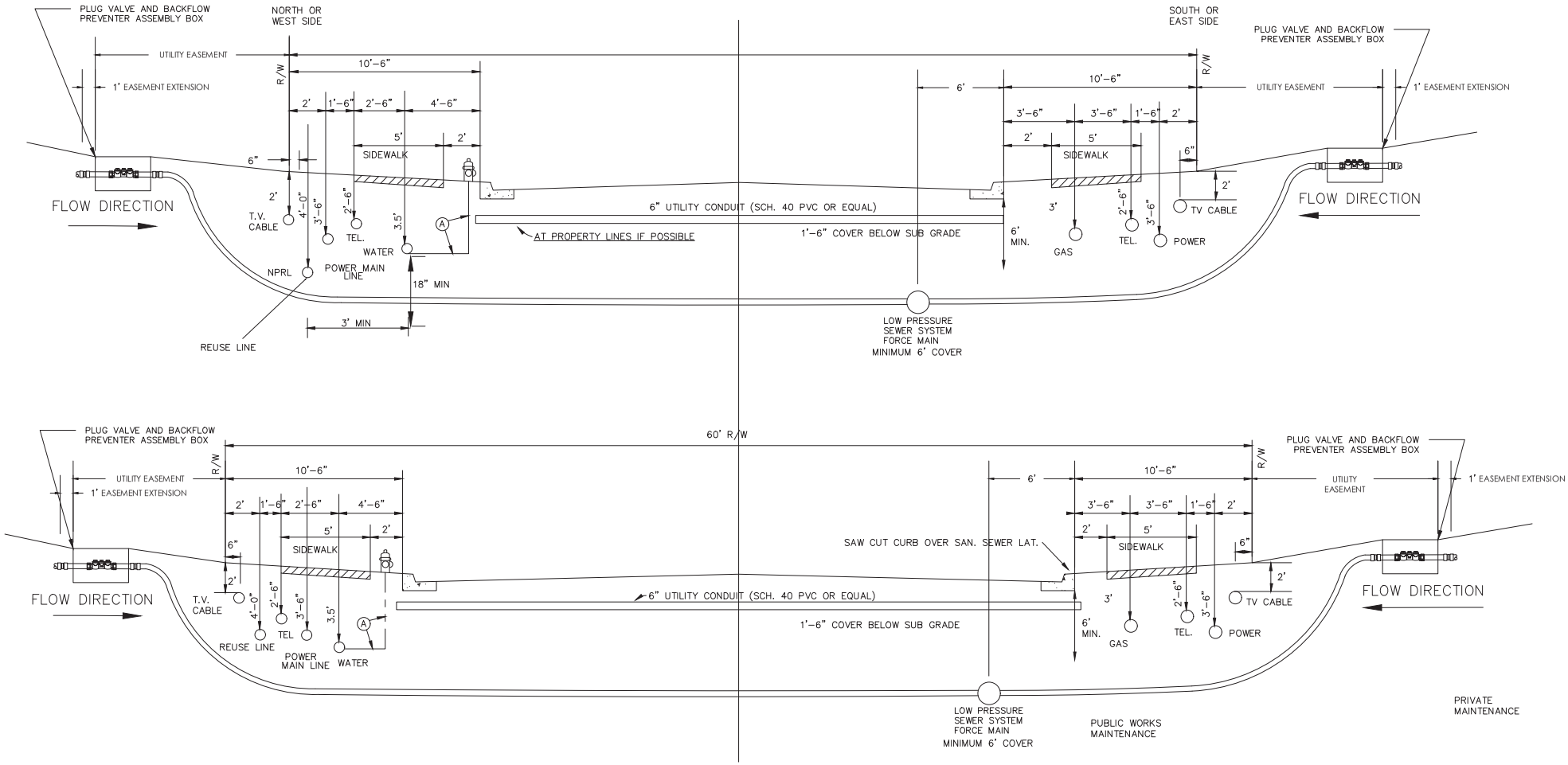
DGS/DRN/CHKD: HM/HM/KK
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

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717

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FULTON COUNTY STANDARD DETAIL 718
TYPICAL SERVICE CROSS SECTION
UTILITY LOCATION
LOW PRESSURE SEWER SYSTEM

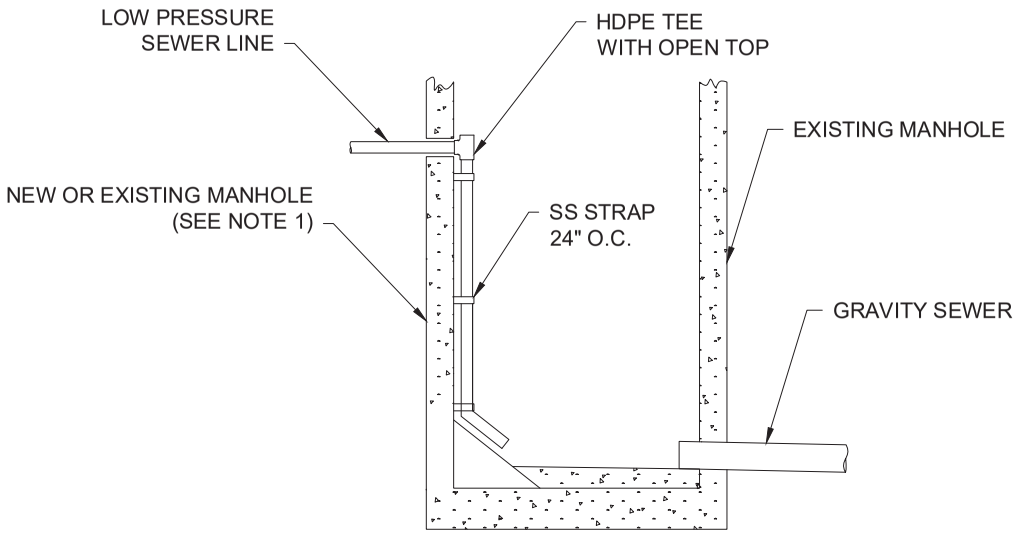
DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: HM/HM/KK
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO. 718

718-S.dwg December 10, 2025 - 5:10pm



NOTES:

1. FOR NEW MANHOLE INSTALL PER DETAIL 114-A OR 114-B STANDARD HDPE MANHOLE. FOR TIE-IN TO EXISTING MANHOLE, CORE FROM INSIDE. CORE SHALL BE AWAY FROM BARREL JOINTS.
2. EXISTING MANHOLE SHALL BE PREPARED AND LINED WITH COATING CAPABLE OF RESISTING CORROSION CAUSED BY HYDROGEN SULFIDE GASES AND OTHER CONSTITUENTS FOUND IN WASTEWATER.
3. NEW MANHOLE SHALL BE HDPE.
4. THE INSTALLED PIPE SHALL BE ALLOWED TO REST A MINIMUM OF 12 HOURS BEFORE TIE-IN TO THE DISCHARGE MANHOLE.
5. HDPE PIPE ENTERING A MANHOLE SHALL BE INSTALLED PER MANHOLE STANDARD DETAIL WITH FLEXIBLE RUBBER CONNECTOR, OR BOOT, TO NEW MANHOLE.
6. DROPS TO BE CONSTRUCTED OF SCHEDULE 80 PVC.
7. USE $\frac{1}{2}$ INCH DIAMETER EXPANSION TYPE STAINLESS STEEL CINCH BOLTS WITH STAINLESS STEEL WASHER AND NUTS TO ATTACH STRAPS.
8. MINIMUM OF THREE STRAPS REQUIRED.
9. MINIMUM SIZE OF MANHOLE WITH INSIDE DROP SHALL BE 60-INCH.

FULTON COUNTY STANDARD DETAIL 719

TYPICAL DROP CONNECTION
LOW PRESSURE SEWER SYSTEM IN MANHOLE

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: HM/HM/KK
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
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DRAWING NO.
719

719-S.dwg December 10, 2025 - 5:13pm

DWG. NO.	DESCRIPTION
800	INDEX - WATER SYSTEM DETAILS
801	5/8" & 3/4" WATER METER INSTALLATION
802	1" WATER METER INSTALLATION
803	1 1/2 " WATER METER INSTALLATION
804	2" WATER METER INSTALLATION
805	LARGE METER AND VAULT INSTALLATION
806	LARGE METER LAYOUT
807	GENERAL NOTES FOR METER INSTALLATION
808	HYDRANT LOCATION DETAIL FOR CURB & GUTTER RESIDENTIAL STREETS
809	HYDRANT LOCATION DETAIL FOR UNCURBED RESIDENTIAL STREETS
810	HYDRANT ASSEMBLY DETAIL
811	UNDERGROUND VALVE BOX
812	3/4" & 1" WATER METER INSTALLATION COPPER SERVICE
813	WATER METER MANIFOLD DETAIL FOR TOWNHOME DEVELOPMENTS
814	WATER METER LAYOUT FOR TOWNHOUSE DEVELOPMENTS WITHOUT LOTS
815	A & V RELEASE VALVE ASSEMBLY 1" OR 2"
816	WATER VALVE MARKER
817	AUTO BLOW OFF FLUSH STATION
818	WATER SAMPLING STATION
819	BACKFLOW PREVENTION ASSEMBLY (1)
820	REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY (2)
821	DOUBLE CHECK VALVE ASSEMBLY
822	FIRE LINE VAULT - TYPE 1
825	FM ASSEMBLY (FIRE SERVICE ONLY)
826	ROOT BARRIER SYSTEM

GENERAL NOTES:

1. REFERENCE TO "DEVELOPER WORK" SHALL MEAN AN ENTITY OR PERSON WHO IMPROVES RAW LAND OR REDEVELOPS EXISTING SITES. ALL ENTITIES MUST CONTRACT WITH A UTILITY CONTRACTOR FOR ANY WATER OR WASTEWATER WORK OUTSIDE OF THE PRIVATE PROPERTY LINES.
2. REFERENCE TO "COUNTY WORK" SHALL MEAN ANY WATER OR WASTEWATER SERVICES PERFORMED BY FULTON COUNTY PUBLIC WORKS OR FCPW'S STANDBY CONTRACTORS.
3. REFERENCE TO "PLUMBER WORK" SHALL MEAN ANY WATER OR WASTEWATER SERVICES PERFORMED WITHIN THE BOUNDARIES OF THE PRIVATE PROPERTY.

NOTES:

1. ALL DISTRIBUTION PIPING AND APPURTENANT MATERIALS USED IN THE FULTON COUNTY WATER SYSTEM MUST BE MADE OF DUCTILE IRON AND COMPLY IN RESPECT TO ANS/AWWAA21.111/C111-85 STANDARD SPECIFICATIONS. PLANS THAT DO NOT MEET THE SPECIFICATIONS IN ALL RESPECTS WILL NOT BE ACCEPTED. ALL LINES SHOULD BE CLASS 51 OR GREATER WHEN REQUESTED BY THE COUNTY.
2. ALL WATER LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE WATER SERVICE LINES.

FULTON COUNTY STANDARD DETAIL 800

INDEX - WATER SYSTEM DETAILS

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML

APPROVED: TM

DATE: 01-21-2026

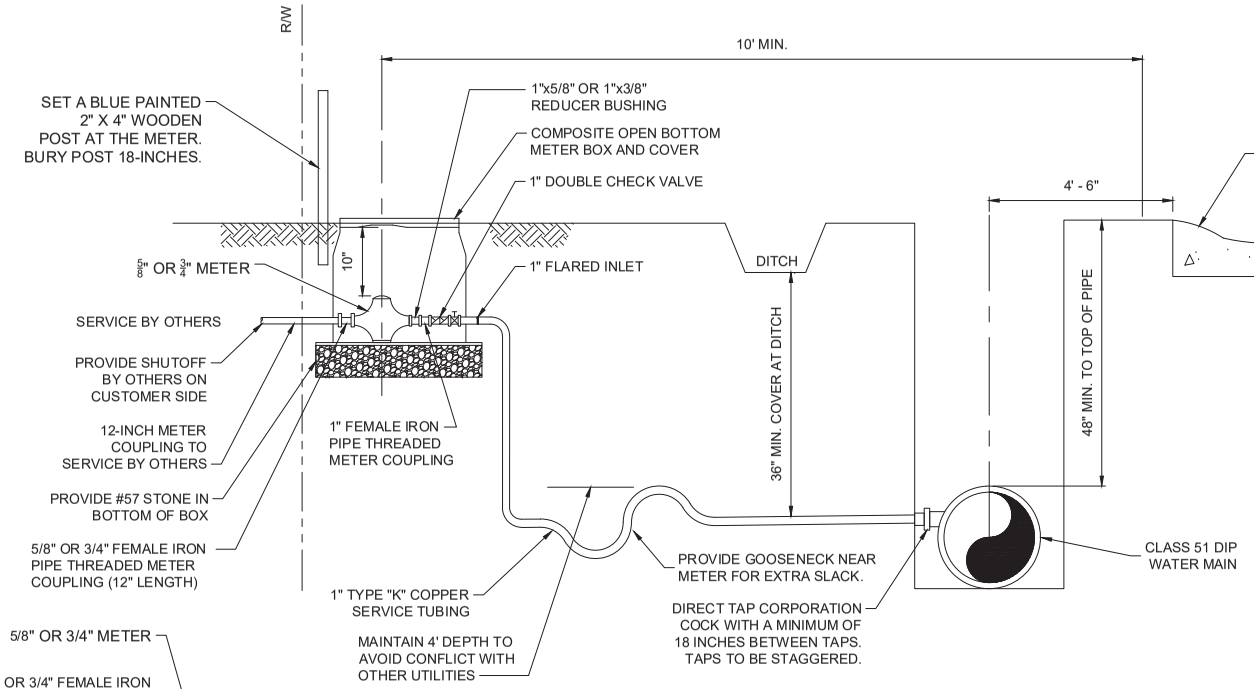
FULTON COUNTY

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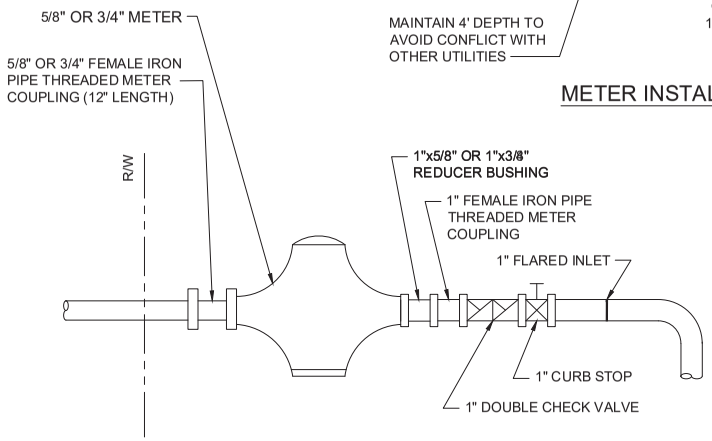
DRAWING NO.

800

800-S.dwg December 08, 2025 - 10:44am



METER INSTALLATION ELEVATION DETAIL
NTS



METER DETAIL
NTS

NOTES:

1. SERVICE LINE SHALL BE CONTINUOUS 1" TYPE "K" COPPER FROM MAIN TO METER WITHOUT ANY COUPLINGS.
2. USE ALL FLARE JOINTS UP TO CURB STOP.
3. INSTALLATION SHALL ALLOW ADEQUATE ROOM TO REMOVE AND/OR REPAIR METER.
4. NEW WATER MAIN SUBJECT TO 250 LB PRESSURE TEST FOR TWO HOURS.
5. EDGE OF METER BOX TO BE WITHIN 6" OF R/W OR ESMT. LINE. BOX TO BE OUTSIDE OF SIDEWALK.
6. THE BUILDER IS TO PROVIDE A SHUT-OFF VALVE IN A SEPARATE VALVE BOX FOR OWNER'S USE ON THE OWNER'S PROPERTY. PRIVATE SHUT OFF VALVE TO BE LOCATED WITHIN 12 INCHES OF METER BOX.
7. POLYETHELENE METER BOX SHALL HAVE NOMINAL DIMENSIONS OF 19-1/2" X 12-3/8" X 18" AND SHALL HAVE A 10,000 LB. LOAD RATING WITH A SINGLE MOUSE HOLE IN EACH END. COVER FOR METER BOX SHALL BE MODIFIED POLYETHELENE WITH "WATER METER" IN MINIMUM 1" HIGH LETTERS. LIDS SHALL HAVE OBLONG KNOCK OUT AND 1/2-INCH RECESS FOR METER ANTENNAE WITH A FERROUS MAGNET IN THE LID AND A PLASTIC LOCKING MECHANISM. THE COVERS SHALL HAVE A NON-SKID SURFACE. METER BOX AND LID SHALL BE DFW METER BOX MODEL 1219-18-1MKF DEEP. LID ONLY SHALL BE MODEL 1219-1-MKF DEEP.
8. LID FOR STRETCH YOKE BOX SHALL BE DFW MODEL 6514-1-MKF DEEP WITH OBLONG KNOCK OUT AND 1/2-INCH RECESS FOR METER ANTENNAE WITH A FERROUS MAGNET IN THE LID AND A PLASTIC LOCKING MECHANISM.
9. SHOULDERS ARE TO BE GRADED TO FINISHED GRADE PRIOR TO SETTING THE METER BOXES.
10. SERVICE SHALL HAVE 10 IN. MIN. COVER AT METER AND 48 IN. MIN. COVER BETWEEN MAIN AND METER.
11. FOR PERMITTED DEVELOPEMENT PROJECTS, SERVICE TAPS, CORPORATION STOP, SERVICE LINE, CURB STOP AND METER BOX SHALL BE FURNISHED AND INSTALLED BY DEVELOPMENT CONTRACTOR. DUAL CHECK VALVE, METER COUPLINGS AND METERS SHALL BE FURNISHED AND INSTALL BY FULTON COUNTY UPON RECEIPT OF APPLICATION FOR SERVICE AND PAYMENT OF APPROPRIATE FEES BY BUILDER / PROPERTY OWNER. FOR NEW INDIVIDUAL SERVICE ON EXISTING MAINS, FULTON COUNTY WILL FURNISH AND INSTALL ALL OF THE ABOVE UPON RECEIPT OF APPLICATION FOR SERVICE AND PAYMENT OF APPROPRIATE FEES BY BUILDER / PROPERTY OWNER.
12. ALL SEWER LINES, WATER LINES, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.

FULTON COUNTY STANDARD DETAIL 801

5/8" AND 3/4" WATER METER INSTALLATION

DATE	REVISIONS	DATE	REVISIONS

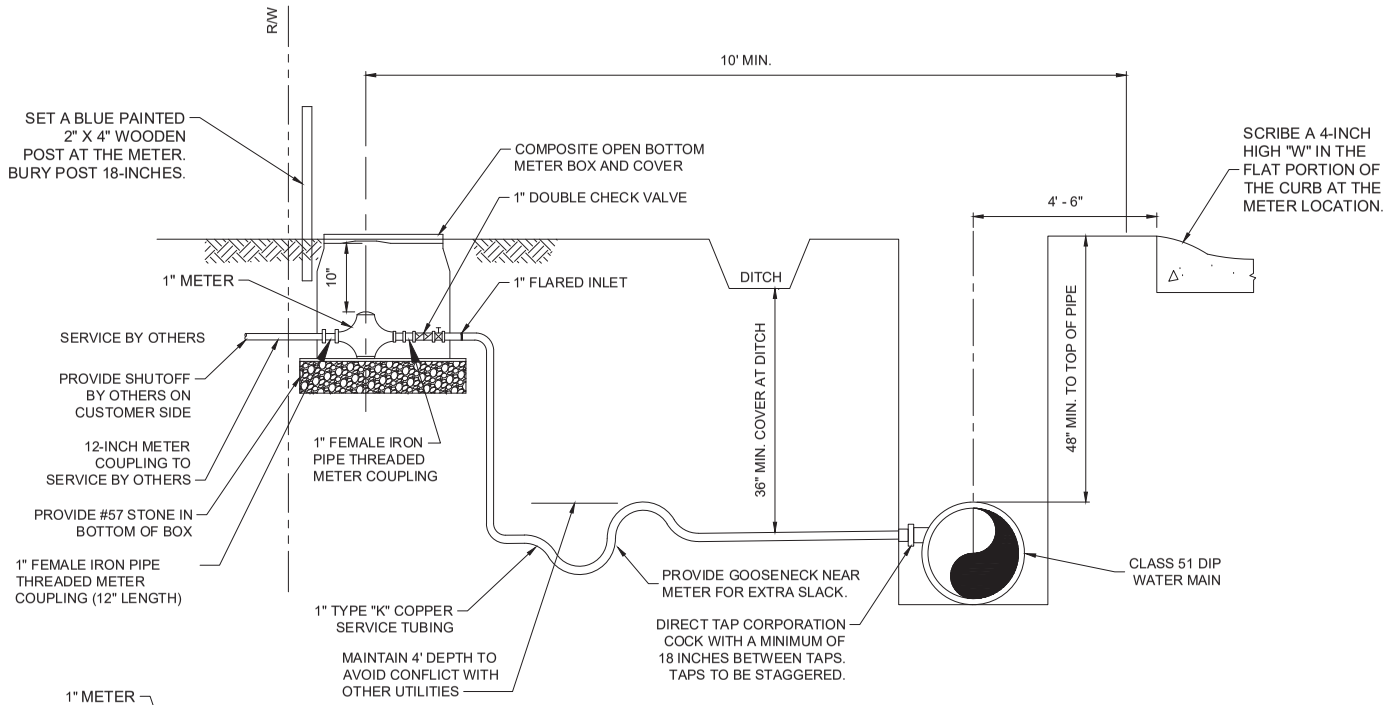
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

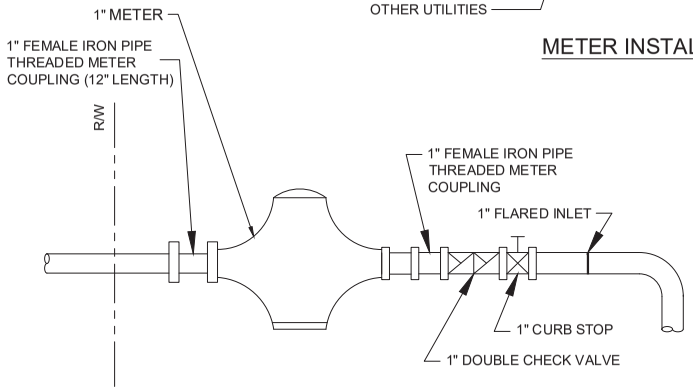
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DRAWING NO. 801

801-S.dwg December 08, 2025 - 10:44am



METER INSTALLATION ELEVATION DETAIL
NTS



METER DETAIL
NTS

NOTES:

1. SERVICE LINE SHALL BE CONTINUOUS 1" TYPE "K" COPPER FROM MAIN TO METER WITHOUT ANY COUPLINGS.
2. USE ALL FLARE JOINTS UP TO CURB STOP.
3. INSTALLATION SHALL ALLOW ADEQUATE ROOM TO REMOVE AND/OR REPAIR METER.
4. NEW WATER MAIN SUBJECT TO 250 LB PRESSURE TEST FOR TWO HOURS.
5. EDGE OF METER BOX TO BE WITHIN 6" OF R/W OR ESMT. LINE. BOX TO BE OUTSIDE OF SIDEWALK.
6. PRIVATE SHUT OFF VALVE TO BE LOCATED WITHIN 12 INCHES OF METER BOX.
7. THE BUILDER IS TO PROVIDE A SHUT-OFF VALVE IN A SEPARATE VALVE BOX FOR OWNER'S USE ON THE OWNER'S PROPERTY.
8. MODIFIED POLYETHELENE METER BOX SHALL HAVE NOMINAL DIMENSIONS OF 19-1/2" X 12-3/8" X 18" AND SHALL HAVE A 10,000 LB. LOAD RATING WITH A SINGLE MOUSE HOLE IN EACH END. COVER FOR METER BOX SHALL BE MODIFIED POLYETHELENE WITH "WATER METER" IN MINIMUM 1" HIGH LETTERS. LIDS SHALL HAVE OBLONG KNOCK OUT AND 1/2-INCH RECESS FOR METER ANTENNAE WITH A FERROUS MAGNET IN THE LID AND A PLASTIC LOCKING MECHANISM. THE COVERS SHALL HAVE A NON-SKID SURFACE. METER BOX AND LID SHALL BE DFW METER BOX MODEL 1219-18-1MKF DEEP. LID ONLY SHALL BE MODEL 1219-1-MKF DEEP.
9. LID FOR STRETCH YOKE BOX SHALL BE DFW MODEL 6514-1-MKF DEEP WITH OBLONG KNOCK OUT AND 1/2-INCH RECESS FOR METER ANTENNAE WITH A FERROUS MAGNET IN THE LID AND A PLASTIC LOCKING MECHANISM.
10. SHOULDERS ARE TO BE GRADED TO FINISHED GRADE PRIOR TO SETTING THE METER BOXES.
11. SERVICE SHALL HAVE 10" MINIMUM COVER AT METER AND 48" MINIMUM COVER BETWEEN MAIN AND METER.
12. FOR PERMITTED DEVELOPEMENT PROJECTS, SERVICE TAPS, CORPORATION STOP, SERVICE LINE, CURB STOP AND METER BOX SHALL BE FURNISHED AND INSTALLED BY DEVELOPMENT CONTRACTOR. DUAL CHECK VALVE, METER COUPLINGS AND METERS SHALL BE FURNISHED AND INSTALL BY FULTON COUNTY UPON RECEIPT OF APPLICATION FOR SERVICE AND PAYMENT OF APPROPRIATE FEES BY BUILDER / PROPERTY OWNER. FOR NEW INDIVIDUAL SERVICE ON EXISTING MAINS, FULTON COUNTY WILL FURNISH AND INSTALL ALL OF THE ABOVE UPON RECEIPT OF APPLICATION FOR SERVICE AND PAYMENT OF APPROPRIATE FEES BY BUILDER / PROPERTY OWNER.
13. ALL SEWER LINES, WATER LINES, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.

FULTON COUNTY STANDARD DETAIL 802

1" WATER METER INSTALLATION

DATE	REVISIONS	DATE	REVISIONS

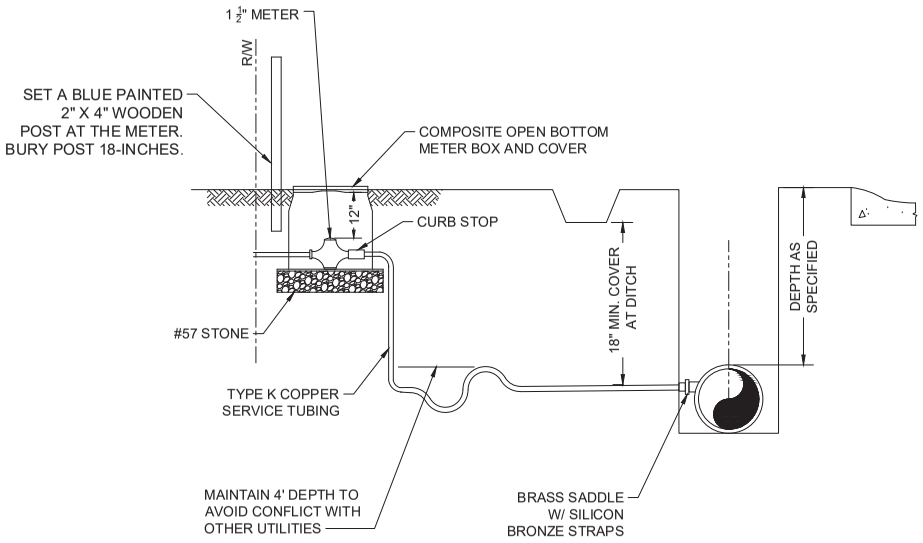
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FULTON COUNTY

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141 PRYOR ST. ATLANTA, GA. 30303
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DRAWING NO.
802

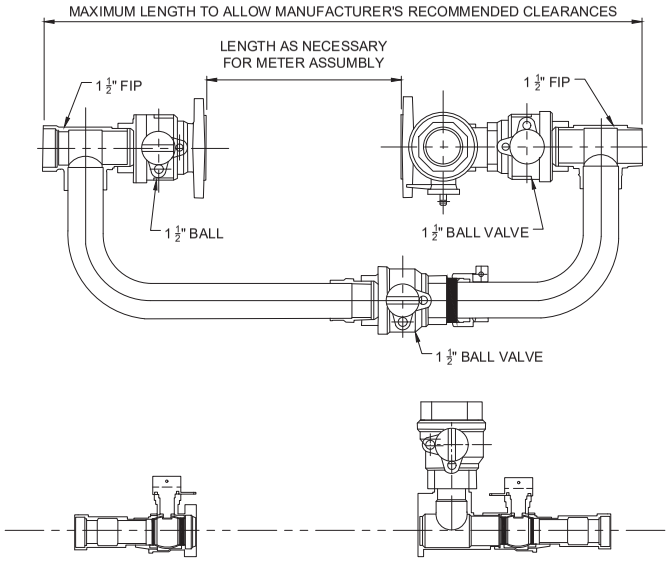
802-S.dwg December 08, 2025 - 10:44am



METER INSTALLATION ELEVATION DETAIL
NTS

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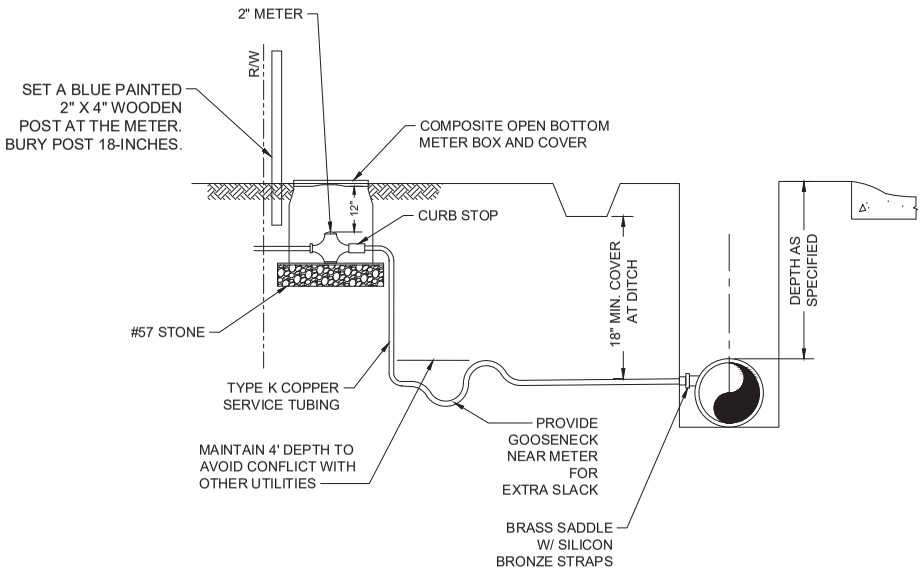
1. SERVICE LINE SHALL BE 1 1/2 " FROM THE MAIN TO THE METER
2. USE ALL COMPRESSION JOINTS UP TO CURB STOP
3. INSTALLATION SHALL ALLOW ADEQUATE ROOM TO REMOVE AND/OR REPAIR METER
4. METER BOX SHALL BE APPROXIMATELY 24" X 36" X 18"
5. TYPE K COPPER SERVICE LINE MUST BE CONTINUOUS FROM METER TO MAIN.
6. SERVICE SHALL HAVE 18 IN. MINIMUM COVER AT METER AND 30 IN. MINIMUM COVER BETWEEN MAIN AND METER.
7. PRIVATE SHUT OFF VALVE TO BE LOCATED WITHIN 12 INCHES OF METER BOX.
8. FOR PERMITTED DEVELOPEMENT PROJECTS, SERVICE TAPS, CORPORATION STOP, SERVICE LINE, CURB STOP AND METER BOX SHALL BE FURNISHED AND INSTALLED BY DEVELOPMENT CONTRACTOR. DUAL CHECK VALVE, METER COUPLINGS AND METERS SHALL BE FURNISHED AND INSTALL BY FULTON COUNTY UPON RECEIPT OF APPLICATION FOR SERVICE AND PAYMENT OF APPROPRIATE FEES BY BUILDER / PROPERTY OWNER. FOR NEW INDIVIDUAL SERVICE ON EXISTING MAINS, FULTON COUNTY WILL FURNISH AND INSTALL ALL OF THE ABOVE UPON RECEIPT OF APPLICATION FOR SERVICE AND PAYMENT OF APPROPRIATE FEES BY BUILDER / PROPERTY OWNER.
9. ALL SEWER LINES, WATER LINES, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.



BYPASS DETAIL
NTS

FULTON COUNTY STANDARD DETAIL 803 1-1/2" WATER METER INSTALLATION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 803

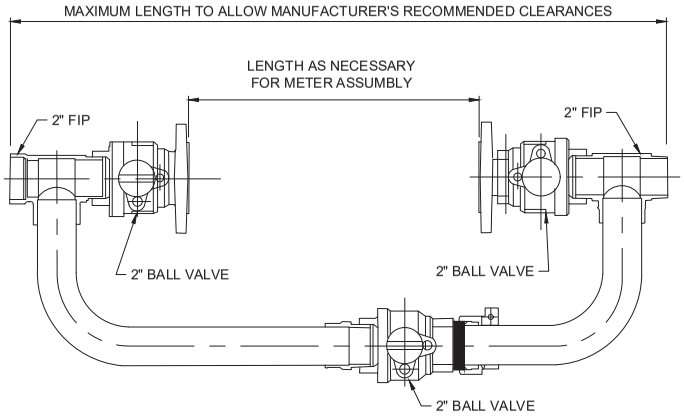
803-S.dwg December 08, 2025 - 10:44am



METER INSTALLATION ELEVATION DETAIL
NTS

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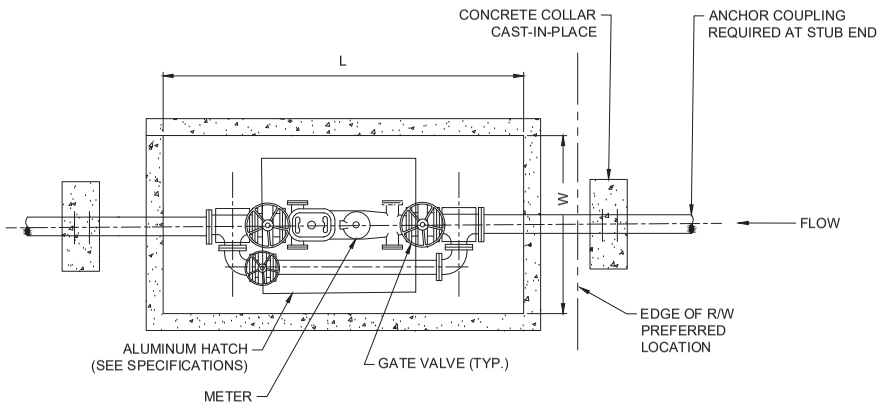
1. SERVICE LINE SHALL BE 2" DIAMETER FROM THE MAIN TO THE METER
2. USE ALL COMPRESSION JOINTS UP TO CURB STOP.
3. INSTALLATION SHALL ALLOW ADEQUATE ROOM TO REMOVE AND/OR REPAIR METER
4. METER BOX SHALL BE APPROXIMATELY 24" X 36" X 18"
5. TYPE K COPPER SERVICE LINE MUST BE CONTINUOUS FROM METER TO MAIN.
6. SERVICE SHALL HAVE 18 IN. MINIMUM COVER AT METER AND 30 IN. MINIMUM COVER BETWEEN MAIN AND METER.
7. FOR PERMITTED DEVELOPEMENT PROJECTS, SERVICE TAPS, CORPORATION STOP, SERVICE LINE, SURB STOP AND METER BOX SHALL BE FURNISHED AND INSTALLED BY DEVELOPMENT CONTRACTOR. DUAL CHECK VALVE, METER COUPLINGS AND METERS SHALL BE FURNISHED AND INSTALL BY FULTON COUNTY UPON RECEIPT OF APPLICATION FOR SERVICE AND PAYMENT OF APPROPRIATE FEES BY BUILDER / PROPERTY OWNER. FOR NEW INDIVIDUAL SERVICE ON EXISTING MAINS, FULTON COUNTY WILL FURNISH AND INSTALL ALL OF THE ABOVE UPON RECEIPT OF APPLICATION FOR SERVICE AND PAYMENT OF APPROPRIATE FEES BY BUILDER / PROPERTY OWNER.
8. PRIVATE SHUT OFF VALVE TO BE LOCATED WITHIN 12 INCHESOF METER BOX.
9. ALL SEWER LINES, WATER LINES, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.



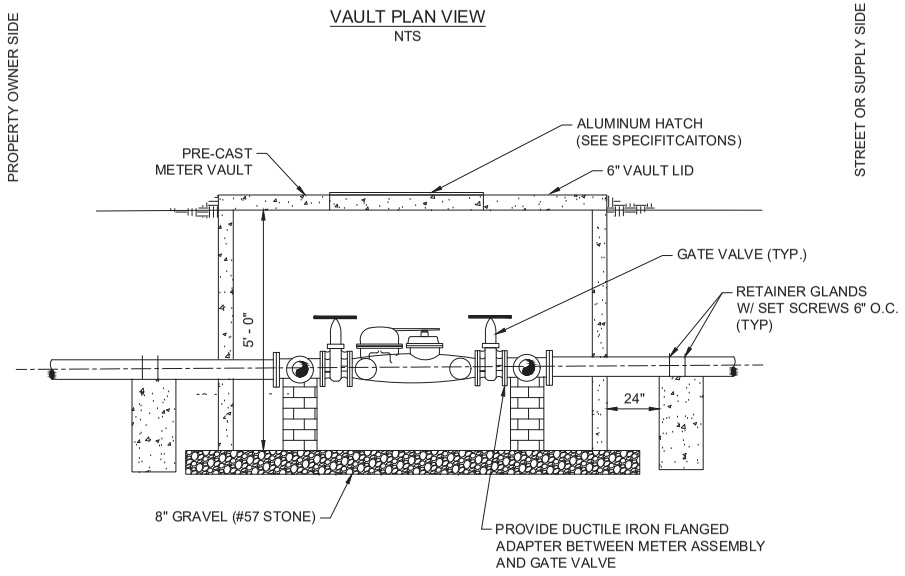
BYPASS DETAIL
NTS

FULTON COUNTY STANDARD DETAIL 804 2" WATER METER INSTALLATION		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 804

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VAULT PLAN VIEW
NTS



VAULT ELEVATION VIEW
NTS

TABLE 805-1
VAULT AND HATCH SIZING

METER SIZE	VAULT			HATCH SIZE
	L	W	D	
3"	9'	5'	6'	3'6" X 3'6"
4"	9'	5'	6'	3'6" X 3'6"
6"	12'	6'	6'	4' X 6'
8"	12'	6'	6'	4' X 6'

NOTES:

1. BOXES EXCEEDING 5' IN DEPTH MUST BE APPROVED BY FULTON COUNTY.
2. WHEN METTER BOX CANNOT BE LOCATED ENTIRELY ON R/W, A PERMANENT EASEMENT SHALL BE OBTAINED TO PREVENT FENCES OR OTHER OBSTRUCTIONS FROM BEING ERECTED AROUND THE METER BOX.
3. COVER OPENING TO BE PLACED NEAREST THE METER REGISTER.
4. THE METER MUST BE INSTALLED WITH AT LEAST 8 DIAMETERS OF STRAIGHT PIPE SAME SIZE AS METER ON THE INLET SIDE TO PERMIT ON-SITE MAINTENANCE AND CALIBRATION, A STRAINER MAY BE PROVIDED IN LIEU OF THE STRAIGHT PIPE IN ACCORDANCE WITH THE METER MANUFACTURER'S RECOMMENDATIONS. AN INLET AND OUTLET GATE VALVE WITH BYPASS LIKE ARE REQUIRED (SEE ILLUSTRATION).
5. THESE BOXES ARE NOT TO BE INSTALLED IN TRAFFIC AREAS WITHOUT PRIOR PERMISSION FROM FULTON COUNTY.
6. ALL VALVES AND FITTINGS INSIDE THE VAULT SHALL BE FLANGED.
7. ALL FITTINGS OUTSIDE THE VAULT SHALL PUSH-ON JOINT WITH AMERICAN 'FAST-GRIP' GASKETS OR APPROVED EQUAL.
8. ALL METERS SHALL COME EQUIPPED WITH A TOUCHREAD OR TOUCHLESS SENSOR COMPATIBLE WITH FULTON COUNTY'S METER READING EQUIPMENT.
9. THIS DETAIL ALSO AUTHORIZED FOR INSTALLATION OF 3" AND LARGER RE-USE METERS.
10. HATCH SHALL BE 4' X 6', DOUBLE LEAF, FLUSH MOUNT, 1/4 " DIAMOND PLATE, ALUMINUM DOORS LOCKABLE WITH A $\frac{5}{8}$" ROD. HATCH SHALL BE BILCO # PDCM-3 OR PRE-APPROVED EQUAL FOR 6" & 8" METERS.
11. HATCH SHALL BE 3'6" X 3'6" SINGLELEAF FLUSH MOUNT $\frac{1}{4}$ " DIAMOND PLATE ALUMINUM DOOR LOCKABLE WITH $\frac{5}{8}$" ROD. HATCH SHALL BE B.LCO#PCM-5 OR PRE-APROVED EQUAL FOR 3" X 4" METERS.
12. FOR PERMITTED DEVELOPMENT PROJECTS WITH THE WATER SYSTEM MAIN ON THE PROPERTY FRONTAGE (SHORT SIDE), FULTON COUNTY WILL FURNISH AND INSTALL TAPPING SLEEVE AND VALVE, SERVICE LINE TO VALVE, VAULT, METER, INTERNAL VALVES AND PIPING TO 3 FEET OUTSIDE OF VAULT UPON RECEIPT OF APPLICATION FOR SERVICE AND PAYMENT OF APPROPRIATE FEES BY BUILDER / PROPERTY OWNER. FOR DEVELOPMENT PROJECTS WHERE THE WATER SYSTEM MAIN IS NOT ON THE PROPERTY FRONTAGE, THE DEVELOPMENT CONTRACTOR WILL BE RESPONCIBLE FOR MAKING THE TAP (IF REQUIRED) AND BRINGING THE WATER SYSTEM MAIN TO THE PROPERTY FRONTAGE LOCATION WHERE THE METER VAULT IS AGREED WITH FULTON COUNTY TO BE INSTALLED.
13. FOR DEVELOPEMENT REQUIRING SEPARATE DOMESTIC AND / OR IRRIGATION METERS TAPS SHALL BE MADE IN THE WATER SYSTEM MAIN BEFORE THE LARGE METER WITHIN THE EASEMENT AND THE METERS SET AT THE EASEMENT EDGE (SEE 806).
14. VAULT DIMENSION ARE INTERIOR. ADD1 FOOT TO HORIZONTAL LENGTH AND WIDTH TO DETERMINE DIMENSION FOR EASEMENT.

FULTON COUNTY STANDARD DETAIL 805

LARGE METER AND VAULT INSTALLATION

DATE	REVISIONS	DATE	REVISIONS

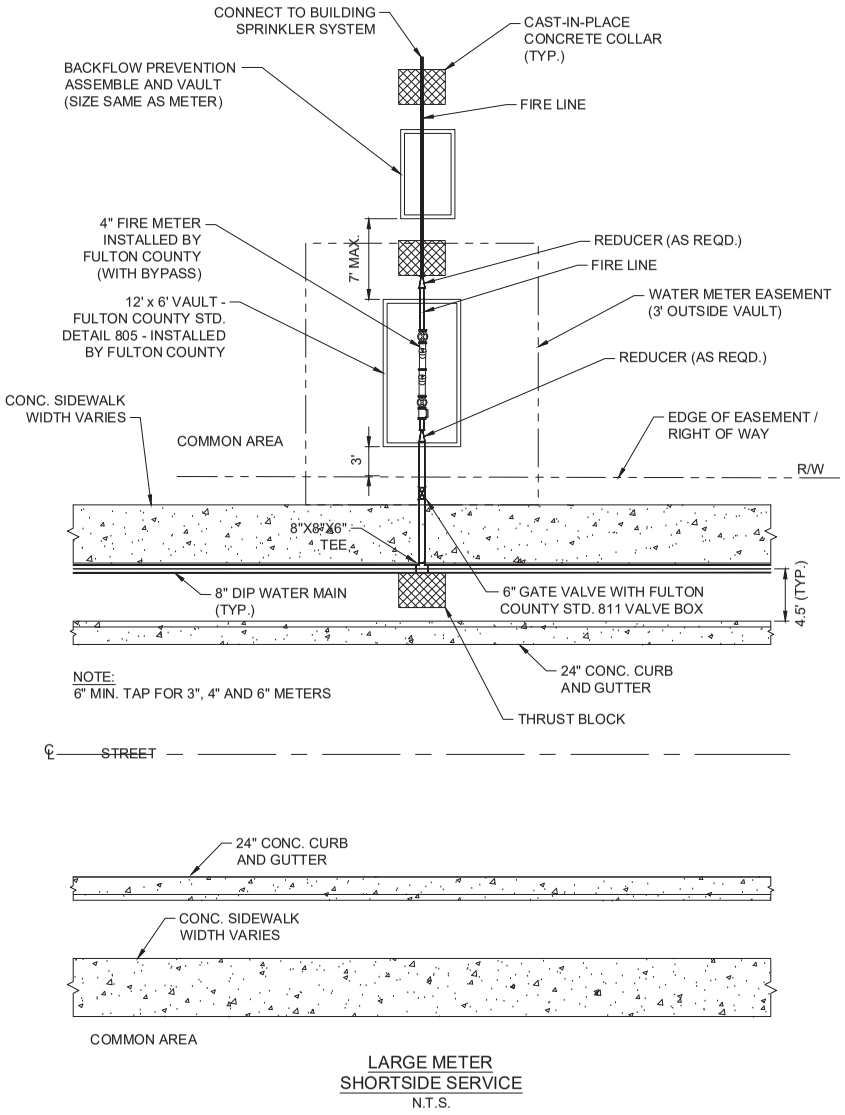
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

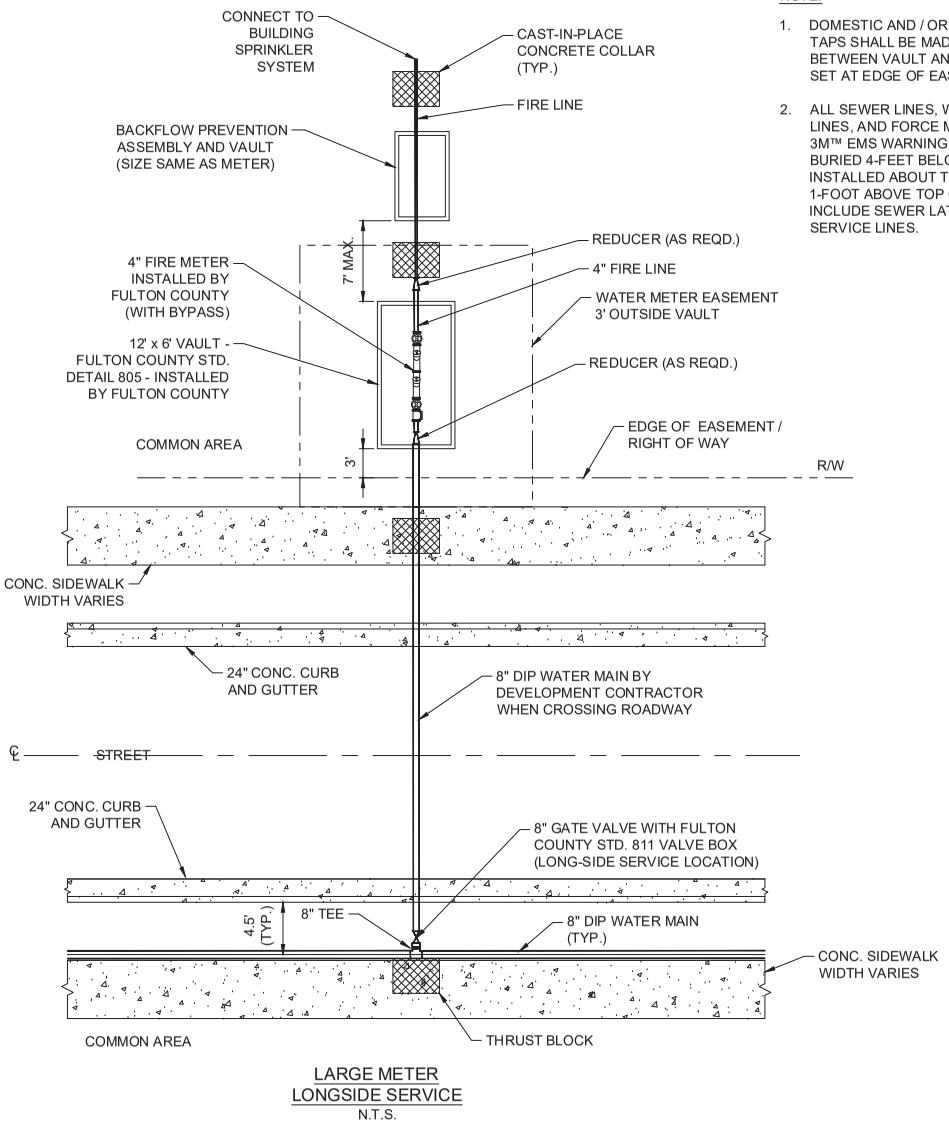
FULTON COUNTY PUBLIC WORKS
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404-612-7400 FAX: 404-224-0498

DRAWING NO.
805

805-S.dwg December 08, 2025 - 10:44am



LARGE METER
SHORTSIDE SERVICE
N.T.S.



LARGE METER
LONGSIDE SERVICE
N.T.S.

NOTE:

1. DOMESTIC AND / OR IRRIGATION SERVICE TAPS SHALL BE MADE BY FULTON COUNTY BETWEEN VAULT AND R/W WITH METERS SET AT EDGE OF EASEMENT.
2. ALL SEWER LINES, WATER LINES, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.

FULTON COUNTY STANDARD DETAIL 806

LARGE WATER METER LAYOUT

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
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DATE: 01-21-2026

FULTON COUNTY

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806

806-S.dwg December 08, 2025 - 10:44am

NOTES:

1. FOR METERS 3 INCHES AND LARGER, VAULTS MAY BE ROTATED 90 DEGREES TO MINIMIZE PROJECTION INTO PROPERTY.
2. ALL METERS ON PRIVATE PROPERTY SHALL HAVE AN ACCESS AND MAINTENANCE EASEMENT THAT EXTENDS THREE FEET FROM EACH SIDE OF THE METER BOX / VAULT, EXCEPT BOXES FOR METERS 2 INCHES AND SMALLER MAY BE PLACED 6 INCHES FROM THE PROPERTY / RIGHT OF WAY LINE.
3. FOR SINGLE SERVICE DEVELOPMENT (COMMERCIAL, APARTMENTS ETC.) TAP, SERVICE LINE, METER SIZE, AND BACKFLOW DEVICE SHALL BE THE SAME.
4. FOR LONG SIDE 1 INCH SERVICE LINES, SERVICE LINES SHALL BE INSTALL IN 6 INCH PVC CONDUIT. TWO 1 INCH SERVICE LINES MAY BE INSTALLED IN ONE CONDUIT.
5. TAP, METER, AND BACKFLOW PROTECTION DEVICE MUST MATCH MAIN SIZE IN DEVELOPMENT.
6. IN THE EVENT CONDUIT IS NOT PRESENT ON LONG SIDE LOT, BORING SHALL BE PERMITTED. WHEN CONDUIT DOES EXIST, 1-IN. PIPE SHALL BE INSERTED THROUGH 6-IN. PVC CASING TO COMPLETE THE INSTALLATION FROM THE MAIN TO THE METER. 2-IN. HDPE CASING TO BE USED WHEN BORING.
7. APPROVAL MUST BE OBTAINED FROM THE CITY IN WHICH THE PROJECT IS LOCATED PRIOR TO ROAD CUT. THE PUBLIC WORKS WATER SERVICES DIVISION DOES NOT HAVE THE AUTHORITY TO APPROVE ROAD CUTS.
8. 48" COVER (MIN.) FROM SURFACE TO TOP OF SERVICE PIPE APPLIES TO COUNTY MAINTAINED ROADS. FOR STATE ROADS SAID MINIMUM CLEARANCE SHALL BE 54".
9. ALL CUTS IN PAVEMENT SHALL BE REPAIRED IN ACCORDANCE WITH EITHER GA..D.O.T OR FULTON CO. STANDARDS. CONTRACTOR SHALL BE RESPONSABLE FOR PROPER DITCH COMPACTION, CUT BACK OF DITCH SIDES AND PAVING OF THE REQUIRED CONCRETE SUB-BASE AND PLATING THE DITCH TO ALLOW TRAFFIC FLOW WHILE CONCRETE IS SETTING UP. STEEL TRAFFIC PLATES WILL COVER POURED CONCRETE FOR A MINIMUM OF 24 HOURS.
10. METERS ARE TO BE SET DIRECTLY OPPOSITE AND AT RIGHT ANGLES TO TAP ON MAIN. THE METER SHALL NOT BE OFFSET LATERALLY FROM TAP ON WATER MAIN.

807-S.dwg December 08, 2025 - 10:44am

FULTON COUNTY STANDARD DETAIL 807

GENERAL NOTES FOR METER INSTALLATION

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML

APPROVED: TM

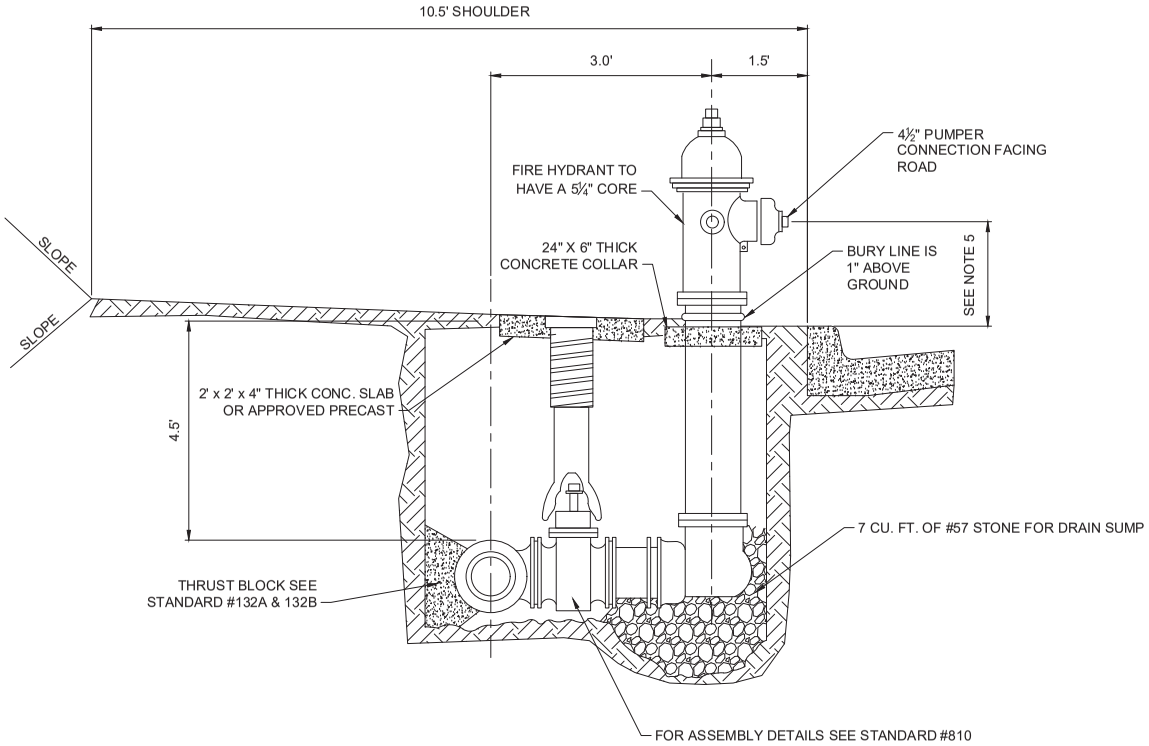
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.

807



HYDRANT LOCATION DETAIL
N.T.S.

NOTES:

1. SEE STANDARD DWG. 809 FOR UNCURBED STREET.
2. ALL VALVES MUST BE RATED AT WORKING PRESSURE OF 200 PSI AND TESTED AT A PRESSURE OF 250 PSI. ALL FIRE HYDRANTS MUST BE ACCOMPANIED BY A MANUFACTURER'S CERTIFICATE THAT STATES EACH HYDRANT HAS BEEN TESTED ACCORDING TO THE LATEST REVISION OF AWWA SPECIFICATION C502.
3. CONCRETE STRENGTH TEST REQUIRED FOR ALL POURED IN-PLACE CONCRETE.
4. PAINT BONNET SILVER FOR HYDRANTS SET ON 10-INCH AND SMALLER WATER LINES; YELLOW FOR HYDRANTS SET ON 12-INCH WATER LINES; AND GREEN FOR HYDRANTS SET ON 16-INCH OR GREATER WATER LINES. REPAINT HYDRANT AT END OF MAINTENANCE.
5. MINIMUM 18 INCHES BETWEEN TOP OF CURB AND CENTER OF CONNECTION. MAXIMUM OF 21 INCHES.

FULTON COUNTY STANDARD DETAIL 808

HYDRANT LOCATION DETAIL FOR CURB & GUTTER RESIDENTIAL STREETS

DATE	REVISIONS	DATE	REVISIONS

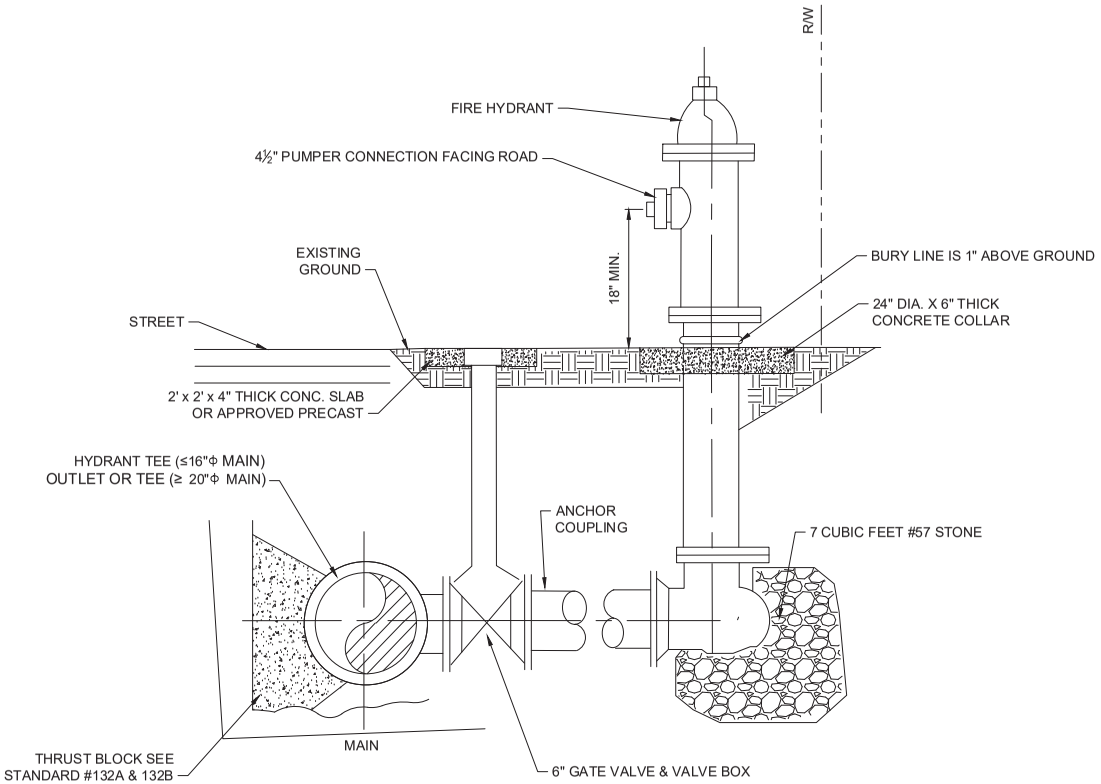
DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
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DRAWING NO.
808

808-S.dwg December 08, 2025 - 10:44am



HYDRANT LOCATION DETAIL
NTS

NOTES:

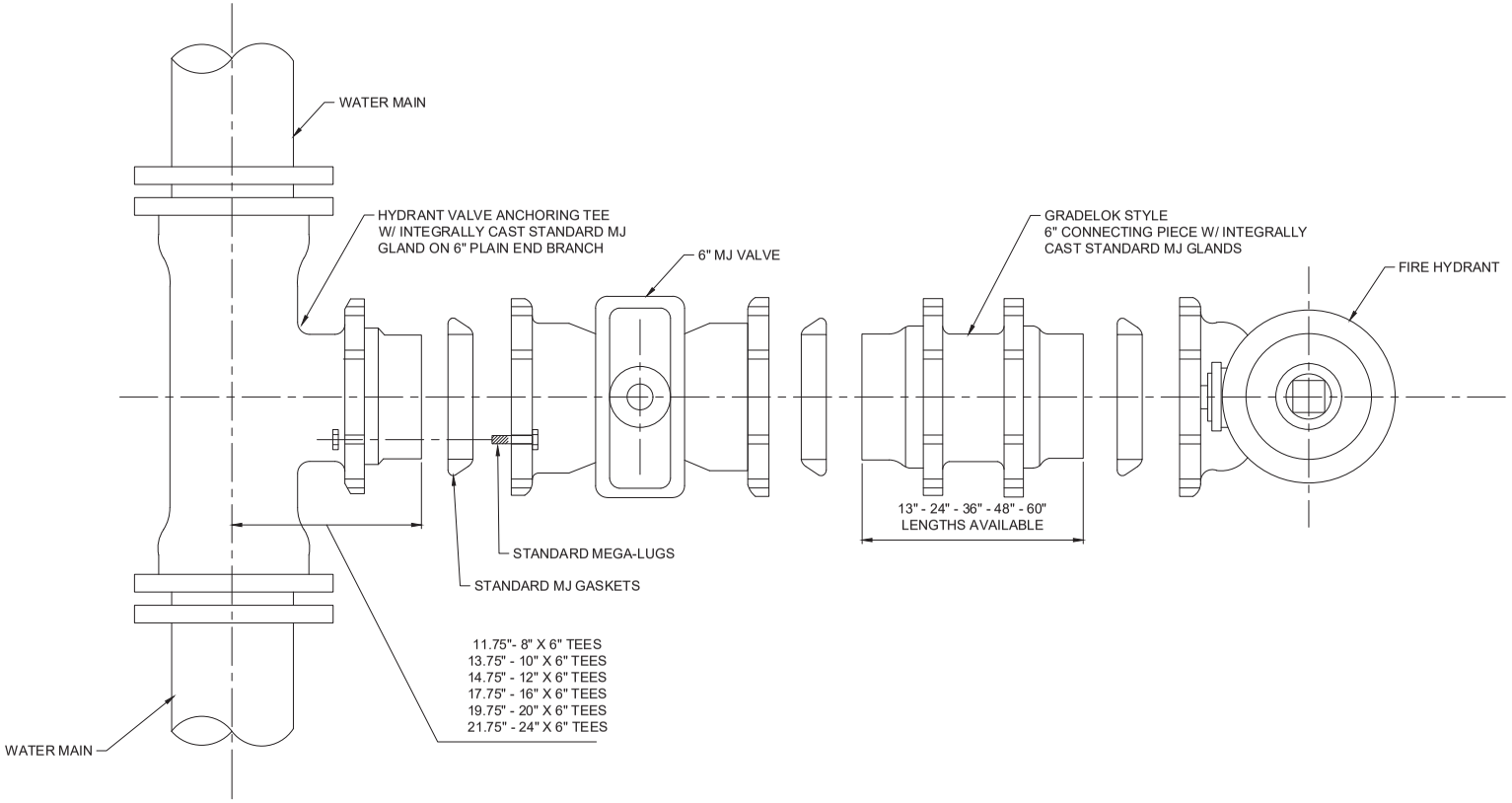
1. FIRE HYDRANTS CONNECTED TO 12-INCH AND LARGER WATER MAINS SHALL BE FURNISHED WITH LOCKING HYDRANT SECURITY CAPS. CAPS SHALL BE PROVIDED ON EACH HOSE AND PUMPER NOZZLE AND INCORPORATE A "FREE SPINNING" DESIGN THAT PROVIDES SECURITY AGAINST UNAUTHORIZED INTRUSION INTO THE FIRE HYDRANT, OR WATER THEFT FROM THE HYDRANT. WHEN SECURED, THE CAP SHALL SPIN FREELY UNTIL UNLOCKED AND REMOVED THROUGH THE USE OF A WRENCH. WHEN UNLOCKED, THE CAP SHALL OPEN IN A MANNER SIMILAR TO A STANDARD CAP. CAPS SHALL BE SIMILAR IN APPEARANCE TO STANDARD CAPS AND SHALL USE A CENTER PLACED LOCKING MECHANISM. THE LOCKING MECHANISM SHALL BE HARDENED STAINLESS STEEL AND SHALL BE PROTECTED FROM THE ELEMENTS. CAPS USING MAGNETIC LOCKS ARE UNACCEPTABLE. WRENCHES SHALL SHIP DIRECT TO OWNER.
2. MINIMUM OF 18 INCHES FROM GROUND TO CENTER OF CONNECTION. MAXIMUM OF 21 INCHES.
3. ALL VALVES MUST BE RATED AT WORKING PRESSURE OF 200 PSI AND TESTED AT A PRESSURE OF 250 PSI. ALL FIRE HYDRANTS MUST BE ACCOMPANIED BY A MANUFACTURER'S CERTIFICATE THAT STATES EACH HYDRANT HAS BEEN TESTED ACCORDING TO THE LATEST REVISION OF AWWA SPECIFICATION C502.
4. CONCRETE STRENGTH TEST REQUIRED FOR ALL POURED IN-PLACE CONCRETE.
5. PAINT BONNET SILVER FOR HYDRANTS SET ON 10-INCH AND SMALLER WATER LINES; YELLOW FOR HYDRANTS SET ON 12-INCH WATER LINES; AND GREEN FOR HYDRANTS SET ON 16-INCH OR GREATER WATER LINES. REPAINT HYDRANT AT END OF MAINTENANCE.
6. FIRE HYDRANT TO HAVE A 5-1/4" CORE.
7. FOR ASSEMBLY DETAILS SEE STANDARD DWG. 810.

FULTON COUNTY STANDARD DETAIL 809 HYDRANT LOCATION DETAIL FOR UNCURBED RESIDENTIAL STREETS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 809

809-S.dwg December 08, 2025 - 10:45am

NOTES:

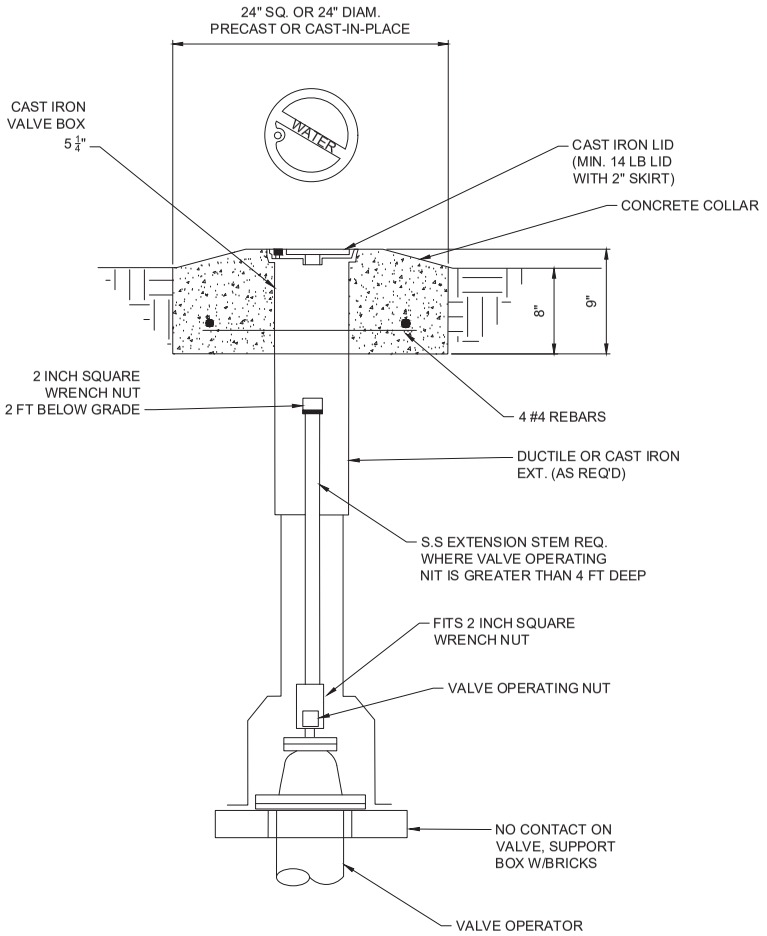
1. SEE ANCHOR RODDING DETAIL #818. GRADE-LOCS CAN BE USED TO ADJUST HYDRANTS TO PROPER BURY DEPTH.



HYDRANT ASSEMBLY DETAIL
NTS

FULTON COUNTY STANDARD DETAIL 810 HYDRANT ASSEMBLY DETAIL		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 810

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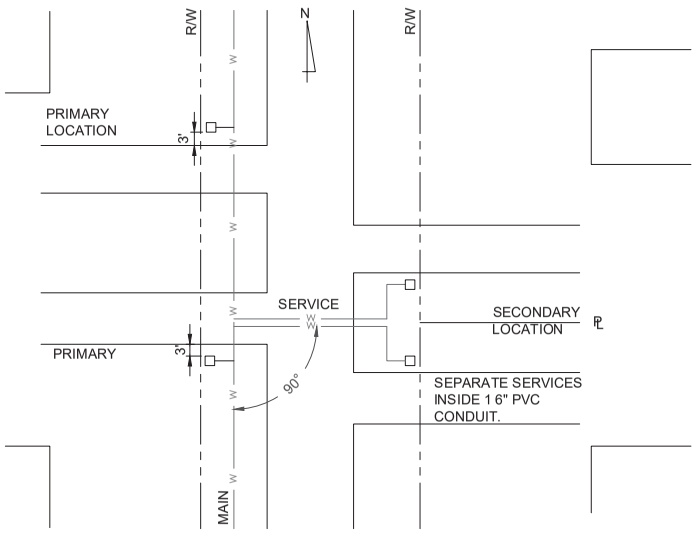


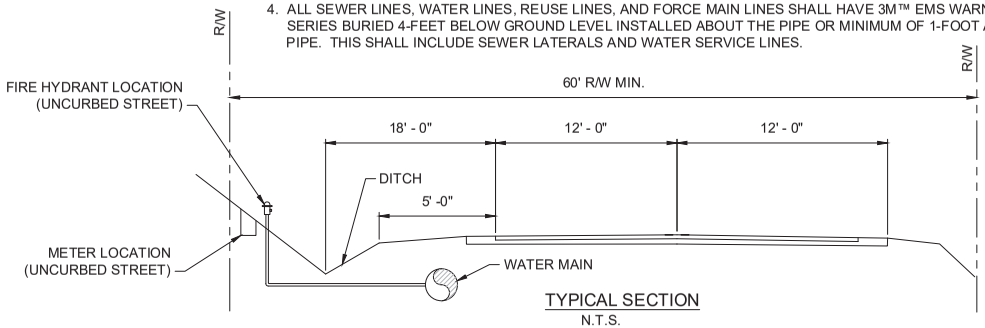
FULTON COUNTY STANDARD DETAIL 811 UNDERGROUND VALVE BOX		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 811

811-S.dwg December 08, 2025 - 10:45am

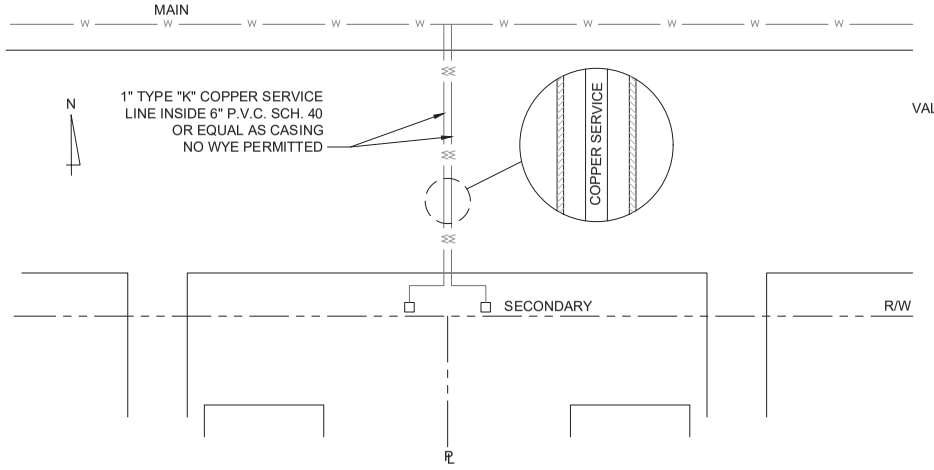
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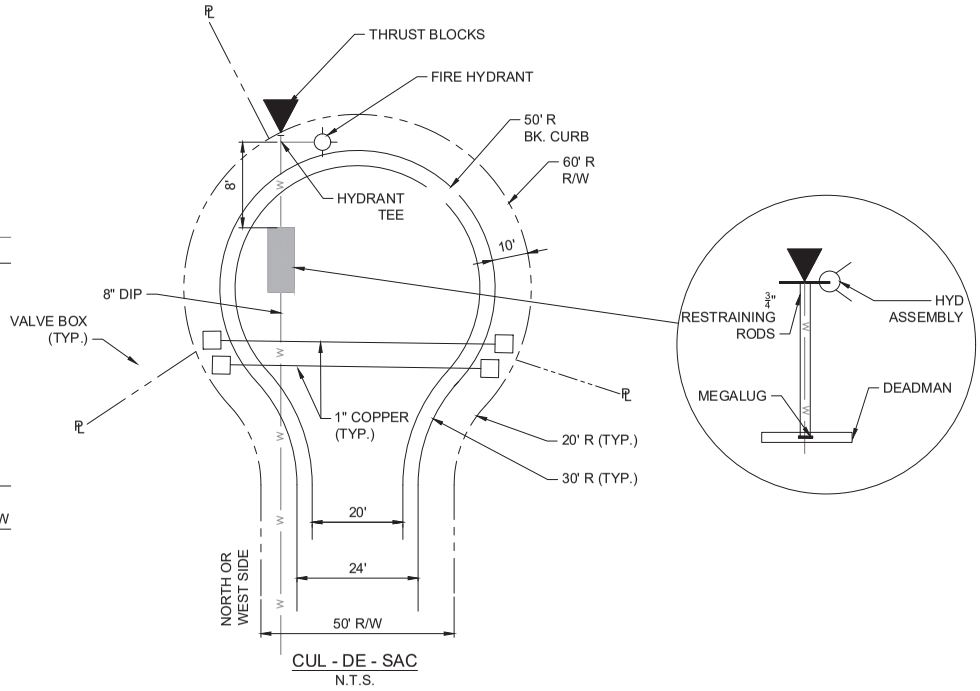
1. SEE STD. # 133 FOR VALVE LOCATION AT STREET INTERSECTION.
2. WATER VALVE MARKERS WILL BE PLACED AT ALL LOCATIONS WHERE WATER VALVES ARE NOT IN THE STREET.
3. WATER VALVES THAT ARE IN THE STREET WILL BE CLEARLY MARKED ON THE CURB.
4. ALL SEWER LINES, WATER LINES, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.





TYPICAL SECTION
N.T.S.

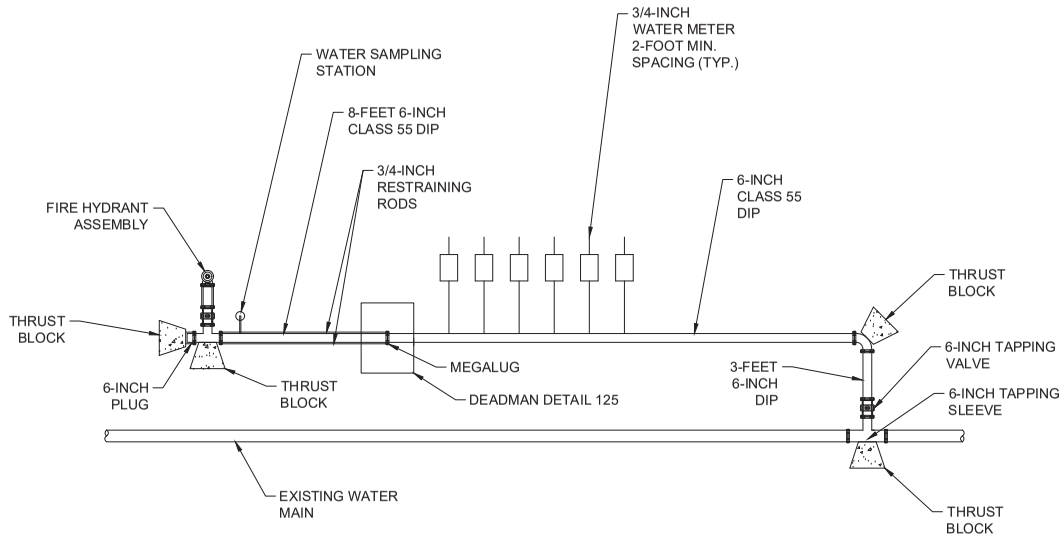




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FULTON COUNTY STANDARD DETAIL 812 SMALL (3/4" & 1") WATER METER INSTALLATION AND LOCATION DETAILS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 812

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PLAN
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NOTES:

1. 6-INCH TAPPING SLEEVE AND VALVE IS TO BE INSTALLED IN ACCORDANCE WITH FULTON COUNTY STANDARD DETAIL 122.
2. THRUST BLOCKS ARE TO BE INSTALLED IN ACCORDANCE WITH FULTON COUNTY STANDARD DETAILS 132A AND 132B.
3. WATER METERS ARE TO BE INSTALLED IN ACCORDANCE WITH FULTON COUNTY STANDARD DETAIL 801.
4. FIRE HYDRANT IS TO BE INSTALLED IN ACCORDANCE WITH FULTON COUNTY STANDARD DETAILS 808 AND 810.
5. END OF LINE IS TO BE INSTALLED IN ACCORDANCE WITH FULTON COUNTY STANDARD DETAIL 812.
6. WATER SAMPLING STATION IS TO BE INSTALLED IN ACCORDANCE WITH FULTON COUNTY STANDARD DETAIL 818.

FULTON COUNTY STANDARD DETAIL 813

WATER METER MANIFOLD DETAIL
FOR TOWNHOME DEVELOPMENTS

DATE	REVISIONS	DATE	REVISIONS

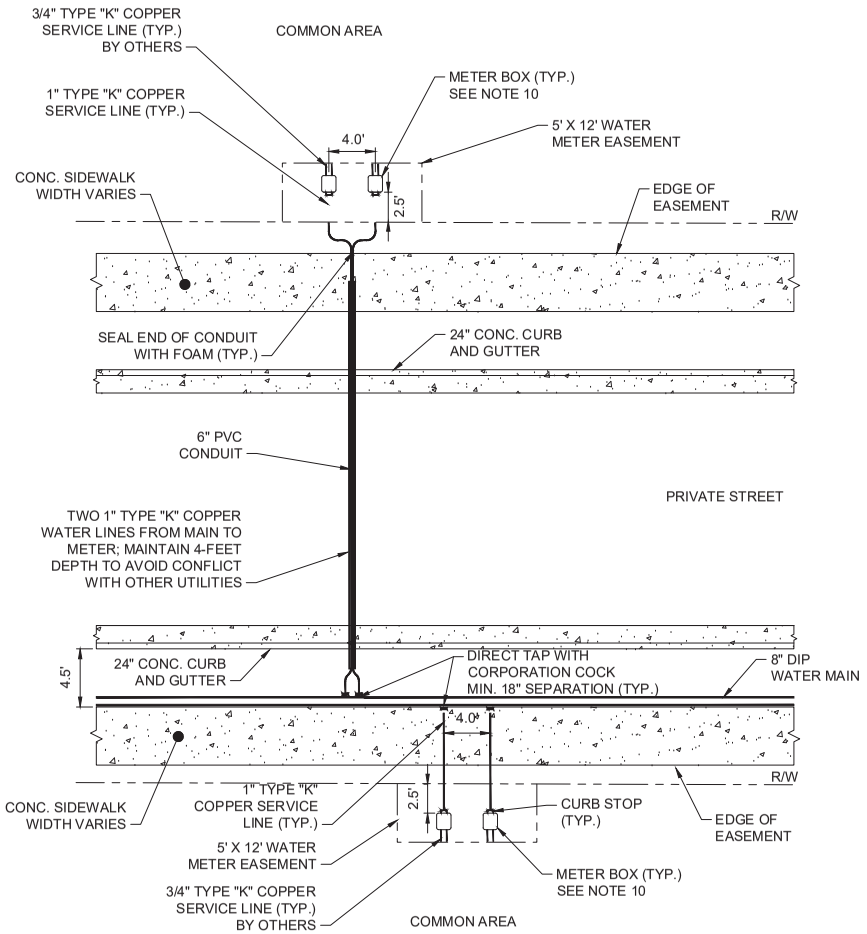
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APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

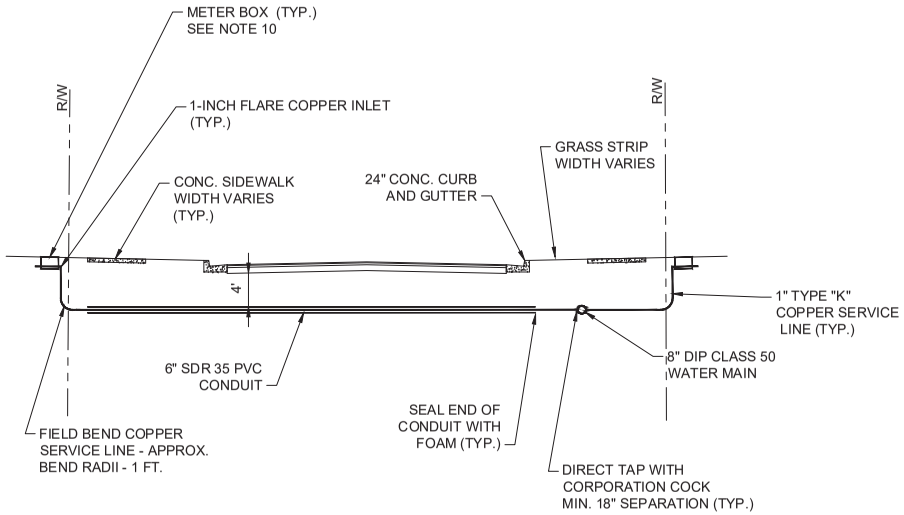
FULTON COUNTY PUBLIC WORKS
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813-S.dwg December 08, 2025 - 10:45am



PLAN VIEW
N.T.S.



PROFILE VIEW
N.T.S.

NOTES:

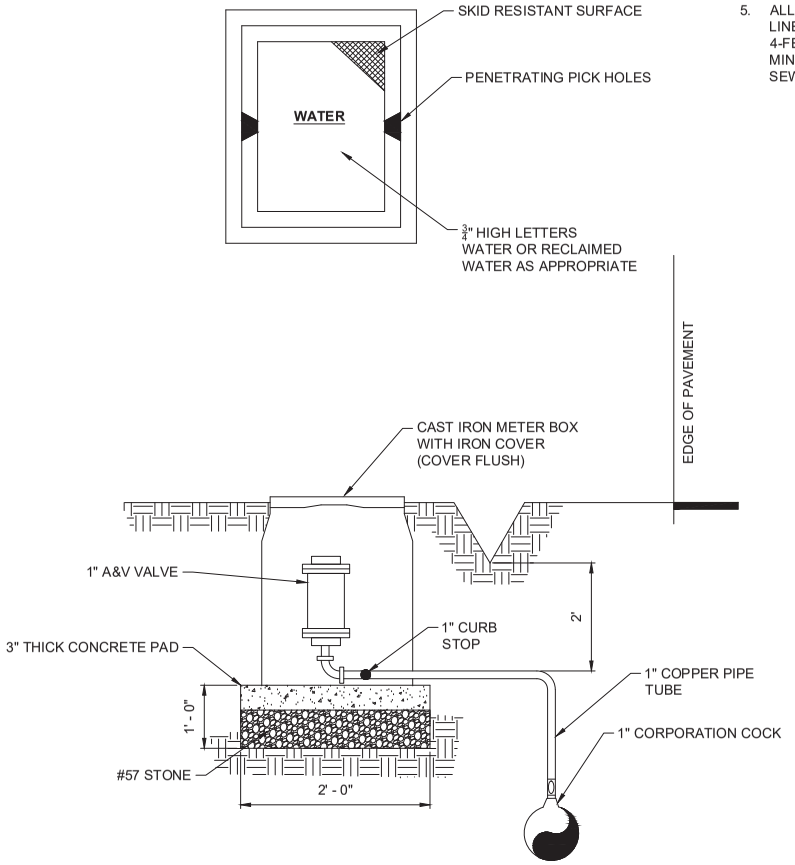
1. THE COPPER SERVICE LINE STUBS ARE TO BE VERTICAL AND SHALL END 12-INCHES BELOW GRADE.
2. SHOULDERS ARE TO BE GRADED TO FINISHED GRADE PRIOR TO SETTING METER BOXES.
3. METER BOX TO BE FORD DGHC228-243-TT-NL W/ ANGLE INLET AND STRAIGHT OUTLET.
4. USE ALL FLARE JOINTS
5. INSTALLATION SHALL ALLOW ADEQUATE ROOM TO REMOVE AND/OR REPAIR METERS.
6. METER BOX SHALL BE APPROXIMATELY 14-3/4" X 17-1/8".
7. NEW WATER MAIN SUBJECT TO 250 PSI PRESSURE TEST FOR TWO HOURS.
8. TYPE "K" COPPER SERVICE LINE MUST BE CONTINUOUS FROM METER TO MAIN.
9. SERVICE SHALL HAVE A MINIMUM COVER OF 48-INCHES BETWEEN THE MAIN AND METER.
10. METER BOX IS TO BE DGHC228-243-TT-NL ASSEMBLY, LONG DOUBLE GULFBOX, ANGLE INLET, FOR ⅝" X ¾" METER BY THE FORD METER BOX CO, INC., DRAWING C14434-001. METER BOX TO HAVE TWO ¾" METERS SIDE BY SIDE (TYP.) SET ON TWO COURSES OF BRICK WITH 8 BRICKS IN EACH. LIDS ARE TO BE PRE-DRILLED WITH TWO 1⅞" HOLES FOR AMR'S W/ PLASTIC AMR PLUGS.
11. ALL SEWER LINES, WATER LINES, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.

FULTON COUNTY STANDARD DETAIL 814 WATER METER LAYOUT FOR TOWNHOUSE DEVELOPMENTS WITHOUT LOTS		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 814

814-S.dwg December 08, 2025 - 10:45am

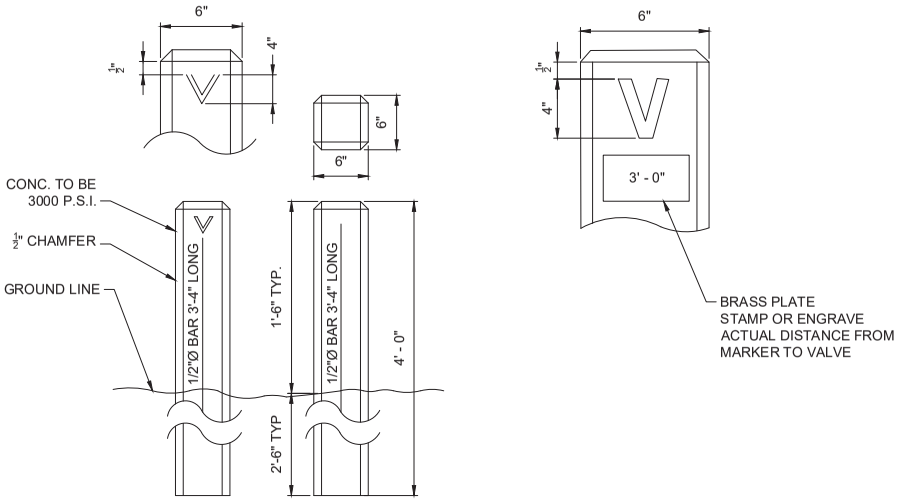
NOTES:

1. VALVE MARKER REQUIRED.
2. A&V VALVE AND COPPER SHALL BE SIZED IN ACCORDANCE WITH VALVE MANUFACTURER'S RECOMMENDATIONS.
3. METER BOX SHALL BE CDR 10 X 1 5HC OR APPROVED EQUAL.
4. A&V VALVE SHALL BE VENT-O-MAT SERIES RBX OR EQUAL.
5. ALL SEWER LINES, WATER LINES, REUSE LINES, AND FORCE MAIN LINES SHALL HAVE 3M™ EMS WARNING TAPE 7900 SERIES BURIED 4-FEET BELOW GROUND LEVEL INSTALLED ABOUT THE PIPE OR MINIMUM OF 1-FOOT ABOVE TOP OF PIPE. THIS SHALL INCLUDE SEWER LATERALS AND WATER SERVICE LINES.



FULTON COUNTY STANDARD DETAIL 815 A & V RELEASE VALVE ASSEMBLY 1" OR 2"		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 815

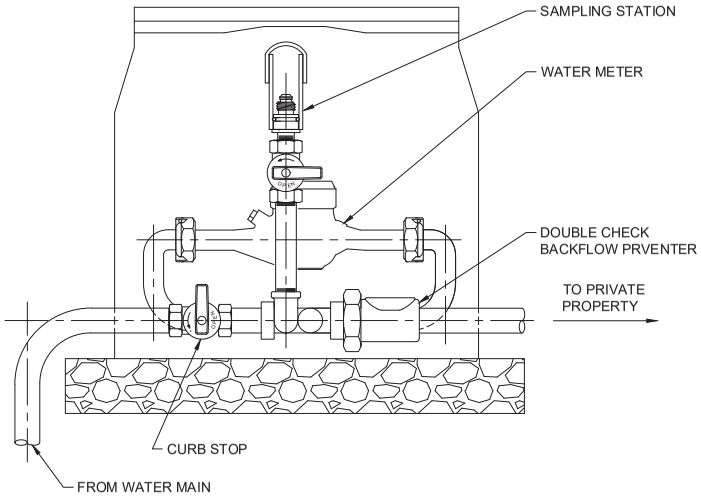
815-S.dwg December 08, 2025 - 10:45am



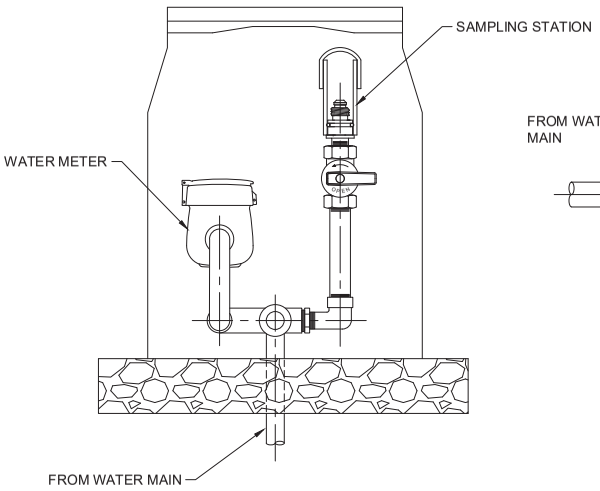
WATER VALVE MARKER DETAILS
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816-S.dwg December 08, 2025 - 10:45am

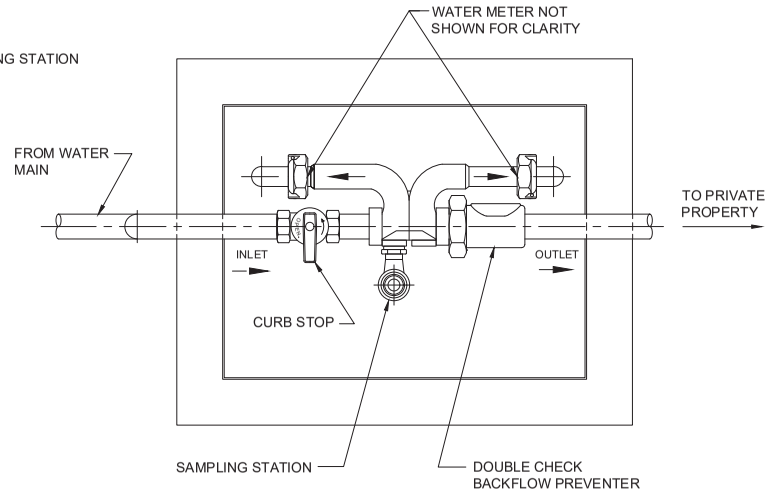
FULTON COUNTY STANDARD DETAIL 816 WATER VALVE MARKER		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 816



FRONT VIEW
N.T.S.



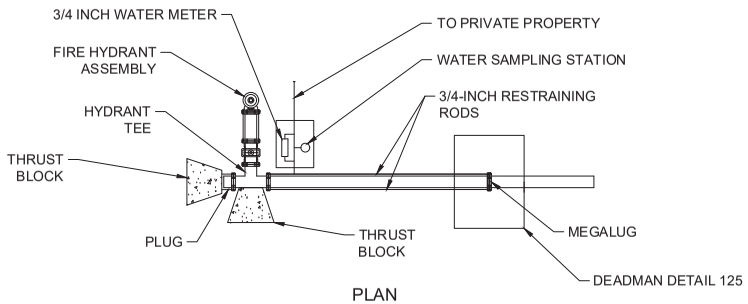
SIDE VIEW
N.T.S.



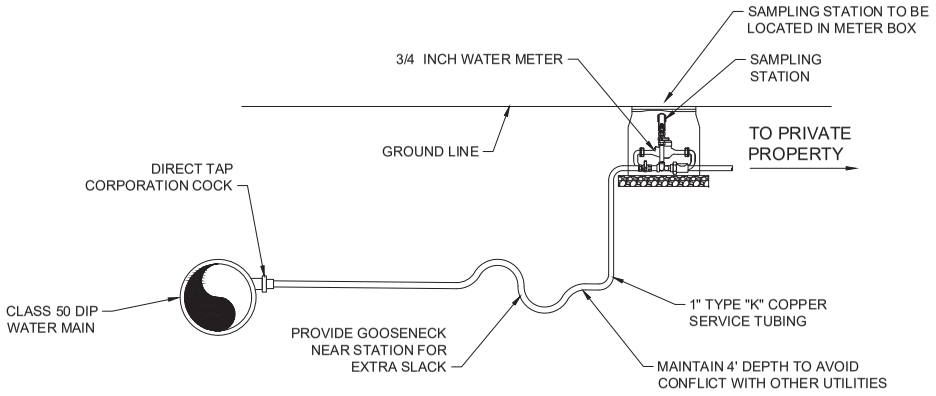
TOP VIEW
N.T.S.

NOTE:

1. SAMPLING STATION SHALL BE ECLIPSE #24 SAMPLING STATION BY KUPFERLE OR FCPW APPROVED EQUAL.
2. SAMPLING STATION TO BE PROVIDED WITH SAMPLING ROD IN PROTECTIVE TRAVEL CASE.



PLAN
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PROFILE
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FULTON COUNTY STANDARD DETAIL 818

WATER SAMPLING STATION

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: MB/EB/ML
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

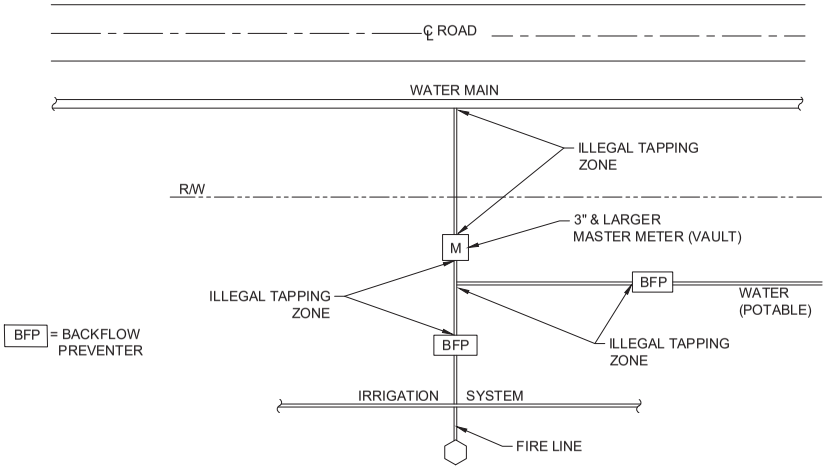
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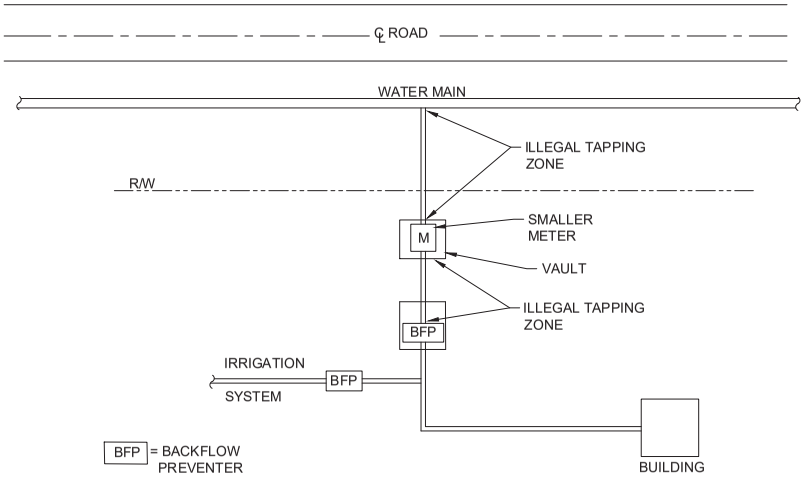
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NOTES:

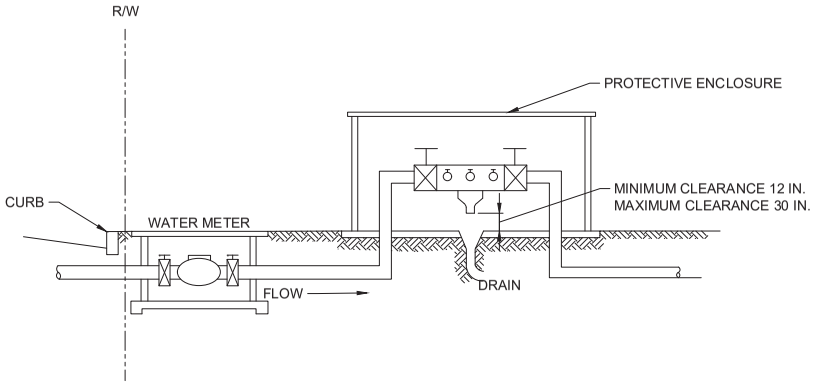
1. INSTALLATION OF THE AIR-GAP OR MECHANICAL BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED SUBJECT TO THE APPROVAL OF FULTON COUNTY PUBLIC WORKS.
2. ANY DEVIATION FROM THE METHODS DESCRIBED ABOVE MUST RECEIVE APPROVAL PRIOR TO INSTALLATION.
3. ALL MECHANICAL BACKFLOW PREVENTION ASSEMBLIES APPROVED BY FULTON COUNTY PUBLIC WORKS FOR INSTALLATION AT THE SERVICE CONNECTION MUST BE APPROVED BY THE FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH, UNIVERSITY OF SOUTHERN CALIFORNIA. THESE ASSEMBLIES ARE ONLY APPROVED FOR THE HORIZONTAL ORIENTATIONS.
4. CHOICE OF THE TYPE OF BACKFLOW PREVENTION ASSEMBLY, I.E. REDUCED PRESSURE PRINCIPLE OR DOUBLE CHECK VALVE ASSEMBLY, WILL BE BASED ON THE DEGREE OF HAZARD AS EVALUATED BY FULTON COUNTY PUBLIC WORKS.
5. FOR FURTHER INFORMATION, REFER TO THE FULTON COUNTY MANUAL ON CROSS CONNECTIONS.
6. IN SOME CASES, A SINGLE VAULT WILL BE ALLOWED FOR THE METER AND THE BACKFLOW PREVENTER.



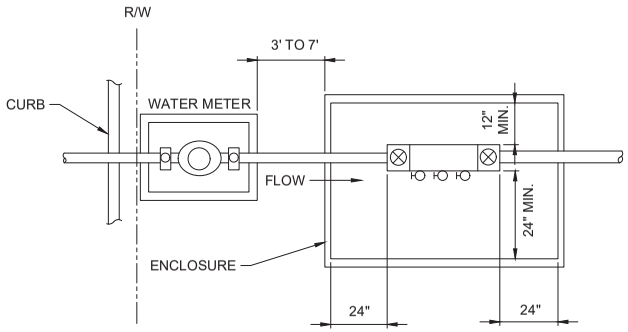


FULTON COUNTY STANDARD DETAIL 819 BACKFLOW PREVENTION ASSEMBLY		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 819

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TYPICAL INSTALLATION PROFILE
N.T.S.



TYPICAL INSTALLATION - PLAN VIEW
N.T.S.

NOTES:

1. THE REDUCED-PRESSURE BACKFLOW PREVENTION ASSEMBLY (RPBA) SHALL BE INSTALLED WITH ADEQUATE SPACE TO FACILITATE MAINTENANCE AND TESTING. THE INSTALLATION SHOULD NOT REQUIRE PLATFORMS, LADDERS OR LIFTS FOR ACCESS. ADEQUATE CLEARANCE FROM THE FLOOR, CEILING, AND WALLS MUST BE PROVIDED TO FACILITATE THE REMOVAL OF THE RELIEF VALVE AND/OR CHECK VALVES.
2. PROTECT THE RPBA FROM FREEZING TEMPERATURES.
3. IF INSTALLED WHERE TEMPERATURES WILL REACH 110 DEGREES FAHRENHEIT, A HOT-WATER TYPE ASSEMBLY MUST BE USED.
4. AN RPBA SHALL NOT BE INSTALLED IN A PIT BELOW GROUND LEVEL.
5. BEFORE INSTALLING AN RPBA, ENSURE THAT THE RELIEF VALVES ARE IN GOOD WORKING CONDITION.
6. IF THE RPBA IS LOCATED INSIDE THE BUILDING, A DRAIN MUST BE PROVIDED TO RECEIVE SPILLAGE FROM THE RELIEF VALVE PORT. THE RELIEF VALVE PORT MUST ALWAYS HAVE AN APPROVED AIR GAP BETWEEN IT AND THE DRAIN OR MAXIMUM FLOOD LEVEL WHICHEVER IS HIGHEST.
7. THE RPBA SHALL NOT BE INSTALLED IN AN AREA WHERE CORROSIVE FUMES OR GASES COULD RENDER THE ASSEMBLY INOPERABLE.

FULTON COUNTY STANDARD DETAIL 820

REDUCED PRESSURE BACKFLOW PREVENTION ASSEMBLY

DATE	REVISIONS	DATE	REVISIONS

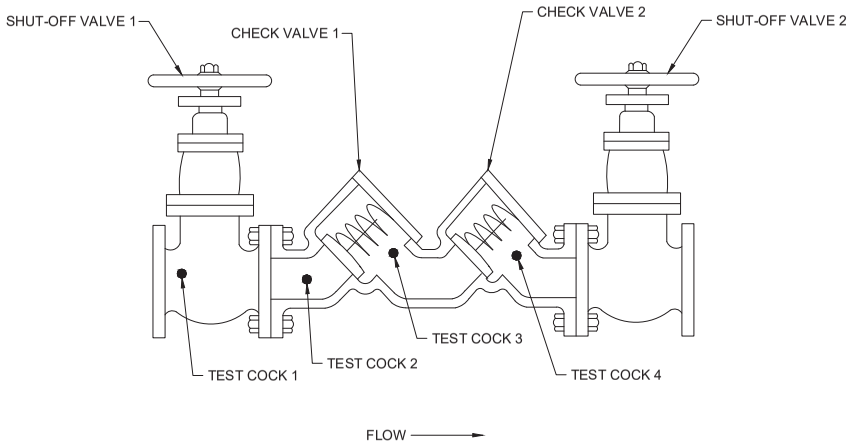
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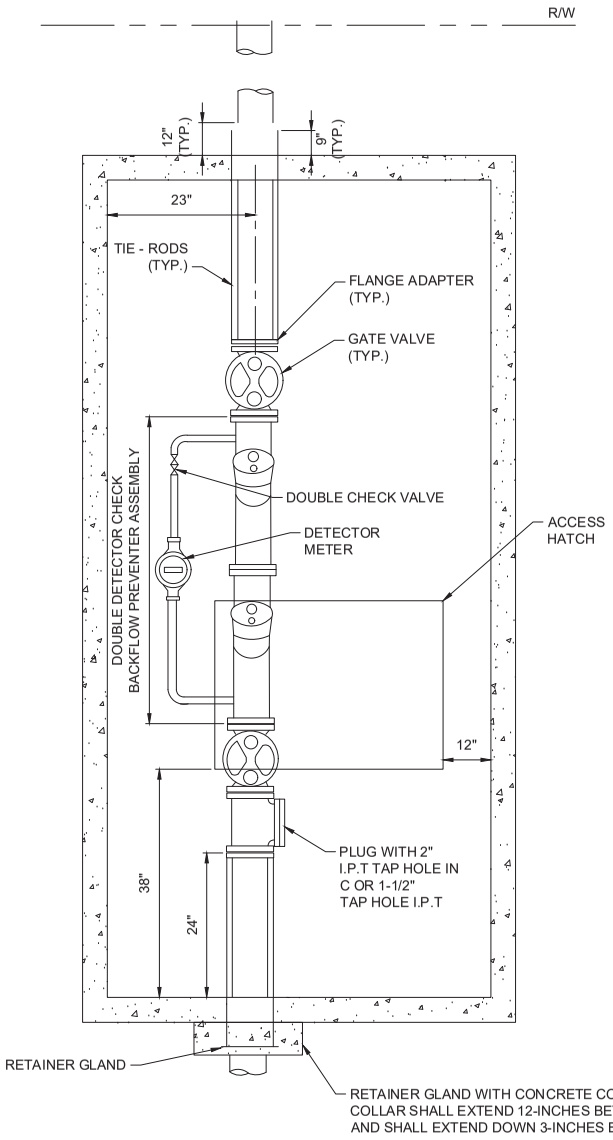
TYPICAL DOUBLE CHECK VALVE ASSEMBLY DETAIL
N.T.S.

NOTES:

1. INSTALLATION OF THE AIR-GAP OR MECHANICAL BACKFLOW PREVENTION ASSEMBLY SHALL BE SUBJECT TO THE APPROVAL OF FULTON COUNTY PUBLIC WORKS.
2. ANY DEVIATION FROM THE METHODS SPECIFIED MUST RECEIVE APPROVAL PRIOR TO INSTALLATION.
3. ALL MECHANICAL BACKFLOW PREVENTION ASSEMBLIES APPROVED BY FULTON COUNTY PUBLIC WORKS FOR INSTALLATION AT THE SERVICE CONNECTION MUST BE APPROVED BY THE FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH, UNIVERSITY OF SOUTHERN CALIFORNIA. THESE ASSEMBLIES ARE ONLY APPROVED FOR THE HORIZONTAL ORIENTATIONS.
4. CHOICE OF THE TYPE OF BACKFLOW PREVENTION ASSEMBLY, I.E. REDUCED PRESSURE PRINCIPLE OR DOUBLE CHECK VALVE ASSEMBLY (DCVA), WILL BE BASED ON THE DEGREE OF HAZARD AS EVALUATED BY FULTON COUNTY PUBLIC WORKS.
5. FOR FURTHER INFORMATION, REFER TO THE FULTON COUNTY MANUAL ON CROSS-CONNECTIONS.
6. THE DCVA SHOULD BE INSTALLED WITH ADEQUATE SPACE TO FACILITATE MAINTENANCE AND TESTING AND SHOULD HAVE FREE ACCESS WITHOUT THE USE OF PLATFORMS, LADDERS, OR LIFTS.
7. THE DCVA SHOULD BE INSTALLED BELOW GROUND LEVEL.
8. ALL DCVAS SHALL BE INSTALLED IN A HORIZONTAL POSITION UNLESS OTHERWISE RECOMMENDED BY THE MANUFACTURER AND/OR FULTON COUNTY PUBLIC WORKS.
9. DCVA MUST BE PROTECTED FROM FREEZING TEMPERATURES. FOR TEMPERATURES OF 100 DEGREES FAHRENHEIT (43 DEGREES CELSIUS) OR ABOVE, CONSULT MANUFACTURER'S LITERATURE FOR RECOMMENDATIONS.

FULTON COUNTY STANDARD DETAIL 821 DOUBLE CHECK VALVE ASSEMBLY		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: MB/EB/ML APPROVED: TM DATE: 01-21-2026	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO. 821

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NOTES:

1. TYPE I VAULT SHALL BE USED FOR 3-INCH, 4-INCH, 6-INCH OR 8-INCH DOUBLE DETECTOR CHECK BACKFLOW PREVENTER FOR USE WITH 1-INCH, 1½-INCH AND 2-INCH METER SET NEXT TO FIRE VAULT.
2. SEE FULTON COUNTY WATER STANDARD SPECIFICATIONS SECTIONS 40 05 01 AND 40 05 19 ALL MATERIAL TO BE FURNISHED BY CONTRACTOR.
3. ALL FITTING SHALL BE DUCTILE IRON WITH FLANGED JOINTS. GATE VALVES SHALL BE OUTSIDE STEM AND YOKE (OSY) WITH HANDWHEEL.
4. VAULT SHALL BE PRECAST CONCRETE. MIN. INSIDE HEIGHT SHALL BE 6 FEET. LOAD BEARING VAULT SHALL BE DESIGNED BY PROPERTY OWNER'S ENGINEER, AND SUBMITTED TO COUNTY FOR APPROVAL.
5. FOR 3-INCH AND 4-INCH FIRE LINES, BACK FLOW VAULT SHALL BE 10' x 6' x 7' WITH 42" x 42" ACCESS HATCH.
6. FOR 6-INCH AND 8-INCH FIRE LINES, BACK FLOW VAULT SHALL BE 13' x 7' x 7' WITH 54" x 54" ACCESS HATCH.
7. VAULT FLOOR SHALL BE #57 CRUSHED STONE, MINIMUM 6 INCHES THICK.
8. PROVIDE CONCRETE PIER UNDER BFP 12" X 12" X 18" HIGH.
9. PROVIDE RETAINER GLAND ON PIPE BEYOND VAULT WALLS. PROVIDE TWO TIE RODS FROM FIRST INTERIOR FLANGE TO RETAINER GLANDS, WITH DOUBLE NUTS AND WASHERS. ENCASE RETAINER GLANDS IN CONCRETE. ALSO, PROVIDE TIE RODS FROM RETAINER GLAND TO TAPPING VALVE OR CASING UNDER ROAD, WHICHEVER IS CLOSER. RODS SHALL BE PROVIDED WITH BITUMASTIC COATING.
10. VAULT WALL OPENINGS SHALL BE SEALED WITH NON-SHRINK GROUT. ENSURE 1-INCH CLEARANCE BETWEEN TOP OF PIPE AND PRECAST WALL.

FULTON COUNTY STANDARD DETAIL 822

FIRE LINE VAULT - TYPE 1

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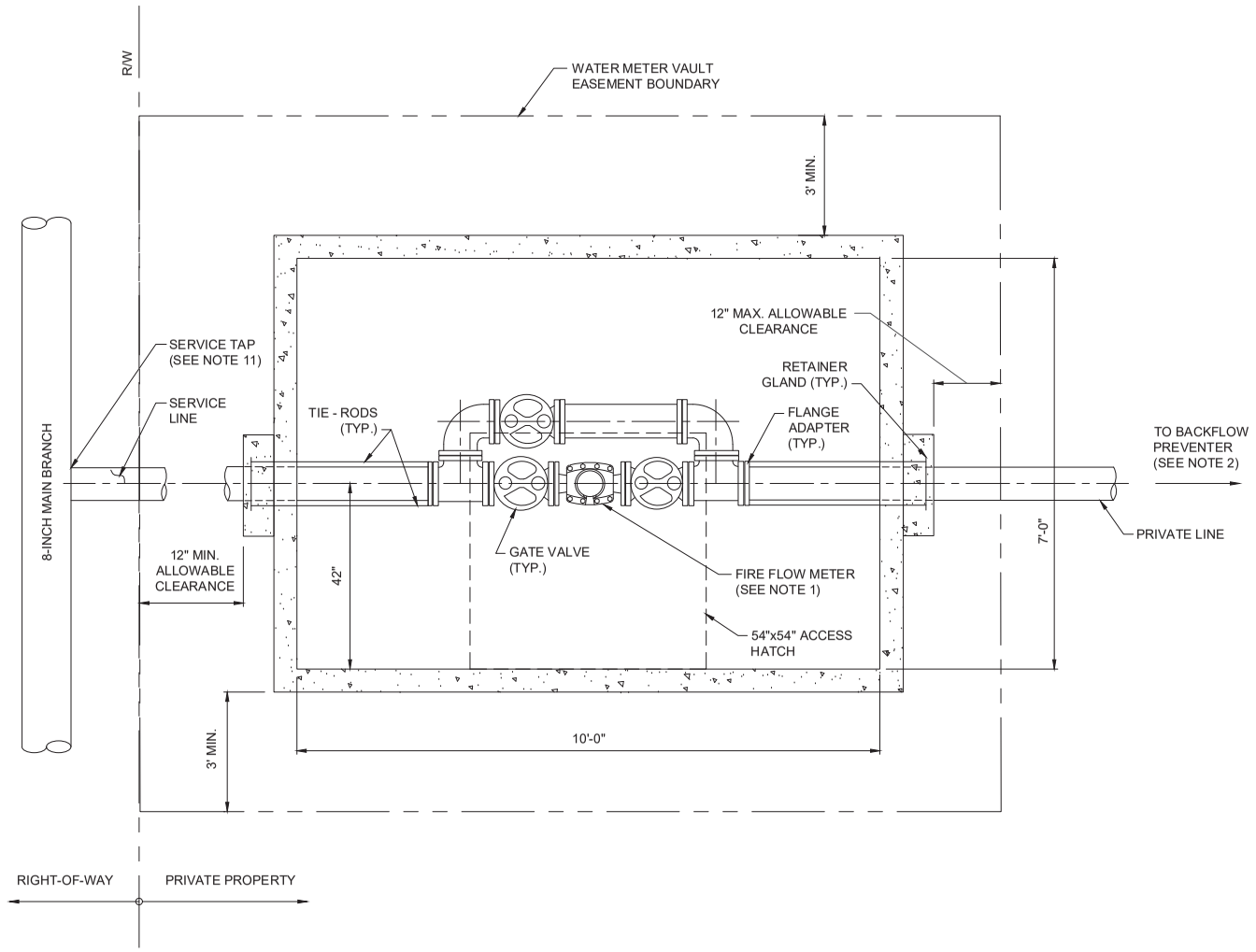
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NOTES:

1. FIRE METER SHALL BE THE MACH 10 ULTRASONIC METER BY NEPTUNE OR FCPW APPROVED EQUAL.
2. BACKFLOW PREVENTER SHALL BE REQUIRED & INSTALLED WITHIN 7 FT. OF THE FIRE METER.
3. STANDARD DETAIL APPLIES TO 3", 4", 6" AND 8" FIRE METER ONLY. DEVELOPER TO SUBMIT DESIGN FOR 10" FIRE METER TO BE REVIEWED BY FCPW.
4. PROVIDE 1'-0" CLEARANCE BETWEEN BOTTOM OF FIRE METER AND THE GRAVEL FLOOR OF VAULT.
5. SEE FULTON COUNTY WATER STANDARD SPECIFICATIONS SECTIONS 40 05 01 AND 40 05 19 FOR MATERIAL SPECIFICATIONS. ALL MATERIAL TO BE FURNISHED BY CONTRACTOR.
6. ALL FITTING SHALL BE DUCTILE IRON WITH FLANGED JOINTS. GATE VALVES SHALL BE OUTSIDE STEM AND YOKE (OSY) WITH HANDWHEEL.
7. VAULT SHALL BE PRECAST CONCRETE. MIN. INSIDE HEIGHT SHALL BE 6 FEET. LOAD BEARING VAULT SHALL BE DESIGNED BY PROPERTY OWNER'S ENGINEER, AND SUBMITTED TO FCPW FOR APPROVAL.
8. PROVIDE RETAINER GLAND ON PIPE BEYOND VAULT WALLS. PROVIDE TWO TIE RODS FROM FIRST INTERIOR FLANGE TO RETAINER GLANDS, WITH DOUBLE NUTS AND WASHERS. ENCASE RETAINER GLANDS IN CONCRETE. ALSO, PROVIDE TIE RODS FROM RETAINER GLAND TO TAPPING VALVE OR CASING UNDER ROAD, WHICHEVER IS CLOSER. RODS SHALL BE PROVIDED WITH BITUMASTIC COATING.
9. VAULT WALL OPENINGS SHALL BE SEALED WITH NON-SHRINK GROUT. ENSURE 1-INCH CLEARANCE BETWEEN TOP OF PIPE AND PRECAST WALL.
10. SERVICE TAP ON SHORT SIDE ONLY. TAP TO BE INSTALLED BY FCPW.

FULTON COUNTY STANDARD DETAIL 825

FM ASSEMBLY (FIRE SERVICE ONLY)

DATE	REVISIONS	DATE	REVISIONS

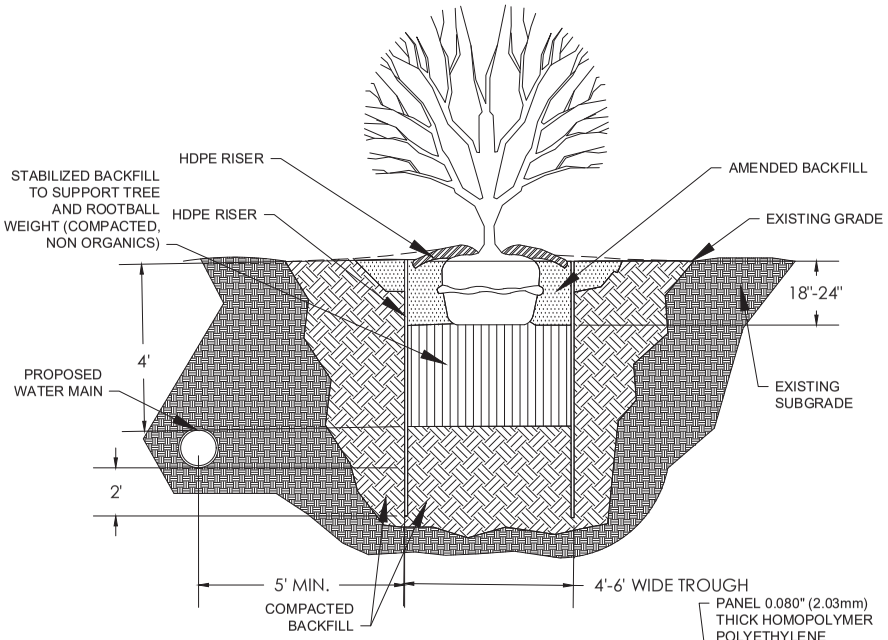
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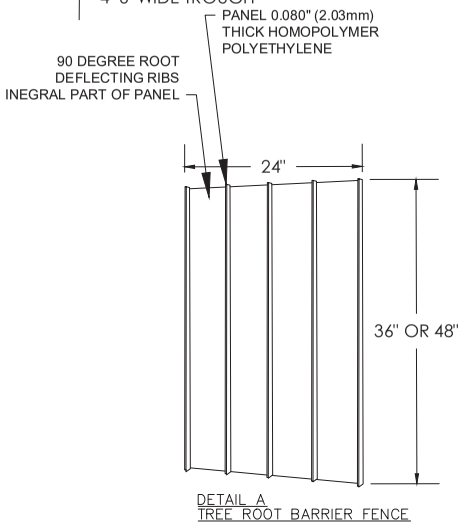
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DETAIL A
TREE ROOT BARRIER FENCE

UB 36–2/UB 48–2 SPECIFICATIONS 36" AND 48" DEEPROOT TREE ROOT BARRIER

A. MATERIALS

1. THE CONTRACTOR SHALL FURNISH AND INSTALL TREE ROOT BARRIER AS SPECIFIED. THE ROOT BARRIER SHALL BE EITHER PRODUCT #UB 36–2 OR UB 48–2 AS MANUFACTURED BY DEEPROOT GREEN INFRASTRUCTURE, LLC, 530 WASHINGTON STREET, SAN FRANCISCO, CA, WWW.DEEPROOT.COM (800).458.7668).
2. ROOT BARRIER SHALL BE RECYCLABLE, BLACK, EXTRUDED PANELS WITH 0.80" (2.03MM) WALL THICKNESS IN MODULES 24" (609MM) LONG AND EITHER 36" (910MM) OR 48" (1220MM) DEEP.
3. ROOT BARRIER SHALL BE MANUFACTURED WITH 100% REPROCESSED HOMOPOLYMER POLYETHYLENE WITH ADDED ULTRAVIOLET INHIBITORS.
4. ROOT BARRIER SHALL BE COMPRISED OF 24" (609mm) MODULES. EACH PANEL SHALL HAVE NO LLESS THAN FOUR (4) MOLDED INTEGRAL VERTICAL ROOT DIRECTING RIBS OF A MINIMUM 0.080" (2.03mm) THICKNESS, PROTRUDING 1/2" (12.7mm) AT 90 DEGREES FROM INTERIOR OF THE BARRIER PANEL, SPACED 6" (152.4mm) APART. (SEE DETAIL A)
5. ROOT BARRIER SHALL HAVE AN INTEGRATED JOINING SYSTEM FOR ASSEMBLY BY SLIDING ONE PANEL INTO ANOTHER.

MATERIAL AND THICKNESS	HOMOPOLYMER POLYETHYLENE 0.080 INCH EXTRUDED	
PROPERTIES	TYPICAL VALUE	ASTM TEST METHOD
TENSILE STRESS @ YIELD	3800 PSI	D638
ELONGATION @ BREAK %	10%	D638
TENSILE MODULUS	155,000 PSI	D638
NOTCHED IZOD IMPACT	0.4 – 4.0	D256A
FLEXUAL MODULUS 73 PSI	145,000	D790
HARDNESS SHORE	P66	D2240

FULTON COUNTY STANDARD DETAIL 826

ROOT BARRIER SYSTEM

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TECHNICAL SPECIFICATIONS

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 – GENERAL

1.01. PROJECT INFORMATION

A. Project Identification: <Insert Bid Title>

1. Project Location: Various locations throughout Fulton County, GA.

B. Owner: Fulton County

1. Owner's Representative: <Insert Contact and Info for PM>

C. Engineer: <Insert Engineer Contact Info>

1.03. WORK COVERED BY CONTRACT DOCUMENTS

A. The work of the Project is defined by the Contact Documents and consists of the following:

1. The work for this project shall include, but not be limited to, furnishing all labor, material, incidentals, supervision and equipment to perform the water main installation and testing, provide erosion and sedimentation control, traffic control, and all associated work in accordance with the Contract Documents.

2. <Insert additional scope of work.>

3. All work shall be in conformance with the Contract Documents, Contract Drawings and Fulton County Standards and Specifications. .

1.04. CONTRACTS

A. The Owner shall award the contract for this Work to a single Prime Contractor. The Contractor shall be solely responsible for the timely completion of the Work and successful startup of the facility.

1.05. PROTECTION OF WORK, PROPERTY AND PERSONS

A. The Contractor shall be responsible for the care of all Work until its completion and final acceptance; and the Contractor shall, at its own expense, replace damaged or lost material and repair damaged parts of the Work, or the same may be done by the Owner, and the Contractor and its sureties shall be liable therefore.

B. The Contractor shall make its own provisions for properly storing and protecting all materials and equipment against theft, injury, or damage from any and all causes. Damaged materials and equipment shall not be used in the Work.

C. The Contractor shall take all risks from floods and casualties or for delays from such causes. The Contractor may, however, be allowed a reasonable extension of time on account of such delays, subject to the conditions herein before specified.

D. The Contractor shall remove from the vicinity of the completed Work all plant, buildings, rubbish, unused material, concrete forms, sheeting or equipment belonging to the Contractor or used under its discretion during construction. In the event of the Contractor's failure to do so, the same may be removed by the Owner at the expense of the Contractor, and the Contractor and its sureties shall be liable therefore.

E. The Contractor shall adopt all practical means to minimize interference to traffic and inconvenience, discomfort, or damage. The Contractor shall maintain local access, school buses, emergency vehicles, etc.

F. The Contractor shall protect against damage, any piling, duct or structures crossing trenching or encountered in the Work and shall be responsible for any damage done to such structures or damage therefrom. The Contractor shall support or replace any such structures without delay and without any additional compensation, to the entire satisfaction of the Owner.

G. The Contractor shall be responsible for all damage to persons and property directly or indirectly caused by its operations, and under all circumstances the Contractor shall comply with the regulations of the Owner, and the laws and regulations of the State of Georgia, relative to safety of persons and property and the interruption of traffic and the convenience of the public within the respective jurisdiction, and the Contractor shall be solely responsible for any damages caused by failure to provide proper safety.

H. The Contractor will be held responsible for and be required to make restitution, at its own expense, for all damage to persons or property caused by the Contractor or subcontractor, or the agents, or employees of either during the progress of the Work and until its final acceptance.

1.06. NOISE CRITERIA

A. Unless otherwise specified, noise levels for all operating equipment shall not exceed the local noise ordinance and all work shall be performed within the working hours as required by authorized government, City, and the County.

B. Noise criteria shall be met without the use of special external barriers or enclosures

1.07. WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1. <Insert description or “None.”>

B. Preceding Work: Owner will perform the following construction operations at Project site. Those operations are scheduled to be substantially complete before work under this Contract begins.

1. <Insert description or "None.">

C. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

1. <Insert description or "None.">

D. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.

1. <Insert description or "None.">

1.08. FUTURE WORK

A. The Contract Documents include requirements that will allow Owner to carry out future work following completion of this Project; provide for the following future work:

1. <Insert description or "None.">

1.09. PURCHASE CONTRACTS

A. General: Owner has negotiated purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum, unless otherwise noted.

B. Purchase Contracts Information:

1. <Insert description or "None.">

1.10. OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

B. Owner-Furnished Products:

1. <Insert description or "None.">

1.11. CONTRACTOR-FURNISHED, OWNER-INSTALLED PRODUCTS

A. Contractor shall furnish products indicated. The Work includes unloading, handling, storing, and protecting Contractor-furnished products as directed and turning over to Owner at Project closeout.

B. Contractor-Furnished, Owner-Installed Products:

1. <Insert description or "None.">

1.12. ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.13. COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Provide not less than 48 hours' notice to Owner of activities that will affect Owner's operations.

1.14. WORK RESTRICTIONS

A. General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in existing buildings to normal business working hours of <Insert time> a.m. to <Insert time> p.m., Monday through Friday, except as otherwise indicated.

1. Weekend Hours: <Insert restrictions on times permitted for weekend work>

2. Hours for Utility Shutdowns: <Insert Owner's restrictions>

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Fulton County not less than two days in advance of proposed utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

E. Controlled Substances: Use of alcohol, tobacco products and other controlled substances on the Project site is not permitted.

1.15. COORDINATION WITH THIRD PARTIES

A. The Contractor shall coordinate the Work with third parties (such as power, natural gas, or telephone companies) in areas where such parties may have rights to underground property or facilities.

B. The Contractor shall request from involved third parties maps or other descriptive information as to the nature and location of such underground facilities or property. The Contractor shall make all necessary investigations to determine the existence and location of underground utilities.

C. The Contractor will be held responsible for any damage to and for maintenance and protection of existing utilities and structures whether or not the utility has been located by its owner. The Contractor shall contact the utility owners and the individual property owners for the location of the utilities within the area of Work.

D. The Contractor shall coordinate the Work with owners of private and public property where access is required for the performance of the Work. Legal access will be acquired and provided by the Owner.

1.16. SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

3. Whenever the term “Construction Manager” or “Engineer” is used in the documents, it shall be taken to mean “Owner’s designated representative” or “Fulton County Engineer”.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.17. ALTERATION OF QUANTITIES

A. The Owner reserves the right to alter the quantities of work to be performed or to extend or shorten the improvements at any time when and as found necessary, and the Contractor shall perform the work as altered, increased or decreased.

1. Payment for such increased or decreased quantity will be made in accordance with the Instructions to Bidders.

2. No allowance will be made for any change in anticipated profits nor shall such changes be considered as waiving or invalidating any conditions or provisions of the Contract and Bond.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 11 10

GEOTECHNICAL INFORMATION

PART 1 – GENERAL

1.01. SCOPE

A. The following geotechnical report document is available for review in the appendix of these Contract Documents:

Report of Subsurface Exploration and Geotechnical Engineering Evaluation
<Insert Project Title>

Prepared by:
<Insert Geotechnical Consultant Contact Info>

Interpretations, evaluations, and conclusions as to the nature of the geotechnical materials, the difficulties of making and maintaining the required excavations, and the difficulties of doing other work affected by geotechnical conditions shall be the sole responsibility of the Contractor. At no additional cost to the Owner, the Contractor may conduct, with Owner's approval, other investigations and tests it deems appropriate.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 11 55

CONSTRUCTION STAKING

PART 1 – GENERAL

1.01 SCOPE

A. Construction staking shall include all of the surveying work required to layout the Work and control the location of the finished Project. The Contractor shall have the full responsibility for constructing the Project to the correct horizontal and vertical alignment, as shown on the Drawings, as specified, or as ordered by the Construction Manager. The Contractor shall assume all costs associated with rectifying work constructed in the wrong location.

B. From the information shown on the Drawings and the information to be provided as indicated under Project Conditions below, the Contractor shall:

1. Be responsible for setting reference points and/or offsets, establishment of baselines, and all other layout, staking, and all other surveying required for the construction of the Project.

2. Safeguard all reference points, stakes, grade marks, horizontal and vertical control points, and shall bear the cost of re-establishing same if disturbed.

3. Stake out the permanent and temporary easements or the limits of construction to ensure that the Work is not deviating from the indicated limits.

4. Be responsible for all damage done to reference points, baselines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, baselines, center lines and temporary bench marks as a result of the operations.

C. Baselines shall be defined as the line to which the location of the Work is referenced including, but not limited to, edge of pavement, road centerline, property line, right of way or survey line.

D. Record Drawing surveys shall be performed in accordance with Section 01 78 39 of these Specifications.

1.02 PROJECT CONDITIONS

A. The Drawings provide the location and/or coordinates of principal components of the Project. The alignment of some components of the Project may be indicated in the Specifications. The Construction Manager may order changes to the location of some of the components of the Project or provide clarification to questions regarding the correct alignment.

B. The survey points, control points, and baseline to be provided to the Contractor shall be limited to only that information which can be found on the Project site by the Contractor.

C. A topographic survey is included on the Drawings.

1.03 QUALITY ASSURANCE

A. The Contractor shall furnish documentation, prepared by a surveyor currently registered in the State of Georgia, confirming that staking is being done to the horizontal and vertical alignment shown in the Contract Documents. This requires that the Contractor hire, at the Contractor's own expense, a currently registered surveyor, acceptable to the Owner, to provide ongoing construction staking or confirmation of such.

B. Any deviations from the Drawings shall be confirmed by the Construction Manager prior to construction of that portion of the Project.

C. Quantities for payments measured under this Contract shall be certified by the registered surveyor.

D. Construction Verification Surveying Cash Allowance

1. This cash allowance is solely for the use of the Construction Manager for verification of the Contractor's reference points, centerlines and work performed and is not to be used by the Contractor to provide cut sheets.

2. The presence of this cash allowance in no way relieves the Contractor of the responsibility of installing reference points, centerlines, temporary bench marks, verifying that the work has been performed accurately, and all other work covered by this Section.

1.04 WATER MAINS

A. Staking Precision: The precision of construction staking required shall be that which the correct location of the water main and sanitary sewer can be established for construction and verified by the Construction Manager. Where the location of components of the water main such as fittings, valves, road crossings and are not dimensioned, the establishment of the location of these components shall be based upon scaling these locations from the Drawings with relation to readily identifiable land mark such as survey reference points, power poles, manholes, etc.

B. Reference Points

1. Reference points shall be placed, at or no more than three feet, from the outside of the construction easement or right of way. The location of the reference points shall be recorded in a log with a copy provided to the Construction Manager for use, prior to verifying reference point locations.

2. Distances shall be accurately measured to 0.01 foot.

3. The Contractor shall give the Construction Manager reasonable notice that reference points are set. The reference point locations must be verified by the Construction Manager prior to commencing clearing and grubbing operations.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 11 80

ENVIRONMENTAL CONDITIONS

PART 2 – GENERAL

1.01 ENVIRONMENTAL CONDITIONS

A. This section describes the environmental conditions which have been observed at the site of the Work and which may reasonably be anticipated throughout the life of the project.

1.02 CLIMATE CONDITIONS

A. The site of the Work is at an elevation of approximately 860 feet to 1,200 feet above mean sea level.

B. Climate conditions are described as follows:

Description	Range of Conditions
Winter	Cool and damp
Summer	Hot and humid
Relative humidity, percent	
Indoors	20 to 90
Average outdoors	20 to 100
Air temperature, degrees F	
Outdoors	15 to 105
Indoors	30 to 105
Barometric pressure, inches, mercury	29.1 to 31.0

1.03 ADDITIONAL CONDITIONS

A. Additional conditions which may be applicable are specified in other sections.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 14 13

INSPECTION OF WORK

PART 1 – GENERAL

1.01 SCOPE

A. The work covered by this Section includes the Construction Manager's and Contractor's responsibilities and obligations regarding inspection of the work performed.

1.02 CONSTRUCTION MANAGER'S INSPECTION

A. The Construction Manager shall have the right of access to and inspection of the Work at all times. Materials, equipment and products shall be subject to the Construction Manager's review as specified herein.

B. The Construction Manager is responsible for general surveillance of the work on behalf of the Owner. The Construction Manager is not responsible for construction means, methods, sequences, or procedures or for safety precautions and programs in connection with the Work. The Construction Manager is not responsible for supervision of the Work and shall not give instruction to the Contractor's personnel as to methods of execution of the Work. The Construction Manager is not responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents.

1.03 CONTRACTOR'S DUTIES

A. The Contractor is responsible for all materials, equipment, methods, and procedures in execution of the Work.

B. The Contractor shall correct to the satisfaction of the Construction Manager any work or material found to be defective or of deficient quality. Such corrections shall be made by the Contractor at no additional expense to the Owner.

1.04 RIGHT OF ENTRY

A. Representatives of Fulton County, the Environmental Protection Division of the Georgia Department of Natural Resources, and the U.S. Department of Agriculture, Soil Conservation Services and others as may be identified by the Owner shall have access to the Work wherever it is in preparation or progress.

B. The Contractor shall provide proper facilities for such access and inspection.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 14 16

OCCUPANCY

PART 1 – GENERAL

1.01 PARTIAL OCCUPANCY BY OWNER

A. Whenever, in the opinion of the Construction Manager, any section or portion of the Work or any structure is in suitable condition, it may be put into use upon the written order of the Construction Manager and such usage will not be held in any way as an acceptance of said Work or structure, or any part thereof, or as a waiver of any of the provisions of these Specifications and the Contract.

B. Pending final completion and acceptance of the Work, all necessary repairs and replacements, due to defective materials or workmanship or operations of the Contractor, for any section of the Work so put into use shall be performed by the Contractor at Contractor's own expense.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 22 00

MEARUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 SCOPE

A. The Bid lists each item of the Project for which payment will be made. No payment will be made for any items other than those listed in the Bid. The Project Manager will clarify all contradictions.

B. Required items of work and incidentals necessary for the satisfactory completion of the work which are not specifically listed in the Bid, and which are not specified in this Section to be measured or to be included in one of the items listed in the Bid, shall be considered as incidental to the work. All costs thereof, including Contractor's overhead costs and profit, shall be considered as included in the unit prices bid for the various Bid items. The Contractor shall prepare the Bid accordingly.

C. Work includes furnishing all labor, equipment, tools and materials, which are not furnished by the Owner and performing all operations required to complete the work satisfactorily, in place, as specified and as indicated on the Drawings.

1.02 DESCRIPTIONS

A. Measurement of an item of work will be by the unit indicated in the Bid. Work performed for items not included in the Bid shall be paid in accordance with Section 8, 00700-87.

B. Final payment shall be based on the actual work or service performed, calculated, and field measured, using the unit prices set forth in the Contract Document.

C. Final quantities to be paid for items not shown on the Project Drawings, shall be based on the Bid Unit Price, and quantity approved by the Owner or Construction Manager.

C. Payment for an item of work includes all necessary and incidental related work required to complete the Work, whether specified or not.

E. Unless otherwise stated in individual sections of the Specifications or in the Bid, or as approved in writing by the Owner prior to beginning the work, no separate payment will be made for any item of work, materials, parts, equipment, supplies or related items required to perform and complete the work.

1. The costs for all such items required shall be included in the price bid for item of which it is a part.

2. In the event that the Owner requests Work that is agreed by both the Owner and the Contractor as not included in the Bid, that item of work will be paid for in accordance with Section 8, 00700-87.

F. Payment will be made by extending unit prices multiplied by quantities provided and then summing the extended prices to reflect actual work.

1. Such price and payment shall constitute full compensation to the Contractor for furnishing all plant, labor, equipment, tools and materials not furnished by the Owner and for performing all operations required to provide to the Owner the entire Project, complete in place, as specified and as indicated on the Drawings and Specifications.

G. “Products” shall mean materials or equipment permanently incorporated into the work.

H. “Provide” shall mean furnish and install.

1.03 NON PAYMENTS

A. No separate payment shall be made for the restoration of developed property and the repair of damaged properties, due to the Contractor’s work execution. The cost shall be included in the Bid Unit Prices, for the execution of the work, and each particular item of work, unless specifically noted otherwise.

B. No separate payment shall be made for pipe, pipe appurtenances, excavation, disposal of rubbish and debris, pipe bedding, backfill, dewatering of trench, repair of damaged properties unless otherwise stated. All testing required for the execution of the work shall be done as part of the price for the item of work involved.

C. No separate payment shall be made for any traffic control, work area protection, recording, safety measures, set-up of equipment and set-up of staging area except as indicated below. Payment for these items shall be part of the unit price bid for each particular item of work.

D. No separate payment shall be made for providing detail field survey needed for construction.

1. Survey work to be performed by Contractor in the establishment of reference points includes construction staking to establish and/or confirm the location of reference points, temporary and permanent bench marks, proposed water main center line or baseline, right–of–way, and easements limits.

2. The Contractor shall be responsible for all the costs of re-establishing the existing bench marks, reference points and stakes.

3. The Contractor shall be responsible in providing further survey necessary to complete the Work.

4. The Contractor shall carefully preserve the established points, and in case of willful or careless destruction, the Contractor shall be responsible for the costs of re-establishing the bench marks, reference points and stakes.

E. No separate payment shall be made for delay or extra cost encountered by the Contractor due to protection, avoidance or relocation of existing utilities, mains, or services shown or not shown on the Project Construction Drawings.

F. No separate payment shall be made for glands, lock ring or harnessing. The cost shall be included in the Bid Unit Price for each particular item of work.

G. No separate payment shall be made for thrust collars and blocks unless listed separately in the Bid. All cost shall be included in the Bid Unit Price for each particular item of work, and as shown on the Project Construction Drawings.

H. No separate payment shall be made for abandoning and/or removal of any existing materials from the project area or work site. The cost of such work and materials shall be included in the Bid Unit Price for each particular item.

I. No separate payments shall be made for existing pavement removal and replacement associated with the construction of the Project unless listed separately in the Bid. The cost of such work and materials shall be included in the Bid Unit Price for each particular item.

J. Not separate payments shall be made for saw cutting existing pavement, any cutting activities necessary to install the proposed work, and including beveling of pipes.

K. No separate payments shall be made for the installation of electronic markers unless listed separately in the Bid. The cost of such work and materials shall be included in the Bid Unit Price for each particular item.

L. No separate payments shall be made for temporary and/or permanent Erosion and Sedimentation Controls unless listed separately in the Bid, or except as noted on the Project Drawings or as directed and approved by the Owner.

M. No separate payments shall be made for any portion of the Project for which temporary Erosion and Sedimentation controls are not property maintained.

N. No separate or additional payments shall be made for the Project area where the Contractor need to reseed for the following causes:

1. Inadequate watering and maintenance.
2. Loss of seeds caused by site erosion, e.g. wind and rain.
3. Inadequate germination of seeds.
4. Inadequate coverage and/or density.
5. Providing permanent species at the appropriate season, after temporary grassing has been performed.

O. No separate or additional payments shall be made for providing temporary species of grass, where the seasonal limitations does not allow for the proper germination of a permanent species of grass. The cost for sowing or planting temporary species shall be included in the Unit Price Bid for the item it pertains.

P. No separate or additional payments shall be made for following reasons:

1. Materials that were not installed,
2. The replacement of defective materials.
3. Any section of the Project activity which does not pass the applicable tests.
4. If the area has not been clean up to the satisfaction of the Construction Manager.

Q. No separate or additional payments shall be made for maintaining traffic flow, on and/or near or through the Project's area detour, roadways, streets, driveways, and work segment impacted by the construction activities unless listed separately in the Bid.

R. No separate or additional payments shall be made for existing rock or pipe line soil excavation, for the Project's construction. The cost shall be included in the particular work item Bid Unit Price.

S. No separate or additional payment shall be made for removing and replacing the damaged pre-construction area condition adjacent to the Project's site, damaged curb and gutter, driveway areas and pavements, caused by Contractor working on the Project.

T. No payments shall be made for restoration and the regrading of easements. The cost shall be included in the particular work item Bid Unit Price.

U. No payment shall be made for fittings provided, due to the Contractor's sequence of construction, layout problems or repairs, except for those shown on the Project Drawings or as specified.

V. No separate payment shall be made for the support of existing pipe, when installing new water mains over or under existing utilities. All costs for support shall be included in the Bid Unit Price for the water main.

W. No separate or additional payments shall be made for temporary measures required or necessary to make the road passable and drivable, including backing to the top of the trench temporarily with crusher run or granular material or placing a temporary asphalt topping surface.

X. No separate or additional payments for trench excavation, backfill and trench stabilization, shall be made for any special or unique method, means, techniques or equipment necessary for the Contractor's compliance with Specifications, regulatory requirements, permits, and laws or regulations, applicable to the Project.

Y. No separate payments shall be made for trench excavation and backfill. All costs shall be included in the Bid Unit Price for the item to which pertains.

Z. No separate payments shall be made for providing any sheeting, bracing, and shoring. All costs shall be included in the Bid Unit price for item to which it pertains.

1.04 CONTRACTOR MOBILIZATION/DEMOBILIZATION

A. All costs associated with mobilization and demobilization of all required resources, a one-time cost for each non-emergency and emergency project assigned by the Owner shall be included in the Unit Price Bid for CONTRACTOR MOBILIZATION/DEMOBILIZATION, based on the project sizes listed in the Bid.

1.05 WATER MAINS AND ACCESSORIES

A. Existing Utilities and Obstructions

1. Horizontal Conflict: Payments for conflicts with existing utilities shall be made only where additional fittings and/or additional lengths of pipe are approved by the Construction Manager.

a. The said payment shall be made at the Bid Unit Price, given in the Bid Document.

b. No other payment will be made for any delay or extra cost encountered by the Contractor due to protection, avoidance or relocation of existing utilities, mains or services or changing the horizontal alignment of the water main.

c. No separate payments shall be made for changing the horizontal alignment of the water main to avoid a horizontal conflict, with existing utilities, except for additional fittings and/or additional lengths of pipe, as approved by the Construction Manager.

2. Vertical Conflict: Where authorized by the Construction Manager, payment for additional depth of cut required to avoid vertical conflicts shall be made at the unit prices bid for water main. No payment will be made for relocation of existing utilities except as authorized by the Construction Manager.

a. Payments for additional fittings, concrete encasement or steel casing, as required and approved by the Construction Manager. shall be made at the Bid Unit Price for which it pertains.

B. Location and Grade: No separate payment shall be made for survey work performed by or for the Contractor in the establishment of reference points, bench marks, cut sheets, limits of right of way or easement, including their restoration, as well as centerline or baseline points.

1. The Construction Verification Surveying cash allowance is solely for the use of the Construction Manager, for the verification of Contractor's reference points, centerlines, and work performed.

2. This cash allowance, in no way relieves the Contractor of the responsibility of, including but not limited to, installing the required Project reference points, centerlines, temporary and permanent bench marks, or verifying that their work has been performed accurately.

C. Construction Along Highways, Streets and Roadways: No separate payment shall be made for traffic control or maintaining highways, streets, roadways and driveways, unless listed separately in the Bid and as authorized by the Construction Manager.

1. The Bid Unit Price shall include the cost of erecting and maintaining barriers, Signs, lights, traffic control measures and channelization devices, flagmen, and whatever is necessary to provide a safe work zone, and to protect the public safety, in accordance with the Traffic control Plan, and the current Manual on Uniform Traffic Control Devices for Streets and Highways.

D. Ductile Iron Pipe Water Main

1. Payment for water main shall be made at the unit price bid for WATER MAIN, for the quantity and type provided at the appropriate depth. Payment will be made at the one unit price for the actual depth of the water line.

2. Measurement for payment at the unit price for WATER MAIN:

   a. Length shall be made along the centerline of the pipe, through valves and fittings.

   b. Depth of cut shall be measured from pipe invert to ground level at the pipe centerline.

   c. Cut sheets prepared by the Contractor and approved by the Construction Manager shall be the basis for payment.

3. The unit price bid for WATER MAIN shall, unless specified otherwise, include all costs for installation of the water line as required including, but not limited to, materials, labor, excavation, dewatering, shoring, bedding, haunching, backfill, compaction, clean-up, testing, and all other related items not listed as separate items in the Bid.

4. The unit price bid for LABOR COST TO INSTALL COUNTY PROVIDED DIP WATER MAIN shall include all costs for installation of the water line and appurtenances (valves, valve boxes, fittings and hydrants) with County provided pipe materials as required including, but not limited to, labor, excavation, dewatering, shoring, bedding, haunching, backfill, compaction, clean-up, testing, and all other related items not listed as separate items in the Bid.

5. Payment for pipe INSTALLED IN STEEL CASING will be made in addition to payment for water main installed at the appropriate depth.

   a. The unit price bid for pipe INSTALLED IN STEEL CASING shall include all additional costs associated with providing the appropriate size steel casing pipe, spacers, grout, brick, as required

for the complete installation of pipe in casing via open-cut installation.

b. All costs associated with installation of the water line, including excavation, dewatering, etc. shall be included in the unit price bid for WATER MAIN.

c. Pipe installed inside a casing shall be RESTRAINED JOINT.

6. No payment shall be made for sections of pipe which are not installed.

7. No additional payment shall be made for replacement of defective materials.

8. No payment shall be made for sections of pipe which have not passed the required tests, or if the area has not been cleaned up to the satisfaction of the Construction Manager.

9. No separate payment will be made for cutting and beveling pipe.

10. Thrust Restraint: No separate payment will be made for retainer glands or harnessing.

11. Payment for concrete thrust collars shall be made at the unit price bid for CONCRETE THRUST COLLARS.

E. Fittings

1. The unit price bid for FITTINGS shall include the costs of fittings and all joint accessories and, unless specified otherwise, the cost of all related blocking. The weight of fittings used for payment shall be as follows:

a. AWWA C110 standard weight for C110 fittings.

b. AWWA C153 standard weight for C153 fittings.

c. The weight of bolts, glands, or cement lining shall not be included.

2. Weight of fittings for payment for diameters 24 inches and larger shall be manufacturer's standard weight and shall not include weight of bolts, glands or cement lining.

3. Anchor couplings not included in a fire hydrant assembly will be paid for at the unit price bid for FITTINGS and shall not be included in the quantities measured for water main.

a. Weight for payment of anchor couplings will be determined from the manufacturer's standard weight, including the coupling and rotating split gland.

4. Hydrant tees not included in a fire hydrant assembly will be paid for at the unit price bid for FITTINGS.

a. Weight for payment of anchor couplings will be determined from the manufacturer's standard weight.

F. Fire Hydrants

1. Unless specified otherwise, payment for fire hydrants shall be made for the actual quantity installed at the unit price bid for FIRE HYDRANT ASSEMBLY- complete.
    a. The unit price bid for fire hydrant assembly shall include all costs associated with providing a complete fire hydrant assembly which shall include the following:
        1) 4.5 foot depth of bury fire hydrant,
        2) 6-inch gate valve,
        3) Valve box,
        4) Related blocking,
        5) Gravel drain,
        6) Grade-lock fitting,
        7) Anchor couplings,
        8) Hydrant tee, and
        8) All associated labor and materials.
    b. Exception: All FITTINGS will be paid for separately at the Unit Price Bid for FITTINGS
2. Payment for hydrant lead piping and blow off piping will be made at the unit price bid for 6-inch WATER MAIN, except when anchor couplings are used.
3. Fittings for blow off and air release hydrant leads will be paid for at the unit price bid for FITTINGS.
4. Payment for hydrant extension sections where the depth of bury of fire hydrants is greater than 4.5 feet shall be made to the nearest half foot at the unit price Bid for HYDRANT EXTENSION.
    a. No distinction shall be made between the additional barrel lengths provided by measuring and ordering the proper depth of bury for the hydrants and the additional barrel length provided by adding extension kits after the hydrant is ordered.
    b. The unit price bid for HYDRANT EXTENSION shall include the cost of valve extension stems.
5. Salvage Existing Hydrant:
    a. Measurement for payment for removal and salvaging or disposal of existing fire hydrants shall be based on the actual quantity at the unit price bid per each hydrant removed.
    b. The unit price bid shall include all costs associated with removal of the hydrant assembly, plugging the existing main, restoration of the area, transportation of the salvaged hydrant assembly to the County's facility located at 11575 Maxwell Road, Alpharetta, GA, or disposal of the assembly if directed by the Construction Manager.

G. Valves:

1. The unit price bid for VALVES shall include the cost of providing the valve, extension stem, valve box, valve marker, all joint accessories and all other related items.

2. For valves in a vault, unless specified otherwise, the vault, and associate piping, equipment, structures, etc. will be included in the VALVE VAULT Bid item Unit Price.

H. Valve Adjustments in Pavement

1. The unit price bid for VALVE ADJUSTMENTS IN PAVEMENT (0' to 5') shall include the cost of providing the new valve box and lid or 6 inch ductile iron pipe, excavation, backfill, concrete pad, pavement repair and all other related items.

2. The unit price bid for VALVE ADJUSTMENTS IN PAVEMENT (greater than 5') shall include the cost of providing the new valve box and lid or 6 inch ductile iron pipe, valve extension, excavation, backfill, concrete pad, pavement repair and all other related items.

I. Valve Adjustments out of Pavement

1. The unit price bid for VALVE ADJUSTMENTS IN PAVEMENT (0' to 5') shall include the cost of providing the new valve box and lid or 6 inch ductile iron pipe, manufactured concrete pad, excavation, backfill, and all other related items.

2.. The unit price bid for VALVE ADJUSTMENTS IN PAVEMENT (greater than 5') shall include the cost of providing the new valve box and lid or 6 inch ductile iron pipe, valve extension, manufactured concrete pad, excavation, backfill, and all other related items.

J. Solid Sleeves:

1. Payment for solid sleeves shall be made at the unit price bid for FITTINGS.

2. No payment shall be made for fittings provided due to the Contractor's sequence of construction, layout problems or repairs, except for those shown on the Drawings or specified.

1.06 CONNECTIONS TO EXISTING WATER LINES

A. The unit price bid for TAPPING SLEEVES AND VALVES shall include the cost of locating the existing line, providing the sleeve, valve, extension stem, valve box, valve marker, all joint accessories, related support blocking and accessories, and all labor, materials, and tools required for a complete installation, including wet tapping the existing line.

1. Payment for required thrust blocking will be paid for at the unit price bid for CONCRETE THRUST BLOCKING.

B. The unit price bid for CUT IN CONNECTION shall include the cost of locating and cutting the existing line and making the connection of the new line to the existing line, including all labor, materials, and tools required for a complete installation.

1. All required fittings, valves, ductile iron water main, and thrust blocking will be paid for at the unit price bid for the item to which it pertains.

C. The unit price bid for STRAIGHT CONNECTION OR CONNECTING TO EXISTING LINE, shall include the cost of locating the existing line, removing existing plugs or other fittings, cutting the existing line, making connection of the new line to the existing line, including all labor, materials and tools required for a complete installation.

1. All required fittings, valves, ductile iron water main, and thrust blocking will be paid for at the unit price bid for the item to which it pertains.

1.07 ABANDON EXISTING WATER MAIN

A. Cut and Plug/Deadman Restraint:

1. The unit price bid for CUT AND PLUG/DEADMAN RESTRAINT shall include all costs associated with cutting and plugging an existing water line.
2. Work shall include locating the existing line, excavation, dewatering, cutting the line as necessary to remove the existing pipe and as directed by the Construction Manager, plugging openings where the cuts were made, providing all anchors, rods, straps, and all other related items.
3. Payment will be made for the quantity installed at the unit price bid for the appropriate size water line.

B. Payment for plugs will be made at the unit price bid for FITTINGS.

C. Payment for concrete thrust blocking or thrust collars will be made at the unit price bid for the appropriate item.

1. The quantities shall be determined from the dimensions shown on the Project Drawings for each size and type of fitting for which the blocking is installed.
2. The Contractor shall bear the costs for quantities in excess of the scheduled amount, as may be required, due to over excavation or other reasons.

1.08 CLEAN-UP, TESTING, AND DISINFECTION

A. No separate payment will be made for clean-up, pressure testing, and disinfection. All costs associated with clean up, pressure testing and disinfection of water main shall be included in the unit price bid for WATER MAIN.

B. Laboratory fees will be paid for through the TESTING cash allowance.

C. No payment shall be made for tests that fail to verify required results.

1.09 WATER SERVICE CONNECTIONS

A. The unit price bid for NEW SERVICE SETUP shall include fixed labor and materials associated with installation of a new water service connection.

1. Cost items shall include direct tap, corporation stop, meter box of the appropriate type, curb stop, associated fittings required for a complete installation, but not including the copper service line itself.

2. Measurement for payment will be made on the number of new services installed, at the unit price bid for each setup.

3. The Owner will supply the meter and the Contractor will have to pick up the meter from 11575 Maxwell Road, Alpharetta, Georgia.

B. The unit price bid for NEW 1-INCH SERVICE LINE shall include all variable labor and materials associated with installation of a new water service line including 1-inch copper tubing from the water main to the water meter.

1. Items included in NEW SERVICE SETUP above shall not be included.

2. Measurement for payment will be made from the tap to the water meter, per linear foot actually installed.

C. The unit price bid for NEW 1-1/2-INCH SERVICE LINE shall include all variable labor and materials associated with installation of a new water service line, including 1-1/2-inch copper tubing from the water main to the water meter.

1. Items included in NEW SERVICE SETUP above shall not be included.

2. Measurement for payment will be made from the tap to the water meter, per linear foot actually installed.

D. The unit price bid for NEW 2-INCH SERVICE LINE shall include all variable labor and materials associated with installation of a new water service line.

1. Items included in NEW SERVICE SETUP above shall not be included.

2. Measurement for payment will be made from the tap to the water meter, per linear foot actually installed.

1.10 WATER SERVICE CHANGEOVERS

A. The unit price bid for CHANGEOVER SETUP shall include fixed labor and materials associated with replacement of an existing water service connection.

1. The unit price bid for CHANGEOVER SETUP shall include:

a. Locating the existing service, abandoning the existing service line, any necessary boring and any associated pavement removal and replacement necessary to accomplish the work.

b. Direct tap, corporation stop, curb stop, associated fittings required for a complete installation, but not including the copper service line itself.

c. It is assumed that the meter and meter box will remain in place and will be reused.

d. Measurement for payment will be made on the number of service changeovers installed, at the unit price bid for each setup.

B. The unit price bid for REPLACE EXISTING WITH 1-INCH SERVICE LINE shall include all variable labor and materials associated with replacement of an existing water service line, including 1-inch copper tubing from the water main to the water meter.

1. Items included in CHANGEOVER SETUP above shall not be included.

2. Measurement for payment will be made from the tap to the water meter, per linear foot actually installed.

C. The unit price bid for REPLACE EXISTING WITH 1-1/2-INCH SERVICE LINE shall include all variable labor and materials associated with replacement of an existing water service line, including 1-1/2-inch copper tubing from the water main to the water meter.

1. Items included in CHANGEOVER SETUP above shall not be included.

2. Measurement for payment will be made from the tap to the water meter, per linear foot actually installed.

D. The unit price bid for REPLACE EXISTING WITH 2-INCH SERVICE LINE shall include all variable labor and materials associated with replacement of an existing water service line, including 2-inch copper tubing from the water main to the water meter.

1. Items included in CHANGEOVER SETUP above shall not be included.

2. Measurement for payment will be made from the tap to the water meter, per linear foot actually installed.

E. Payment for WATER METER RELOCATION will be made only as ordered by the Construction Manager, in addition to payment for service changeovers as appropriate.

1. The unit price bid for WATER METER RELOCATION shall include all additional work required beyond the fixed cost for changeover setup plus the linear foot cost for replacing an existing service line.

2. The unit price bid shall include disconnecting the existing meter and pressure reducing valve, moving the meter, meter box and pressure reducing valve to the new location, reconnecting the meter and pressure reducing valve to the existing house service line including up to 10 linear feet of house side copper tubing, reinstalling the meter box for the meter in accordance with the Drawings and providing a new valve box for the pressure reducing valve.

1.11 PRECAST VALVE VAULT

A. Precast valve vault shall include either rectangular precast box of circular manholes

B. Measurement for PRECAST VALVE VAULT shall be at the Unit Price Bid. All the cost to completely install a PRECAST VALVE VAULT shall be included in Unit Price Bid.

C. Payments for the construction of PRECAST VALVE VAULT at the station indicated on the Project Drawings, shall include concrete vault, hatch, and/or manhole cover, sump, ladder, miscellaneous fittings, and other work necessary to complete the vault, as specified, and shown on the Project Drawings. The actual vault shall be paid for under the associated item.

D. The unit price bid for 4 OR 5-FOOT DIAMETER PRECAST VALVE VAULT, at the depths listed in the Bid, shall include all costs associated with construction of a complete valve vault or manhole on a new water line, including excavation, shoring, dewatering, backfilling, compaction, crushed stone bedding, grouting, and all incidental items required to complete the installation.

E. Measurement for payment at the unit price for PRECAST VALVE VAULT shall be made from the outside bottom of the vault or manhole to the top of the top section. Payment will be made at the one unit price for the actual depth of the vault or manhole.

F. If specified to be bid separately, the unit price bid for VALVE VAULT RING AND COVER shall include the cost of providing the appropriate type ring and cover on a new valve vault or manhole or new riser section including materials, labor, grouting, brick and mortar, minor grade adjustments (up to three inches either way vertically) and all incidental items required to complete the installation.

1.12 AIR RELEASE VALVES

A. Measures for AIR RELEASE VALVES shall be the Unit Price Bid. All the cost to provide and install the air release valve, at stations indicated on the Project Drawings, shall be included in the Unit Price Bid.

B. Payment for AIR RELEASE VALVES shall be at the Unit Price provided in the Bid under AIR RELEASE VALVES, at stations indicated on the Project Drawings.

C. The Unit Price for AIR RELEASE VALVE shall include full payment for the air release valve, piping, tapping, fittings, manhole, frame and cover, stone and all related items, as called for on the Project Drawings and Specifications.

1.13 BORE AND JACK CASINGS

A. The unit price bid for BORE AND JACK CASING shall include all costs associated with furnishing and installation of the casing and carrier pipe, including but not limited to excavation, shoring, dewatering, backfilling, compaction, steel casing

pipe, ductile iron carrier pipe, spacers, end seals, grout, and other accessories, for installing the pipe complete in place.

1. The unit price bid shall assume that all bore and jack casing installations exceed 60 feet in length.

B. Payment for casing shall be made only at the completion of all work specified for the casing installation. No partial payment shall be made for the construction of the casing without carrier pipe.

C. Measurement for payment shall be made along the centerline of the pipe line to the limits of bore and jack as ordered by the Construction Manager.

D. Casing pipe may be included in Partial Payment Requests as stored materials, if the casing pipe is stored at the Project site. Casing pipe which has been properly installed, but has not yet been paid for as installed casing, may also be included as stored materials.

E. Payment for the carrier pipe in the casing shall be made only at the completion of all work specified for the pipe installation. Payment for carrier pipe in the casing shall be made only at the one unit price bid for the BORE AND JACK CASING.

F. In the event that rock is encountered during the installation of the pipe casing, and the installation penetration pressure exceed 6,000 psi, which in the opinion of the Construction Manager cannot be removed through the casing, then the Construction Manager may authorize the Contractor to complete the crossing by another method via a change directive. Payment for rock shall be compensated for under the item to which it pertain

G. No additional payment shall be made for rock excavation through the casing.

1.14 STORM DRAIN PIPE INSTALLATION

A. The unit price bid for STORM DRAIN PIPE shall include all costs associated with the installation or replacement of the appropriate size and type of storm drain piping associated with construction of a water line, where directed by the Construction Manager. Costs for excavation, shoring, dewatering, backfilling, compaction, and bedding shall also be included in the unit price bid for STORM DRAIN PIPE.

B. Measurement for payment will be made along the centerline of the storm drain pipe installed.

C. No separate payment will be made for support of existing pipe when installing new water line over or under existing storm water piping. All costs for support shall be included in the unit price bid for WATER MAIN.

D. Costs for removing and replacing existing storm water pipe for ease of construction when installing new water line shall be included in the unit price bid for WATER

MAIN. Payment for storm drain pipe will only be made where removal or replacement is approved or ordered by the Construction Manager prior to removal.

E. The unit price bid for PRECAST CONCRETE HEADWALL shall include all cost associated with the installation or replacement of the appropriate size and type of precast concrete headwall associated with construction of a water line, where directed by the Construction Manager. Costs for excavation, shoring, dewatering, backfilling, compaction, and bedding shall be included in the unit price bid for PRECAST CONCRETE HEADWALL.

1.15 EROSION AND SEDIMENTATION CONTROL

A. General

1. No separate payment shall be made for erosion and sedimentation controls, except as noted below. All other erosion and sedimentation control costs shall be included in the unit price bid for the item to which it pertains.
2. No payment will be made for any portion of the Project for which temporary erosion and sedimentation controls are not properly maintained.
3. Quantities for payment of erosion and sedimentation controls devices, if bid separately, shall be based upon actual quantity constructed by the Contractor.

B. Construction Exits

1. All costs for construction exits, including installation, maintenance, repair, and removal, shall be included in the unit price bid for CONSTRUCTION EXITS.
2. The unit price bid shall include geotextile underliner, stone, and all incidental costs associated with maintaining a construction exit to Fulton County standards.
3. If the action of the construction vehicles traveling over the gravel pad does not sufficiently remove mud and debris, the vehicle tires shall be washed prior to allowing vehicles to enter public right-of-way. No additional payment will be made for the cost of washing tires.
4. No payment will be made for construction exits that are improperly constructed or use materials that are not approved.

C. Reinforced Silt Fence: All costs for Type S silt fence, where ordered by the Construction Manager, including installation, maintenance, repair, replacement, and removal, shall be included in the unit price bid for REINFORCED SILT FENCE.

D. Hay Bale Check Dams: All costs for hay bale check dams, including hay bales, necessary earthwork, staking, periodic maintenance and repair, and removal of sediment and hay bales following establishment of permanent erosion control measures shall be included in the unit price bid for HAY BALE CHECK DAMS.

E. Stone Check Dams: All costs for stone check dams, including stone, geotextile underliner, necessary earthwork, periodic maintenance and repair, and removal of sediment and stone following establishment of permanent erosion control measures shall be included in the unit price bid for STONE CHECK DAM. Measurement for payment will be made to the limits allowed in accordance with the Standard Details and Specifications.

F. Curb Inlet Filter and Protection: All costs for temporary fabric, blocks, wires, and the furnishing of all labor, material, equipment and tools for installation, maintenance, repair and removal, shall be included in the Unit Price Bid for CURB INLET FILTER. Payment shall be based on the actual field quantity installed.

G. Inlet Sediment Traps: All costs for temporary inlet sediment traps (silt box), including installation, maintenance, repair and removal, shall be included in the unit price bid for INLET SEDIMENT TRAPS. Payment shall be based on the actual field quantity installed.

H. Pigs-in-a-Blanket: All costs for pigs in a blanket, including installation, maintenance, repair and removal, shall be included in the unit price bid for PIGS-IN-A-BLANKET. The unit price will be per structure rather than individual pigs-in-a-blanket. Payment shall be based on the actual field quantity installed.

I. Rip Rap With Filter Fabric Underlay: All costs for rip rap, including filter fabric, installation, maintenance, repair and removal, as required by the Standard Details and Specifications, or as directed by the Construction Manager, shall be included in the unit price bid for RIP RAP WITH FILTER FABRIC UNDERLAY.

J. Rip Rap: All costs for rip rap, excluding RIP RAP WITH FILTER FABRIC UNDERLAY, installation, maintenance, repair and removal, as required by the Standard Details and Specifications, or as directed by the Construction Manager, shall be included in the unit price bid for Rip Rap.

K. Box Gabion – 3’x3’x6’ Baskets: All costs for box gabions, including stone, wire mesh, stakes, anchors, filter fabric, assembly of box gabion, placement, excavation, backfill, compaction, and all incidental costs shall be included in the unit price bid for BOX GABION.

L. Tree Protection Fence: All costs for either passive or active tree protection fence, also known as orange mesh safety fence, including installation, maintenance, repair and removal, shall be included in the unit price bid for TREE PROTECTION FENCE.

1.16 VEGETATION RESTORATION

A. Temporary Seeding: Temporary seeding and mulching shall be applied to all disturbed area to be left exposed for a period greater than 14 days, or as ordered by the Construction Manager.

1. The unit price bid for TEMPORARY SEEDING shall include all costs associated with spreading fast growing seed, mulching, watering, maintenance and repair until permanent grassing is established.

B. Permanent Seeding: All costs for permanent seeding, including fine grading, raking, soil preparation (removal of rocks and other objectionable materials), sewing the appropriate type of grass seed, fertilizing, mulching, watering, temporary protective measures, maintenance and repair until permanent grassing is established, shall be included in the unit price bid for PERMANENT SEEDING.

1. Permanent seed will be applied only after final grading and dress-up of disturbed area have been completed to the satisfaction of the Construction Manager.

C. Sod Grassing: Where ordered by the Construction Manager, sod shall be provided at the unit price bid for SOD GRASSING for any type.

1. All costs for proper installation, including preparation of surface, installation, rolling, compacting, watering, maintenance, repair, and any temporary measures required to protect the sod until establishment, shall be included in the unit price bid for SOD GRASSING.

D. Hydroseeding: All costs for hydroseeding, including preparation of surface, maintenance, repair, and any temporary measures required to protect the area until establishment, shall be included in the unit price bid for HYDROSEEDING.

E. In no case shall any one area be paid more than once for temporary grassing or for permanent grassing.

F. If an area is temporarily grassed and as directed by the Construction Manager to leave the area that way permanently, no additional payment will be made for permanent grassing.

G. Measurement for payment will be made by square yard, along the water line centerline, to the widths allowed by the Standard Details and Specifications.

1.17 TEMPORARY STREAM CROSSING

A. Temporary Stream Crossing: All costs for constructing temporary stream crossings, whether for Contractor access to the work or for work crossing streams, shall be included in the unit price bid for TEMPORARY STREAM CROSSING.

1. All labor and materials including temporary culverts, stone, filter fabric underlay, check dams, bypassing, necessary earthwork, periodic maintenance and repair, and removal of sediment and all materials placed by the Contractor following the end of the usefulness of the temporary crossing, shall be included in the unit prices bid for TEMPORARY STREAM CROSSING.

B. Stream Crossings shall be constructed as shown in the Standard Details and Specifications, limited to 10 feet upstream and 10 feet downstream from top of trench excavation and from five feet beyond top of bank, across stream or ditch bank and bottom, to five feet beyond top of bank. Any other areas at streams or ditches disturbed by the Contractor, which may require rip rap, shall be rip rapped at no additional cost to the Owner.

1.18 TRENCH EXCAVATION AND STABILIZATION

A. No separate or additional payment will be made for any special or unique method, means, techniques or equipment necessary for the Contractor's compliance with the Specifications, regulatory requirements, permits, laws or regulations which govern this Project.

B. Trench Excavation: No separate payment will be made for trench excavation. All costs shall be included in the unit price bid for the item to which it pertains at the appropriate depth.

C. Sheeting, Bracing and Shoring: No separate payment will be made for providing any sheeting, bracing and shoring. All costs shall be included in the unit price bid for the item to which it pertains at the appropriate depth.

D. Dewatering Excavations: All costs of equipment, labor and materials required for dewatering shall be included in the price bid for the item to which it pertains.

E. Trench Foundation and Stabilization

1. No payment for trench stabilization shall be authorized until after the trench has been dewatered.

   a. If the pipe is installed in an inadequately prepared trench bottom, the Construction Manager will notify the Contractor in writing of the deficiency and will not authorize payment for that portion of that length of pipe which was improperly installed.

2. Payment for trench stabilization shall be made on the basis of the amount authorized and the unit price bid for TRENCH STABILIZATION.

   a. Payment shall include all costs for the removal and disposal of the unsuitable material and replacement with the materials listed in the Bid including filter fabric.

   b. No additional payment will be made for material required for specified bedding.

F. Bedding and Haunching

1. The unit price bid for pipe for WATER MAIN shall include excavation of the trench to the depth below the pipe necessary to provide specified bedding and to lay the water line to grade. Measurements for payment will be made only to the pipe invert.

2. No separate payment will be made for material used to provide specified bedding. The cost of all bedding materials shall be included in the unit price bid for the item to which it relates, except for trench stabilization.

3. No additional payment will be made for improved bedding required to compensate for over excavation of the trench.

G. Trench Rock Excavation

1. Rock excavation shall be paid for in addition to payment for normal pipe excavation accounted for in the unit price bid for WATER MAIN.

   a. Payment will be made for the measured quantity of rock excavated, at the sum of the unit prices for Trench Rock Base Cost and Trench Rock Premium Cost if applicable.

2. The unit price for Trench Rock Base Cost is for the normally anticipated cost of rock excavation, the cost of additional bedding and backfill material as specified and all costs incidental thereto.

3. The unit price bid for Trench Rock Premium Cost shall be for all additional costs for rock excavation which, in the opinion of the Contractor, are in excess of the Base Cost:

   a. Including but not limited to extra blasting protection, closer grouping of blasting holes, more detonator caps, more caution, etc.

   b. The Contractor shall not bid less than zero (bid a deduct) for the Trench Rock Premium Cost. Any Bids containing a deduct will be declared non-responsive and rejected by the Owner.

4. The maximum allowable volume of rock excavation for payment shall be based on a trench width equal to the outside diameter of the pipe barrel plus 18 inches, but not less than 36 inches, and depth of rock on the pipe centerline, from the top of the rock to the bottom of the rock or the specified bottom of the trench, whichever has the higher elevation.

5. The Construction Manager must be given reasonable notice to measure all rock. Payment will not be made for excavated rock that was not measured and approved by the Construction Manager prior to removal.

6. No allowance shall be made for excavating to extra widths for construction of manholes or other appurtenances, for excavating to sloping sides, or for excavations made necessary by the physical limitations of the Contractor's equipment. Cost of such additional rock excavation shall be included in the unit price bid for the item to which it pertains.

7. Payment for blasting monitoring shall be made from the BLASTING MONITORING cash allowance.

   a. A fee must be agreed upon by the Construction Manager prior to the Contractor employing an independent, qualified specialty subcontractor to monitor the blasting.

b. If the Contractor employs the specialty subcontractor prior to the Construction Manager's approval of the fee, all such costs are subject to non-reimbursement.

H. Initial Backfill

1. No separate payment shall be made for initial backfill.
2. No separate payment shall be made for drying out the initial backfill material in order to meet the compaction requirements.
3. No separate payment shall be made for the adding of moisture to the initial backfill materials in order to meet the compaction requirements.
4. No separate payment shall be made for providing select material if the insitu material cannot meet the compaction requirements.

I. Concrete Encasement: Payment for concrete encasement shall be at the unit price bid for CONCRETE ENCASEMENT.

J. Final Backfilling

1. No additional payment will be made for additional material when excavated materials are used.
2. No separate payment shall be made for drying out the final backfill material in order to meet the compaction requirements.
3. No separate payment shall be made for the adding of moisture to the final backfill materials in order to meet the compaction requirements.
4. No additional payment will be made for providing select material if the insitu material cannot meet the compaction requirements.

K. Backfill Density testing for compacted Trench material placed, shall be included in the Unit Price Bid item BACKFILL DENSITY TEST.

1. The Unit Price shall include, but not limited to, labor, equipment, lab cost, cost incidentals and/or related items, and the relevant specification.
2. Field measurement cost shall be based on a density test per 500 linear feet interval, along installed pipe length, and the Contractor and sub-contractor are responsible to provide documentation and/or daily record of the actual number of field tests, as approved by The Construction Manager.

L. Additional Material: No separate payment will be made for additional earth or fill materials imported to the Project site.

1.19 EASEMENT CLEARING AND GRUBBING

A. The unit price bid for EASEMENT CLEARING AND GRUBBING shall include all costs associated with clearing a 20-foot wide easement of the specified type, as approved by the Construction Manager prior to clearing, including but not limited

to removal and disposal of trees, stumps, roots, undergrowth, debris, or other objectionable matter.

B. LIGHT CLEARING shall be defined by an easement that is dense with shrubs, brush, and trees up to one foot in diameter.

C. MEDIUM CLEARING shall be defined by an easement that is dense with shrubs, brush, and trees averaging one to two feet in diameter.

D. HEAVY CLEARING shall be defined by an easement that is dense with shrubs, brush, and trees averaging over two feet in diameter, including specimen trees.

E. The cost of moving and re-establishing landscape features, including labor and materials, shall be included in the unit price bid for the item to which it pertains.

F. No payment will be made for clearing and grubbing in grassed areas and in areas with non-established vegetation. The costs associated with such clearing shall be included in the unit price bid for the item to which it pertains.

1.20 REMOVE, REPAIR AND REPLACE DRIVEWAY, CURB AND GUTTER, AND SIDEWALK

A. General:

1. Payment for removing and replacing driveway shall be made based on the actual field measured quantity replaced for the type pavement, at the Unit Price Bid, for REMOVE AND REPLACE PAVEMENT.
2. The Unit Price Bid shall include all costs associated with the following:
    a. Cutting, removing and disposing of existing materials
    b. Replacing and compacting materials for base, subbase,
    c. All related items as required for a complete driveway repair, including:
        1) Providing select backfill if necessary,
        2) All traffic control and temporary measures for maintaining traffic, and access, in accordance with the Project Drawings Standard Details and Specifications and/or per the applicable jurisdiction Standard Details and Specifications.
3. Payment shall be made only for that length for which the pipeline is constructed underneath or within four feet of the edge of the pavement to a width as shown in the Standard Details and Specifications.
4. Payment for driveway soils testing shall be made from the SOILS, CONCRETE, ASPHALT, AND MATERIALS TESTING cash allowance.
5. No payment shall be made for tests that fail to verify required results.
6. No additional payment will be made for removing and replacing damaged adjacent pavement.
7. No additional payment will be made for saw cutting of driveways or curbs.

B. Payment for removing, repairing and replacing Concrete Driveway

1. Shall be made based on the actual field measured quantity replaced, at the Unit Price Bid, for CONCRETE DRIVEWAY - RESIDENTIAL.
2. The Unit Price Bid shall include all costs associated with the following:
    a. Cutting, removing, and disposing of existing materials,
    b. Replacing and compacting materials for base, subbase, and
    c. All related items as required for a complete driveway repair, including:
        1) Providing select backfill if necessary,
        2) All traffic control and temporary measures for maintaining traffic, and access, in accordance with the Project Drawings Standard Details and Specifications and/or per the applicable jurisdiction Standard Details and Specifications.
3. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width to the nearest construction joint on either side of the new pipe line.

C. Payment for removing and replacing Gravel Driveways will be made based on the actual measured quantity replaced at the unit price Bid for GRAVEL DRIVEWAY.

1. The unit price bid shall include all costs associated with removing, replacing, and compacting a minimum of four-inches of GAB or #57 stone, and all related items as required for a complete driveway repair, including:
    a. All traffic control and temporary measures for maintaining traffic and access in accordance with the Project Drawing Standard Detail and Specifications and/or per the applicable jurisdiction Specifications.
2. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width as limited by the Standard Details and Specifications.

.D. Payment for removing and replacing Asphalt Driveways

1. Shall be made based on the actual measured quantity replaced at the unit price Bid for ASPHALT DRIVEWAY- RESIDENTIAL.
2. The unit price bid shall include all costs associated with the following:
    a. Cutting, removing existing pavement, disposing of removed materials,
    b. Replacing and compacting materials for base, subbase, and
    c. Compacting and placing a minimum of four inches of GAB and 1-1/2 inches of 9.5 mm Superpave asphalt.
    d. All related items as required for a complete driveway repair, including:

1) Providing select backfill if necessary

2) All traffic control and temporary measures for maintaining access in accordance with the Project Drawing Standard Detail and Specifications and/or per the applicable jurisdiction Specifications.

3. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width as limited by the Standard Details and Specifications.

E. Payment for removing and replacing Commercial Concrete Driveways

1. Shall be made based on the field measured quantity replaced at the unit price Bid for CONCRETE DRIVEWAY - COMMERCIAL.

2. The Unit Price Bid shall include all costs associated with the following:

a. Cutting, removing, and disposing of existing materials.

b. Replacing and compacting materials for base, subbase.

c. Placing a minimum of six inches concrete with reinforcing steel.

d. All related items as required, including:

1) Providing select backfill if necessary.

2). All traffic control and temporary measures for maintaining traffic, and access, in accordance with the Project Drawings Standard Details and Specifications and/or per the applicable jurisdiction Standard Details and Specifications.

3. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width to the nearest construction joint on either side of the new pipeline.

F. Payment for removing and replacing Concrete Sidewalk shall be made based on the field measured quantity replaced, at the Unit Price Bid for SIDEWALK.

1. The Unit Price Bid shall include all costs associated with cutting, removing existing sidewalk, removing, replacing, displacing existing materials, and compacting placement material, and all other items as required for completing the sidewalk repair, including all traffic control measures, and temporary measures for maintaining sidewalk capability, in accordance with the Project Drawings Sidewalk Standard Details and Specifications, and/or per the applicable jurisdiction specification.

2. No payment for sidewalk shall be made where the centerline of the new pipe is more than 5-feet from the closest edge of the sidewalk.

3 The Unit Price Bid for removing, disposal and replacing existing Sidewalk, shall include, but not limited to base, bricks, concrete, forms, curing, finishing, labor, materials, tools, and appliances, and all related items necessary to complete the work, and/or per the applicable jurisdiction Standard Detail and Specification.

It is anticipated that existing Curb inlets and storm sewer Catch Basins can be avoided during construction. However, if the Contractor encounters a situation where the proposed pipeline cannot be installed without the removal of an existing Curb Inlet or Catch Basin, or their affected parts, then the Construction Manager shall be notified. If approved by the Construction Manager, the removal and replacement of the Curb Inlet and/or Catch Basin or the affected parts shall be paid for from the Utility Relocation or Utility Conflict resolution cash allowance.

G. Payment for removal and replacement of curb and gutter shall be made based on the actual field measured quantity replaced, and the Standard Details and Specifications, at the unit prices bid for CONCRETE CURB AND GUTTER or for GRANITE CURB as appropriate.

1. The Unit Price Bid shall include all costs associated with cutting, removing, replacing, and displacing existing materials, and all related items as required, including all traffic control measures.

2. No payment for curb and gutter shall be made where the centerline of the new pipe is more than 5-feet from the closest edge of the curb and gutter.

1.21 ASPHALT PAVEMENT REMOVAL AND REPLACEMENT

A. Payment for removing and replacing pavement shall be based on the field verifiable measured quantity replaced, at the Unit Price Bid for ASPHALT PAVEMENT REPLACEMENT.

1. The Unit Price Bid shall include all costs associated with the following:

a. Trench cutting, existing asphalt pavement saw cut, labor. materials, tools and equipment.

b. Removing, and disposing of existing materials.

c. Replacing and compacting materials for base, subbase.

d. All related items as required, including:

1) Providing select backfill if necessary, as required by and approved by Construction Project Manager.

2) All traffic control and temporary measures for maintaining traffic, and access, in accordance with the Project Drawings Standard Details and Specifications and/or per the applicable jurisdiction Standard Details and Specifications.

B. Payment for removal and replacement of asphalt pavement (Type A Cut Repair), where the Fulton County Standard Utility Cut (Type C Cut Repair) is not required, shall be made at the unit price bid for ASPHALT PAVEMENT REMOVAL AND REPLACEMENT.

1. The unit price bid shall include all costs associated with a Type A Cut Repair, including:

a. Cutting, removing existing pavement, disposing of removed materials.

b. Compacting and placing a minimum of six inches of crusher run and 1-1/2 inches of 9.5 mm Superpave asphalt.

c. All related items as required for a complete repair, including road plates and all traffic control and temporary measures as specified above.

2. Payment will be made for the length for which the pipeline is constructed underneath the roadway and for the width as limited by the Standard Details and Specifications, or as approved by the Construction Manager.

C. Payment for Fulton County Standard Utility Cut (Type C Cut Repair) shall be made at the unit price bid for COMPLETE FULTON COUNTY STANDARD UTILITY CUT.

1. The unit price bid shall include all costs associated with a Type C Cut Repair, including:

a. cutting, removing existing pavement.

b. disposing of removed materials.

c. eight inch concrete cap, bituminous tack coat, and 1-1/2 inches of 9.5 mm Superpave asphalt.

d. All related items as required for a complete repair, including road plates and all traffic control and temporary measures as specified above.

2. Payment will be made for the length for which the pipeline is constructed underneath the roadway and for the width as limited by the Standard Details and Specifications, or as approved by the Construction Manager.

D. No separate or additional payment shall be made for temporary measures required to make the road or driveway surface passable, including backfilling the top of the trench temporarily with crusher run or granular material or placing a temporary asphalt topping.

E. Payment for milling shall be made at the unit price bid for ROAD SURFACE MILLING.

1. The Unit Price shall include all costs associated with the milling activity, such as:

a. Lowering of existing water valves or manholes.

b. Milling the existing pavement to the required thickness.

c. Disposing all waste materials.

d. All related items, including:

1) All traffic control and temporary measures as specified above.

2) As required by the Municipality Standard Detail and Specification, and/or the Construction Project Manager.

2. Payment shall be made for the actual field measured road surface area length and width milled, as approved by the Construction Project Manager.

F. Payment for overlay shall be made at the unit price bid for ROAD SURFACE OVERLAY.

1. The unit price bid shall include all costs associated with overlaying a road surface with a bituminous tack coat and a minimum of 1-1/2 inches of 9.5 mm Superpave asphalt, and all related items as required including all traffic control and temporary measures as specified above.

2. Measurement shall be made based on actual area overlaid, as approved by the Construction Manager.

G. Payment for road resurfacing shall be made at the Unit Price Bid for ROAD RESURFACING.

1. The limits eligible for payment shall be based on actual field measured area width and length, relevant Municipality Standard and Specification, Project Drawings, as approved by Construction Manager.

2. The Unit Price Bid shall include all costs associated with road resurfacing:

a. Labor, materials, tools, equipment.

b. Bituminous tack coat.

c. Replacing existing stripping and traffic devices.

c. Raising existing water valves, or manholes.

d. Potholes repair.

e Replacing items affected by the resurfacing activity, and restoring the road to its pre-construction condition.

f. All related items as required including all traffic control and temporary measures as specified above.

1.22 PAVEMENT MARKING AND STRIPING

A. The unit price bid for PAVEMENT MARKING AND STRIPING shall include all costs associated with applying standard DOT striping and paint as listed in the Bid and as ordered by the Construction Manager. All required materials, labor, tools, equipment and traffic control shall be included in the unit price bid.

1.23 TRAFFIC CONTROL

A. All costs for providing traffic control in compliance with the Manual on Uniform Traffic Control Devices (MUTCD) and Georgia Department of Transportation (GDOT) specifications shall be included in the unit price bid for the item to which it pertains. No additional payment will be made for complying with MUTCD or GDOT requirements.

B. Payment for TRAFFIC CONTROL as indicated in the Bid will be made only for additional traffic control devices beyond the requirements of the MUTCD and / or GDOT as ordered by the Construction Manager.

C. The unit price bid for STANDARD DOT BARRIER shall include all costs for providing, installing and removing a standard DOT barrier, as directed by the Construction Manager.

1. No excavation in or near roadways will be left open overnight. Therefore, all concrete barriers will be required to be removed from the roadway and moved to a location where vehicular and pedestrian traffic are not obstructed. The cost of moving the barriers as such shall be included in the unit price bid.

2. Measurement for payment shall be made based on the actual linear footage of barrier installed, per day, approved by the Construction Manager and serving the purpose for which it was intended. Payment will not be made for excess barriers stored by the Contractor in any location.

D. The unit price bid for MUTCD STANDARD SAFETY BARREL shall include all costs for providing, installing and removing a standard MUTCD safety barrel, as directed by the Construction Manager. Only safety barrels directed by the Construction Manager, in addition to those required by the MUTCD and GDOT, shall be paid for separately.

E. The unit price bid for POLICE CRUISER shall include all costs for providing a police cruiser for additional traffic control.

1. Payment will be made for hours spent on site, which may be a portion of a standard work day.

2. Payment will be made only for hours documented by the Contractor and approved by the Construction Manager.

F. The unit price bid for CERTIFIED FLAGMAN shall include all costs for providing a flagman for additional traffic control, as directed by the Construction Manager, in addition to the requirements of MUTCD and GDOT.

1. The flagman shall be certified and dedicated to maintaining and directing traffic flow.

   a. An individual who works part time as a flagman and part time as a laborer or acts in dual capacity will not be approved for payment under this item.

   b. Proof of certification may be required by the Construction Manager prior to acceptance for payment.

2. Payment will be made for hours spent on site performing dedicated flagman duties, which may be a portion of a standard work day.

3. Payment will be made only for hours documented by the Contractor and approved by the Construction Manager.

G. The unit price bid for LIGHT PLANT shall include all costs for providing a light plant, including generator and lighting system, for night work, as directed by the Construction Manager.

H. The unit price bid for ELECTRONIC MESSAGE BOARD shall include all costs for providing an electronic message board, as directed and approved by the Construction Manager.

1.24 REMOVE AND REPLACE EXISTING FENCE

A. The unit price bid for REMOVE AND REPLACE EXISTING FENCE shall include all costs associated with removing and replacing an existing fence of the type and material listed in the Bid, including disposing of waste materials, restoration of site to original condition, and all other associated work for a complete installation.

1.25 CAST IN PLACE CONCRETE

A. Structural Concrete: The unit price bid for STRUCTURAL CONCRETE shall include all costs associated with placing concrete as directed by the Construction Manager including excavation, dewatering, formwork, placing of concrete, and all associated labor, tools, and materials. This item will not be utilized for concrete piers for stream crossings.

B. Reinforcing Steel: The unit price bid for REINFORCING STEEL shall include all costs associated with providing reinforcing steel for structural concrete, including providing steel as directed by the Construction Manager and all labor, tools, and materials required.

C. The unit price bid for REINFORCED CONCRETE PLACEMENT shall include all costs of placing reinforced concrete as directed by the Construction Manager. Reinforced concrete placement shall only be used for concrete requiring the installation of rebar reinforcement in addition to items listed elsewhere in the Bid.

C. Concrete Thrust Collars: The unit price bid for CONCRETE THRUST COLLARS shall include all associated costs including high early strength concrete, reinforcing, forming and weld on collar or split retainer gland as directed by the Construction Manager. Measurement for payment shall be made at the unit price in the Bid for the quantity of installed concrete for the appropriate size pipe.

D. Concrete Thrust Blocking: The unit price bid for CONCRETE THRUST BLOCKING AND ENCASEMENT shall include all associated costs including high early strength concrete, reinforcing, forming, and all related items.

1. Limits shall be determined from dimensions shown on the Drawings for each size and type of fitting for which blocking is installed, or as directed by the Construction Manager.

2. Payment for concrete thrust blocking and encasement shall be made at the unit price bid for the measured quantity installed.

3. The Contractor shall bear all costs for quantities in excess of the scheduled amount, as may be required due to over excavation or other reasons.

E. The unit price bid for concrete – FLOWABLE FILL shall include all costs of filling abandoned pipes with concrete as directed by the Construction Manager. Flowable fill shall only be used for concrete in addition to items listed elsewhere in the Bid.

F. The cost of services of the consulting soil and foundation engineer will be paid by the Contractor from the SOILS, CONCRETE, ASPHALT, AND MATERIALS TESTING cash allowance.

1.26 PROGRAMMABLE ELECTRONIC MARKING DEVICES

A. The unit price bid for PROGRAMMABLE ELECTRONIC MARKING DEVICES shall include the cost of providing the marking devices including:

1. Programmer/locator as specified.
2. Programming the devices and placing them along the water line.
3. The cost of excavation shall be included in the unit price bid for WATER MAIN or UTILITY LOCATION.
4. Measurement for payment will be based on the quantity installed as directed by the Construction Manager.

1.27 UTILITY LOCATION – EXCAVATION AND BACKFILL

A. Soft Dig Hydro Excavation:

1. The unit price bid for SOFT DIG HYDRO EXCAVATION shall include all costs associated with the following:
   a. Locating the assigned utility.
   b. Excavating to directly above the pipe.
   c. Measuring the depth, diameter and type of the pipe.
   d Backfilling and compacting the hole up to two feet from existing grade with soil.
   e Encoding a 3M ID marker device and installing the marker above the pipe at a depth of two feet.
   f. Backfilling with soil and dressing the disturbed area with like surrounding materials.
2. Measurement for payment shall be based on the actual field number of locations, only when directed and approved by the Construction Manager prior to any soft dig excavation.

B. Where utility location is performed in roadways or sidewalks, other materials may be required for backfill.

1. Select materials will be paid for at the unit prices bid for TRENCH STABILIZATION.
2. Measurement for payment will be made on the actual quantity of material used for backfill of the hole where the marker ball is installed.

C. Exploratory Excavation:

1. The unit price bid for EXPLORATORY EXCAVATION shall include all costs associated with excavation of an area by machine and by hand where necessary with the intent of locating an existing utility as ordered by the Construction Manager, including all equipment, tools, and labor.
2. The costs associated with removal and replacement of roadway, driveway, sidewalk, or curb and gutter shall be included under the appropriate pay item.
3. Measurement for payment will be based on the actual hours required to locate the utility, only when ordered by the Construction Manager prior to any excavation.
4. This item shall not be used for standard locating of utilities as required to perform the work.

D. No payment will be made for excavation that does not locate the assigned utility, or where the marker ball is not installed directly above the pipe.

E. No separate or additional payment will be made for any special or unique method, means, techniques or equipment necessary for the Contractor's compliance with these Specifications, regulatory requirements, permits, laws or regulations which govern this Project.

1.28 INSERTAVALVE INSTALLATION.

A. The unit price bid for INSERTAVALVE installation shall include all costs associated with the excavation of an area by machine and by hand where necessary with the intent of installing an INSERTAVALVE by others as ordered by the Construction Manager, including all equipment, tools, and labor.

1. The costs associated with removal and replacement of roadway, driveway, sidewalk, or curb and gutter shall be included under the appropriate pay item.
2. Measurement for payment will be based on the actual amount of excavation required to expose the Fulton County water line.
3. The soil from the excavation may be required to be removed by the project and replaced with GAB or #57 Stone under the pavement.

1.29 WATER LINE MAINTENANCE SIGN

A. The unit price bid for WATER LINE MAINTENANCE SIGN shall include all costs associated with providing a water line maintenance sign as Specified and directed by the Construction Manager, including placing and removal of the sign.

1.30 BACKFLOW PREVENTER

A. The unit price bid for BACKFLOW PREVENTER shall include fixed labor and materials associated with installation of a new backflow preventer, including vault or meter box of the appropriate type, associated fittings required for a complete installation, but not including the service line itself.

B. Measurement for payment will be made on the number of new services installed, at the unit price bid for each setup.

C. Unit price bid shall also include testing and calibration of the backflow preventer.

D. The Owner will provide the backflow preventers for all 5/8-, 3/4-, and 1-inch service connections. The Contractor will provide all larger Backflow Preventers. All Detector Check Valves will be provided by the Contractor.

1.31 CASH ALLOWANCES

A. General

1. The Contractor shall include in the Bid Total all allowances stated in the Contract Documents.
    a. These allowances shall cover the net cost of the services provided by a firm selected by the Owner.
    b. The Contractor's handling costs, labor, overhead, profit and other expenses contemplated for the original allowance shall be included in the items to which they pertain and not in allowances.
2. No payment will be made for nonproductive time on the part of testing personnel due to the Contractor's failure to properly coordinate testing activities with the work schedule or the Contractor's problems with maintaining equipment in good working condition.
3. The Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests.
4. No payment shall be provided for services that fail to verify required results.

B. Should the net cost be more or less than the specified amount of the allowance, the Contract will be adjusted accordingly by change order. The amount of change order will not recognize any changes in handling costs at the site, labor, overhead, profit and other expenses caused by the adjustment to the allowance.

C. Documentation

1. Submit copies of the invoices by the Contractor with each periodic payment request from the firm providing the services.

2. Submit, by the Contractor, results of services provided which verify required results.

D. Schedule of Cash Allowances

1. Unforeseen Conditions: Allow the amount specified in the Bid to resolve unforeseen project situations and/or site conditions during construction, to be pre–approved and approved by Construction Manager, prior to the start of work activity.

   a. Utility Conflicts: Allow the amount specified in the Bid to resolve any unforeseen utility conflicts, which may accrue during the Project's construction, including its relocation and/or replacement, as directed and approved by the Construction Manager.

      1) Known on site located utility which was not shown or accurately field marked by Fulton County water locators, but is necessary to be relocated to accommodate the installation of the proposed pipeline.

      2). Unknown on site located utility which was not marked by Fulton County water locators, but requires significant relocation work, prior to the start of the proposed pipeline installation.

2. Soils, Concrete, Asphalt, Materials, and Water Quality Testing: Allow the amount provided in the Bid for the services of a Geotechnical Engineering firm or testing laboratory to verify soils conditions including trench excavation and backfill, asphalt coring and density tests, testing of concrete cylinders for poured in place concrete, pipe materials, water quality and similar issues as directed by the Construction Manager.

   a. Services will be reimbursed at direct cost with no markup,

   b. Contractor must provide invoices for Owner approval.

   c. This allowance amount specified in the Bid, is for additional testing services not included in the Unit Price Bid for the item to which it relates, and for services not specifically required in the applicable authorized Specifications but is requested or directed and for approval by the Construction Manager, prior to the start of work activity.

3. Large Tree Removal: Allow the amount specified in the Bid for the services of a tree removal specialist to remove individual trees, for additional tree removal, not included in the Unit Price Bid under EASEMENT CLEARING AND GRUBBING, as directed and approved by the Construction Manager.

   a. Services will be reimbursed at direct cost plus 10%.

b. The Contractor must provide an estimate invoice from the tree removal specialist to the Construction Project Manager for approval, prior to the start of work.

c. Contractor must provide invoices for approval of payment by Owner.

d. No payment will be made for trees removed as part of clearing and grubbing.

4. Preblast Survey/Inspection and Blasting Monitoring: Allow the amount provided in the Bid for the services of an independent, qualified specialty subcontractor to monitor the blasting, as directed and approved by the Construction Project Manager.

a. The services will be reimbursed at direct cost with no mark–up.

b. The Contractor must provide an estimated invoice for services or activities to be performed, for approval by the Construction Manager, prior to the start of work.

c. Contractor must provide invoices for approval of payment by Owner.

5. Additional Landscaping, not shown on the Project Drawings: Allow for the amount specified in the Bid for additional existing or current landscaping replacement, not shown on the Project Drawings, or specified, but is affected by the Project construction.

a. The Contractor must provide an estimate invoice for activities to be performed, for approval by the Construction Project Manager, prior to the start of work activity.

b. Contractor must provide invoices for approval of payment by Owner.

6. Construction Verification Surveying:

a. Allow the amount provided in the Bid for Project construction field staking surveying of the proposed pipeline horizontal centerline alignment, depth of cover checks throughout installation of pipeline, and as-built verification and accuracy of pipe line, if deemed necessary by the Construction Manager.

b. The Construction Manager shall pre-approve the independent surveying firm selection by the Contractor.

c. The Contractor must provide an estimate invoice from the approved selected survey firm to perform the work activity, prior to the start of work.

d. This allowance shall only be utilized by the Owner or Construction Manager, for field verification of the Contractor's reference points, proposed pipeline centerline, and project activities performed by the Contractor.

e. This cash allowance does not in any way relieves the Contractor of their responsibilities, for installing the necessary project reference

points, field staking the proposed pipeline horizontal centerline, field checking, or verifying the installed pipeline required minimum depth of cover, installing temporary and permanent bench marks, and field verifying the accuracy of the Contractor's work activities performed, including as-built drawings.

7. Exploratory Excavation: Allow the amount provided in Bid for subsurface investigation to field locate and identify existing water lines size, depth, pipe type, within the Project's pipeline installation limit, where there is no as-built or record drawings.

   a. The Construction Manager shall pre–approve and approve all exploratory excavation locations, the number of locations, and exploratory excavation request by Contractor, including estimated cost, prior to the start of work.

1.32 EMERGENCY SERVICES

A. The following labor and equipment are included in the Bid for when the County needs manpower or additional equipment to assist in making emergency repairs other than those specified above as unit price items. Hourly rate items below shall NOT apply when work is performed under non-emergency conditions. The Notice to Proceed for each project will indicate emergency or non-emergency project status. On emergency projects, the Contractor shall have a representative on site within 2 hours of notification to assess the work to be performed and have emergency work crews on site with the proper equipment within 4 hours of the original notification. Once an emergency is declared contained by the Construction Manager, the project will go forward as non-emergency utilizing line items and a notice to proceed will be issued for the remainder of the work.

B. The unit price bid for the following items shall include all costs for providing the specified personnel on an hourly basis as required by the Owner. Payment may be made for partial work days where applicable. All overhead and direct costs, including all costs for providing the labor, equipment, tools, supplies associated shall be included. Separate payments for items not included shall be agreed to prior to providing such items. No payment will be made for additional services provided without proper written notification to the Owner that the services being requested are additional.

1. Water Superintendent with Pickup Truck
2. Water Crew Truck - Fully equipped with tools and repair parts including but not limited to pipe saw, wacker-packer, chain saw, and miscellaneous hand tools, including water foreman and three laborers.
3. Rubber tired front end loader with trailer and operator.
4. Rubber tired backhoe with trailer and operator.
5. Excavator with trailer and operator.
6. Trench compactor with operator.

7. Mobile air compressor with hoses and air tools (jackhammer, pavement breaker, clay spade, etc.) with operator.
8. 10 CY dump truck with operator.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 – GENERAL

1.01. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02. SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.03. DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

B. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work.

C. No other adjustments are made to the Contract Sum.

1.04. PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

B. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

C. Notification by Owner: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

D. Execute accepted alternates under the same conditions as other work of the Contract.

1.05. SCHEDULE OF ALTERNATES

A. <To be developed for each Project>

PART 2– MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USE)

END OF SECTION

SECTION 01 25 00

SUBSTITUTIONS AND OPTIONS

PART 1 – GENERAL

1.01 SCOPE

A. This Section outlines the restrictions and requirements for substitutions, product and manufacturer options, and construction method options.

1.02 DEFINITIONS

A. For the purposes of these Contract Documents, a “substitute item” shall be defined as one of the following:

1. A product or manufacturer offered as a replacement to a specified product or manufacturer.

2. A product or manufacturer offered in addition to a specified product or manufacturer.

B. For the purposes of these Contract Documents, a “substitute construction method” shall be defined as one of the following:

1. A mean, method, technique, sequence or procedure of construction offered as a replacement for a specified mean, method, technique, sequence or procedure of construction.

2. A mean, method, technique, sequence or procedure of construction offered in addition to a specified mean, method, technique, sequence or procedure of construction.

1.03 GENERAL

A. An item or construction method, which is offered where no specific product, manufacturer, mean, method, technique, sequence or procedure of construction is specified or shown on the Drawings, shall not be considered a substitute and shall be at the option of the Contractor, subject to the provisions in the Contract Documents for that item or construction method.

B. For products specified only by a referenced standard, the Contractor may select any product by any manufacturer, which meets the requirements of the Specifications, unless indicated otherwise in the Contract Documents.

C. If the manufacturer is named on the Drawings or in the Specifications as an acceptable manufacturer, products of that manufacturer meeting all requirements of the Specifications and Drawings are acceptable.

D. Whenever the Engineer's design is based on a specific product of a particular manufacturer, that manufacturer will be shown on the Drawings and/or listed first in the list of approved manufacturers in the Specifications. Any Bidder intending to furnish products of other than the first listed manufacturer, or furnish substitute items, shall:

1. Verify that the item being furnished will fit in the space allowed, perform the same functions and have the same capabilities as the item specified.
2. Include in its Bid the cost of all accessory items which may be required by the other listed substitute product,
3. Include the cost of any architectural, structural, mechanical, piping, electrical or other modifications required, and
4. Include the cost of required additional work by the Construction Manager, if any, to accommodate the item.

E. Whenever a product is identified on the Drawings or in the Specifications by reference to manufacturers or vendors names, trade names, catalog numbers, etc., it is intended only to denote the quality standard of product desired and that they do not restrict Bidders to a specific brand, make, manufacturer or specific name. These listings and citations are used only to set forth and convey to Bidders the general style, type, character and quality of product desired. Equivalent products will be acceptable, subject to the substitution provisions of this Section.

1.04 APPROVALS

A. Approval, of a substitution as an acceptable manufacturer, of the Construction Manager is dependent on determination that the product offered is essentially equal in function, performance, quality of manufacture, ease of maintenance, reliability, service life and other criteria to that on which the design is based; and will require no major modifications to structures, electrical systems, control systems or piping systems.

1.05 SUBSTITUTIONS AND OPTIONS

A. No substitutions will be considered for the manufacturers listed in the Bid Form.

B. After Notice to Proceed

1. Substitute items will be considered only if the term “equal to” precedes the names of acceptable manufacturers in the Specification.
2. Where items are specified by referenced standard or specified as indicated in Article 1.03 above, such items shall be submitted to the Construction Manager for review.
3. The Contractor shall submit shop drawings on the substitute item for the Construction Manager's review in accordance with the Section 01 33 23.

C. Prior to Opening of Bids

1. No consideration or approvals will be made for products specified by a referenced standard, or specified as indicated in Article 1.03 above. Such consideration may occur only after the Notice to Proceed.

2. No consideration or approvals will be made for products being offered where the term “equal to” precedes the name of an approved product. Such substitution consideration may occur only after the Notice to Proceed.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 – GENERAL

1.01 SCOPE

A. Work under this Section includes all scheduling and administering of pre-construction and progress meetings as herein specified and necessary for the proper and complete performance of this Work.

B. Scheduling and Administration by Construction Manager:

1. Prepare agenda.
2. Make physical arrangements for the meetings.
3. Preside at meetings.
4. Record minutes and include significant proceedings and decisions.
5. Distribute copies of the minutes to participants.

1.02 PRECONSTRUCTION CONFERENCE

A. The Construction Manager shall schedule the preconstruction conference prior to the issuance of the Notice to Proceed.

B. Representatives of the following parties are to be in attendance at the meeting:

1. Owner
2. Design Engineer.
3. Construction Manager
4. Project Manager
5. Contractor and superintendent
6. Major subcontractors
7. Representatives of governmental or regulatory agencies when appropriate.

C. The agenda for the preconstruction conference shall consist of the following as a minimum:

1. The Work – including, but not limited to:
    a. Adequacy of distribution of Contract Documents.
    b. Scheduling and phasing requirements.
    c. Schedule and submittal of shop drawings, product data and samples.
    d. Major equipment deliveries and priorities.

e. Critical work sequencing.

f. Use of premises, including office and storage areas and Owner's requirements.

g. Special conditions and coordination.

h. Security.

i. Work hours.

2. Distribution and discussion of major subcontractors and tentative construction schedule, and project phasing requirements.

3. Communications – including, but not limited to:

a. Designation of responsible personnel and emergency telephone numbers.

b. Change and persons authorized to direct changes.

c. Requests for Information (RFI), field decisions, and clarifications.

d. Processing of field decisions and change orders.

e. Non-Conformance Reports.

f. Hazard communication.

g. Project meetings.

4. Contractor's Site Specific Safety Plan and first aid procedures.

5. Administrative and procedural requirements including, but not limited to:

a. Contract modification.

b. Progress payment.

c. Pay request format, submittal cutoff date, pay date and retainage.

d. Submittals - including Contractor's Construction Progress Schedule.

e. Electronic Communications.

f. Apprentice and Journey Level Worker Utilization Reporting, if required.

6. Owner testing and inspection.

7. Contractor Quality Control.

8. Procedures for maintaining record documents.

9. Temporary Facilities and Controls including, but not limited to:

a. Deliveries and storage.

b. Temporary utilities and enclosures.

c. Security procedures.

d. Noise and vibration control.

e. Cutting, patching, and field engineering.

f. Utility shutdowns.

g. Contractor parking.

h. Housekeeping and waste management.

10. Closeout Procedures – including Project Record documents.

D. Contractor shall conduct a like meeting, covering the same body of information, with each Subcontractor's project manager and foreman supervising the Work prior to the performance of any work on site by that Subcontractor.

1. Provide Construction Manager with copies of meeting minutes prepared by the Contractor with each Subcontractor, when requested by Construction Manager.

1.03 PROJECT COORDINATION MEETINGS

A. Project Coordination Meetings may be requested at any time at the discretion of the Owner, Construction Manager or Contractor. The party requesting a meeting shall provide the other two parties with as much notice as possible, as well as a written agenda for such meeting.

B. Schedule regular monthly or bi-weekly meetings as directed by the Construction Manager.

C. Hold called meetings as the progress of the work dictates.

D. The meetings shall be held at the location indicated by the Construction Manager.

E. Representatives of the following parties are to be in attendance at the meetings:

1. Construction Manager
2. Design Engineer
3. Project Manager
4. Contractor and superintendent
5. Major subcontractors as pertinent to the agenda
6. Owner's representative as appropriate
7. Representatives of governmental or other regulatory agencies as appropriate.

F. Contractor shall:

1. Administer the meetings.
2. Provide schedules, logs and other construction activity data in support of the issues discussed and recorded in meeting minutes.
3. Record and distribute copies of minutes prior to the next meeting.

G. Construction Manager will:

Will review meeting minutes and ascertain that the Work is in accordance with the Construction Documents and the Construction Progress Schedule.

H. The minimum agenda for progress meetings shall consist of the following:

1. Review and approve minutes of previous meetings.
2. Review work progress since last meeting.
3. Review plans for progress during subsequent work period.
   Identify pending meetings.
   Discuss safety activities and Job Hazards Analysis.
4. Discuss field observations, problems, and conflicts.
   a. Identify problems impeding the Construction Progress Schedule.
5. Identify problems which impede planned progress.
6. Review Quality Control.
   a. Non-conformance reports - discuss corrective Work actions.
7. Review off-site fabrication, delivery schedules and problems.
8. Review Contractor's corrective measures and procedures to regain plan schedule.
9. Review Contractor's revision to the construction schedule as outlined in the Supplementary Conditions.
10. Review submittal schedule and RFIs; - present methods to expedite as required to maintain schedule.
11. Maintenance of quality and work standards.
12. Review proposed changes in the Work and substitution requests for:
    a. Timely processing.
    b. Effect on Construction Progress Schedule and on completion date.
    c. Effect on any other contracts of the Project.
13. Identify and track action items for all parties. The intent is to maintain a running list of action items with specific designation for parties responsible and expected completion dates.
14. Complete other current business.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 32 16

CONSTRUCTION SCHEDULES

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section includes preparing, furnishing, distributing, and periodic updating of the construction schedules as specified herein.

B. The purpose of the schedule is to demonstrate that the Contractor can complete the overall Project within the Contract Time and meet all required interim milestones.

C. The schedule also provides a basis for determining the progress status of each phase and the Project relative to specific dates and completion time.

1.02 DESCRIPTION

A. The Contractor shall provide a graphic construction schedule prepared by the critical path method of analysis. The critical path schedule shall be prepared from estimates of the required duration and sequence for each item of work and function to be performed.

B. A general guide for preparing such a schedule is contained in "The Use of CPM in Construction, A Manual for Contractors," published by the Associated General Contractors of America.

C. Tabulation and analysis of the work schedule shall be performed by computer using a commercially available critical path software program. In addition to the capability to produce tabular reports, the computer software shall plot the construction schedule after the Contractor has produced it in draft form as required by paragraph 1.03 Submittals.

D. The schedule shall depict all significant construction activities and all items of work listed in the breakdown of contract prices submitted by the Contractor in accordance with the General Conditions of the Contract Documents. The dependencies between activities shall be indicated so that it may be established what effect the progress of any one activity has on the schedule.

E. No activity on the schedule shall have a duration longer than 21 days or assigned value greater than $100,000, except activities comprising only fabrication, and delivery may extend for more than 21 days. Activities which exceed these limits shall be divided into more detailed components. The schedule duration of each activity shall be based on the work being performed during the normal 40-hour workweek with allowances made for legal holidays and normal weather conditions.

1.03 SUBMITTALS

A. Overall Project Schedule (OPS)

1. Submit the schedule within 10 days after date of the Notice to Proceed.
2. The OPS schedule shall identify various critical project milestones, in order to address the public and activities within the project's area.
3. The Construction Manager will review the schedule and return it within 10 days after receipt.
4. If required, resubmit within 10 days after receipt of a returned copy.

B. Near Term Schedule (NTS)

1. Submit the first Near Term Schedule within 10 days of the Notice to Proceed.
2. The Construction Manager will review the schedule and return it within 10 days after receipt.

C. Submit an update of the OPS and NTS with each progress payment request.

D. Submit the number of copies required by the Contractor, plus four copies to be retained by the Construction Manager.

1.04 APPROVAL

A. Approval of the Contractor's detailed construction program and revisions thereto shall in no way relieve the Contractor of any of Contractor's duties and obligations under the Contract.

B. Approval is limited to the format of the schedule and does not in any way indicate approval of, or concurrence with, the Contractor's means, methods and ability to carry out the work.

1.05 OVERALL PROJECT SCHEDULE (OPS)

A. The Contractor shall submit to the Construction Manager for approval a detailed Overall Project Schedule of the Contractor's proposed operations for the duration of the Project. The OPS shall be in the form of a Gantt/bar chart. Primavera P6 shall be used to produce this Gantt/bar chart.

B. Gantt/Bar Chart Schedule

1. Each activity with a duration of five or more days shall be identified by a separate bar. Activities with a duration of more than 21 days shall be sub-divided into separate activities.
2. The schedule shall include activities for shop drawing preparation and review, fabrication, delivery, and installation of major or critical path materials and equipment items. .

3. The schedule shall show the proposed start and completion date for each activity. A separate listing of activity start and stop dates and working day requirements shall be provided unless the information is shown in text form on the Gantt/bar chart.

4. The schedule shall identify the Notice to Proceed date, the Contract Completion date, major milestone dates, and a critical path.

5. The schedule shall be printed on a maximum 11 x 17-inch size paper. If the OPS needs to be shown on multiple sheets, a simplified, one page, summary bar chart showing the entire Project shall be provided.

6. The schedule shall have a horizontal time scale based on calendar days and shall identify the Monday of each week.

7. The schedule shall show the precedence relationship for each activity.

1.06 NEAR TERM SCHEDULE (NTS)

A. The Contractor shall develop and refine a detailed Near Term Schedule showing the day to day activities with committed completion dates which must be performed during the upcoming 30 day period. The detailed schedule shall represent the Contractor's best approach to the Work which must be accomplished to maintain progress consistent with the Overall Project Schedule.

B. The Near Term Schedule shall be in the form of Gantt/bar chart and shall include a written narrative description of all activities to be performed and describe corrective action to be taken for items that are behind schedule.

1.07 SCHEDULE REVISIONS

A. Revisions to the accepted critical path construction schedule may be made only with written approval of the Contractor and Owner.

B. Changes in timing for activities which are not on the critical path may be modified with written agreement of the Contractor and Construction Manager.

C. A change affecting the contract value of any activity, the timing of any activity on the critical path, the completion time and specific dates as specified in the Contract Documents, and work sequencing may be made only in accordance with applicable provisions of the General Conditions of the Contract Documents.

1.08 UPDATING

A. Project status review and update shall be provided each month as specified in the General Conditions of the Contract Documents.

B. Show all changes occurring since previous submission of the updated schedule.

C. Indicate progress of each activity and show actual completion dates.

D. The Contractor shall be prepared to provide a narrative report at the Project Coordination Meetings. The report shall include the following:

1. A description of the overall Project status and comparison to the OPS.
2. Identify activities which are behind schedule and describe corrective action to be taken.
3. A description of changes or revisions to the Project and their effect on the OPS.
4. A description of the Near Term Schedule of the activities to be completed during the next 30 days. The report shall include a description of all activities requiring participation by the Construction Manager and/or Owner.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 32 33

CONSTRUCTION VIDEOS AND PHOTOGRAPHS

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall furnish all equipment and labor materials required to provide the Owner with digital construction videos and photographs of the Project.

B. Videos and photographs shall be provided on a flash drive.

C. Photograph and video files shall become the property of the Owner and none of the photographs herein shall be published without express permission of the Owner.

1.02 PRE-CONSTRUCTION VIDEOS AND PHOTOGRAPHS

A. The Contractor shall provide preconstruction photographs and videos prior to commencement of work on the site. The documentation shall be digital and shall indicate the date, name of project, direction in which the images were taken and the location where the images were taken.

B. A minimum of 50 photographs shall be taken prior to construction including a video of the entire route.

C. Before construction may start, digital copies of the documentation shall be delivered on a flash drive to the Construction Manager.

D. The Contractor shall document the entire area of proposed construction and site entries and access roads from multiple perspectives.

E. All conditions which might later be subject to disagreement shall be shown in sufficient detail to provide a basis for decisions.

F. The pre-construction photographs shall be submitted to the Construction Manager within 28 calendar days after the date of receipt by the Contractor of Notice to Proceed.

1.03 PROGRESS PHOTOGRAPHS AND SUBMITTALS

A. The Contractor shall provide digital construction images showing the progress of the work on a monthly basis.

B. Starting immediately after the date of the preconstruction documentation and continuing as long as the work is in progress, construction photographs shall be taken.

C. Photographs shall be taken to document completely the ongoing work, points of site entry and access roads.

D. A minimum of 20 photographs shall be taken each month including a video of the route.

E. Additional photographs shall be taken and be of such subjects as may be directed by the Construction Manager.

F. All photographs shall indicate the date, job title and brief description of the image(s), including the location and direction the image was taken.

G. A final set of aerial photographs shall be taken once all grassing has been established.

H. Photographs should be provided on a flash drive with each payment application. In addition, one hard copy of each photograph shall be submitted. Failure to include photographs may be cause for rejection of the payment request.

I. If software is used to organize, store and describe the photos, a copy of the software and all relevant updates shall be supplied to both the Owner and the Construction Manager by the Contractor, at no additional cost to Owner.

J. Progress photograph and video files shall be provided on flash drive as well as hard copies for photographs.

K. The file name of each photograph shall at a minimum contain the date the photograph was taken. All photographs shall be labeled to indicate date, time taken, and description of work shown.

1.04 COMPLETION DIGITAL PHOTOGRAPHS AND VIDEO

A. Following completion of the work, photographs and videos shall be made showing the same areas and features as in the pre-construction photographs.

B. The Contractor shall provide one (1) set of completion photographs after Substantial Completion has been achieved.

C. The photographs shall be digital, and shall indicate the date, name of project, direction in which the photograph was taken and the location where the photograph was taken.

D. A minimum of 50 photographs shall be taken at project completion including a video of the entire pipeline route.

E. Before Final Completion and acceptance of the project, digital copies of the photographs shall be delivered on a flash drive to the Construction Manager.

F. The Contractor shall photograph all of the constructed work, the entire area of construction and all site entries and access roads from multiple perspectives.

G. Post construction photographs and videos shall be provided prior to final acceptance of the Project.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SUBMITTALS

A. Submittals covered by these requirements include manufacturers' information, shop drawings, test procedures, test results, samples, requests for substitutions, and miscellaneous work-related submittals.

B. Submittals shall also include, but not be limited to, all mechanical, electrical and electronic equipment and systems, materials, reinforcing steel, fabricated items, and piping and conduit details.

C. The Contractor shall furnish all drawings, specifications, descriptive data, certificates, samples, tests, methods, schedules, and manufacturer's installation and other instructions as specifically required in the contract documents to demonstrate fully that the materials and equipment to be furnished and the methods of work comply with the provisions and intent of the contract documents.

1.02 CONTRACTOR'S RESPONSIBILITIES

A. General:

1. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal.

    a. The Contractor shall verify that all features of all products conform to the specified requirements. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment, which are being submitted for review.

    b. All extraneous materials shall be crossed out or otherwise obliterated. The Contractor shall ensure that there is no conflict with other submittals and notify the Construction Manager in each case where his submittal may affect the work of another contractor or the Owner.

    c. The Contractor shall coordinate submittals among his subcontractors and suppliers.

2. The Contractor shall coordinate submittals with the Work so that work will not be delayed. He shall coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another.

    a. No extension of time will be allowed because of failure to properly schedule submittals.

b. The Contractor shall not proceed with work related to a submittal until the submittal process is complete. This requires that submittals for review and comment shall be returned to the Contractor stamped "No Exceptions Taken" or "Make Corrections Noted."

3. The Contractor shall certify on each submittal document that he has reviewed the submittal, verified field conditions, and complied with the contract documents.

4. The Contractor may authorize in writing a material or equipment supplier to deal directly with the Construction Manager or the Owner with regard to a submittal. These dealings shall be limited to contract interpretations to clarify and expedite the Work.

1.03 CATEGORIES OF SUBMITTALS

A. General:

1. Submittals fall into two general categories: submittals for review and comment, and submittals which are primarily for information only. Submittals which are for information only are generally specified as Product Data in Part 2 of applicable specification sections.

B. Submittals for review and comment:

1. All submittals except where specified to be submitted as product data for information only shall be submitted by the Contractor to the Construction Manager for review and comment.

C. Submittals (product data) for information only:

1. Where specified, the Contractor shall furnish submittals (product data) to the Construction Manager for Information only. Submittal requirements for operation and maintenance manuals, which are included in this category, are specified in Section 01 78 23.

1.04 TRANSMITTAL PROCEDURE

A. General:

1. Unless otherwise specified, submittals regarding material and equipment shall be accompanied by Transmittal Form 01 33 00-A specified in Section 01 99 90.

2. Submittals for operation and maintenance manuals, information and data shall be accompanied by Transmittal Form 01 78 23-A specified in Section 01 99 90.

3. A separate form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which the submittal is required. Submittal documents common to more than one piece of equipment shall be identified with all the appropriate equipment numbers.

4. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

5. A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted.

   a. Original submittal numbers shall have the following format: XX XX XX.XX.YY, where 'X' denotes the applicable specification section and 'Y' denotes the individual submittal number for that particular specification section, beginning with 01.

   b. The initial submittal shall be identified as "Revision" 000.

   c. Subsequent resubmittals shall be identified 001, 002, etc. Packages shall be identified as follows: XXXXXXXXAA; where 'X' denotes the applicable specification.

B. Deviation from contract:

1. If the Contractor proposes to provide material, equipment, or method of work which deviates from the project manual, he shall indicate so under "deviations" on the transmittal form accompanying the submittal copies.

C. Submittal completeness:

1. Submittals which do not have all the information required to be submitted, including deviations, are not acceptable and will be returned without review.

D. Submittal schedule and log:

1. Contractor shall prepare and maintain a submittal log/schedule that includes all specified submittals for the project.

   a. Copies of the submittal log shall be provided to the Owner and Construction Manager for review within 15 days of the notice to proceed.

   b. No progress payments will be made by the Owner until the submittal log/schedule is accepted and approved by the Construction Manager.

2. The schedule shall clearly delineate submittals for review and comment and product data (submittals) for information only.

3. Submittal schedule information shall be updated monthly with the Contractor's updated project schedule.

4. The Contractor shall identify as an activity in the project schedule specified in Section 01 32 16, all major equipment submittals as well as those involving complex reviews and long lead deliveries.

1.05 REVIEW PROCEDURE

A. General:

1. Submittals are specified for those features and characteristics of materials, equipment, and methods of operation which can be selected based on the Contractor's judgment of their conformance to the specified requirements.

2. Other features and characteristics are specified in a manner which enables the Contractor to determine acceptable options without submittals.

3. The review procedure is based on the Contractor's guarantee that all features and characteristics not requiring submittals conform as specified.

   a. Review shall not extend to means, methods, techniques, sequences or procedures of construction, or to verifying quantities, dimensions, weights or gages, or fabrication processes (except where specifically indicated or required by the project manual) or to safety precautions or programs incident thereto.

   b. Review of a separate item, as such, will not indicate approval of the assembly in which the item functions.

4. When the contract documents require a submittal, the Contractor shall submit the specified information as follows:

   a. Three (3) hard copies of all submitted information plus one digital pdf copy of all information shall be transmitted with submittals for review and comment.

   b. Unless otherwise specified, 3 copies of all sample data shall be transmitted with submittals (Product Data) for information only.

B. Submittals for review and comment:

1. Unless otherwise specified, within 30 calendar days after receipt of a submittal for review and comment, the Construction Manager shall review the submittal and return 1 copy of the marked-up copy. The marked-up copy/returned submittal will be retained by the Construction Manager. The returned submittal shall indicate one of the following actions:

   a. If the review indicates that the material, equipment or work method complies with the project manual, submittal copies will be marked "NO EXCEPTIONS TAKEN." In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.

   b. If the review indicates limited corrections are required, copies will be marked "MAKE CORRECTIONS NOTED." The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated in O&M data, a corrected copy shall be provided.

   c. If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked "AMEND AND RESUBMIT."

Except at his own risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

d. If the review indicates that the material, equipment, or work method does not comply with the project manual, copies of the submittal will be marked "REJECTED - SEE REMARKS." Submittals with deviations which have not been identified clearly may be rejected. Except at his own risk, the Contractor shall not undertake the work covered by such submittals until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

C. Submittals (product data) for information only:

1. Such information is not subject to submittal review procedures and shall be provided as part of the work under this contract and its acceptability determined under normal inspection procedures.

1.06 EFFECT OF REVIEW OF CONTRACTOR'S SUBMITTALS

A. General:

1. Review of contract drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of his responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the Construction Manager or the Owner, or by any officer or employee thereof, and the Contractor shall have no claim under the Contract on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed.

2. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the Owner has no objection to the Contractor, upon his own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 – GENERAL

1.01 SCOPE

A. Work under this Section includes submittal to the Construction Manager of shop drawings, product data and samples required by the various sections of these Specifications.

B. Submittal Contents: The submittal contents required are specified in each section.

C. Definitions: Submittals are categorized as follows:

1. Shop Drawings

a. Shop drawings shall include technical data, drawings, diagrams, procedure and methodology, performance curves, schedules, templates, patterns, test reports, calculations, instructions, measurements and similar information as applicable to the specific item for which the shop drawing is prepared.

b. Provide newly prepared information, on reproducible sheets, with graphic information at accurate scale (except as otherwise indicated) or appropriate number of prints hereof, with name or preparer (firm name) indicated.

c. The Contract Drawings shall not be traced or reproduced by any method for use as or in lieu of detail shop drawings.

d. Show dimensions and note dimensions that are based on field measurement.

e. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements.

f. Do not allow shop drawings to be used in connection with the Work without appropriate final “Action” markings by the Construction Manager.

g. Drawings shall be presented in a clear and thorough manner. Details shall be identified by reference to sheet and detail, specification section, schedule or room numbers shown on the Contract Drawings.

h. Minimum assembly drawings sheet size shall be 22 x 34 inches.

i. Minimum detail sheet size shall be 8 1/2 x 11 inches.

j. Minimum Scale:

1) Assembly Drawings Sheet, Scale: 1 inch = 30 feet.

2) Detail Sheet, Scale: 1/4 inch = 1 foot.

2. Product Data

a. Product data includes standard printed information on materials, products and systems, not specially prepared for this Project, other than the designation of selections from among available choices printed therein.

b. Collect required data into one submittal for each unit of work or system, and mark each copy to show which choices and options are applicable to the Project.

c. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked and special coordination requirements.

3. Samples

a. Samples include both fabricated and unfabricated physical examples of materials, products and units of work, both as complete units and as smaller portions of units of work, either for limited visual inspection or, where indicated, for more detailed testing and analysis.

b. Provide units identical with final condition of proposed materials or products for the work.

1) Include “range” samples, not less than three units, where unavoidable variations must be expected, and describe or identify variations between units of each set.

2) Provide full set of optional samples where the Construction Manager's selection is required.

3) Prepare samples to match the Construction Manager's sample where indicated.

4) Information with each sample to show generic description, source or product name and manufacturer, limitations and compliance with standards.

5) Samples are submitted for review and confirmation of color, pattern, texture and “kind” by the Construction Manager.

7) Construction Manager will note “test” samples, except as otherwise indicated, for other requirements, which are the exclusive responsibility of the Contractor.

4. Miscellaneous submittals related directly to the Work (non-administrative) warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, statements of applicability, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, security/protection/safety keys and

similar information, devices and materials applicable to the Work but not processed as shop drawings, product data or samples.

1.02 SPECIFIC CATEGORY REQUIREMENTS

A. General: Except as otherwise indicated in the individual work sections, comply with general requirements specified herein for each indicated category of submittal. Submittals shall contain:

1. The date of submittal and the dates of any previous submittals.
2. The Project title.
3. Numerical submittal numbers, starting with 1.0, 2.0, etc. Revisions to be numbered 1.1, 1.2, etc.
4. The Names of:
   a. Contractor
   b. Supplier
   c. Manufacturer
5. Identification of the product, with the Specification section number, permanent equipment tag numbers and applicable Drawing Number.
6. Field dimensions, clearly identified as such.
7. Relation to adjacent or critical features of the Work or materials.
8. Applicable standards, such as ASTM or Federal Specification numbers.
9. Notification to the Construction Manager in writing, at time of submissions, of any deviations on the submittals from requirements of the Contract Documents.
10. Identification of revisions on resubmittals.
11. An 8 x 3 inch blank space for Contractor and Construction Manager stamps.
12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria and coordination of the information within the submittal with requirements of the Work and of Contract Documents.
13. Submittal sheets or drawings showing more than the particular item under consideration shall have all but the pertinent description of the item for which review is requested crossed out.

1.03 ROUTING OF SUBMITTALS

A. Submittals and routine correspondence shall be routed as follows:

1. Supplier to Contractor (through representative if applicable)
2. Contractor to Construction Manager

3. Construction Manager to Contractor and Owner
4. Contractor to Supplier

PART 2 – PRODUCTS

2.01 SHOP DRAWINGS

A. Unless otherwise specifically directed by the Construction Manager, make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the Work.

B. Submit all shop drawings in the form of six hard copies and one pdf file.

C. One reproducible for all submittals larger than 11 x 17 inches and no more than three prints of other submittals will be returned to the Contractor.

2.02 MANUFACTURER'S LITERATURE

A. Where content of submitted literature from manufacturers includes data not pertinent to this submittal, clearly indicate which portion of the contents is being submitted for the Construction Manager's review.

B. Submit the number of copies which are required to be returned (not to exceed three) plus three copies which will be retained by the Construction Manager.

2.03 SAMPLES

A. Samples shall illustrate materials, equipment or workmanship and established standards by which completed work is judged.

B. Unless otherwise specifically directed by the Construction Manager, all samples shall be of the precise article proposed to be furnished.

C. Submit all samples in the quantity which is required to be returned plus one sample which will be retained by the Construction Manager.

2.04 COLORS

A. Unless the precise color and pattern is specifically described in the Contract Documents, wherever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to the Construction Manager for review and selection.

B. Unless all available colors and patterns have identical costs and identical wearing capabilities, and are identically suited to the installation, completely describe the relative costs and capabilities of each.

PART 3 – EXECUTION

3.01 CONTRACTOR'S COORDINATION OF SUBMITTALS

A. Prior to submittal for the Construction Manager's review, the Contractor shall use all means necessary to fully coordinate all material, including the following procedures:

1. Determine and verify all field dimensions and conditions, catalog numbers and similar data.
2. Coordinate as required with all trades and all public agencies involved.
3. Submit a written statement of review and compliance with the requirements of all applicable technical Specifications as well as the requirements of this Section.
4. Clearly indicate in a letter or memorandum on the manufacturer's or fabricator's letterhead, all deviations from the Contract Documents.

B. Each and every copy of the shop drawings and data shall bear the Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Construction Manager without the Contractor's stamp will be returned to the Contractor for conformance with this requirement.

C. The Owner may back charge the Contractor for costs associated with having to review a particular shop drawing, product data or sample more than two times to receive a “No Exceptions Taken” mark.

D. GROUPING OF SUBMITTALS

1. Unless otherwise specifically permitted by the Construction Manager, make all submittals in groups containing all associated items.
2. No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent.
    a. It is the Contractor's responsibility to assemble the shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to the Construction Manager along with Contractor's comments as to compliance, non-compliance or features requiring special attention.

E. SCHEDULE OF SUBMITTALS

1. Within 30 days of Contract award and prior to any shop drawing submittal, the Contractor shall submit a schedule showing the estimated date of submittal and the desired approval date for each shop drawing anticipated.
2. A reasonable period shall be scheduled for review and comments.
3. Time lost due to unacceptable submittals shall be the Contractor's responsibility and some time allowance for resubmittal shall be provided.

The schedule shall provide for submittal of items which relate to one another to be submitted concurrently.

3.02 TIMING OF SUBMITTALS

A. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery.

B. In scheduling, allow sufficient time for the Construction Manager's review following the receipt of the submittal.

3.03 REVIEWED SHOP DRAWINGS

A. CONSTRUCTION MANAGER REVIEW

1. Allow a minimum of 30 days for the Construction Manager's initial processing of each submittal requiring review and response, except allow longer periods where processing must be delayed for coordination with subsequent submittals.
    a. The Construction Manager will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination.
    b. Allow a minimum of two weeks for reprocessing each submittal.
    c. Advise the Construction Manager on each submittal as to whether processing time is critical to progress of the Work, and therefore the Work would be expedited if processing time could be foreshortened.
2. Acceptable submittals will be marked “No Exceptions Taken”. A minimum of three copies will be retained by the Construction Manager for Construction Manager's and the Owner's use and the remaining copies will be returned to the Contractor.
3. Submittals requiring minor corrections before the product is acceptable will be marked “Make Corrections Noted”. The Contractor may order, fabricate and ship the items included in the submittals, provided the indicated corrections are made. Drawings must be resubmitted for review and marked “No Exceptions Taken” prior to installation or use of products.
4. Submittals marked “Amend and Resubmit” must be revised to reflect required changes and the initial review procedure repeated.
5. The “Rejected See Remarks” notation is used to indicate products which are not acceptable. Upon return of a submittal so marked, the Contractor shall repeat the initial review procedure utilizing acceptable products.
6. Only two copies of items marked “Amend and Resubmit” and “Rejected See Remarks” will be reviewed and marked. One copy will be retained by the Construction Manager and the other copy with all remaining unmarked copies will be returned to the Contractor for resubmittal.

B. No work or products shall be installed without a drawing or submittal bearing the "No Exceptions Taken" notation. The Contractor shall maintain at the job site a complete set of shop drawings bearing the Construction Manager's stamp.

C. Substitutions: In the event the Contractor obtains the Construction Manager's approval for the use of products other than those which are listed first in the Contract Documents, the Contractor shall, at the Contractor's own expense and using methods approved by the Construction Manager, make any changes to structures, piping and electrical work that may be necessary to accommodate these products.

D. Use of the "No Exceptions Taken" notation on shop drawings or other submittals is general and shall not relieve the Contractor of the responsibility of furnishing products of the proper dimension, size, quality, quantity, materials and all performance characteristics, to efficiently perform the requirements and intent of the Contract Documents.

1. The Construction Manager's review shall not relieve the Contractor of responsibility for errors of any kind on the shop drawings.
2. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site.
3. The Contractor is also responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the work of all trades.

3.04 RESUBMISSION REQUIREMENTS

A. SHOP DRAWINGS

1. Revise initial drawings as required and resubmit as specified for initial submittal, with the resubmittal number shown.
2. Indicate on drawings all changes which have been made other than those requested by the Construction Manager.

B. Project Data and Samples: Resubmit new data and samples as specified for initial submittal, with the resubmittal number shown.

END OF SECTION

SECTION 01 35 00

UNIQUE REQUIREMENTS

PART 1 – GENERAL

1.01 SCOPE

A. The scope of this Section is to convey to the Contractor unique and unusual stipulations and requirements which have been established for this Project.

1. Some of the stipulations and requirements are a result of negotiations with various entities and organizations which have an interest in this Project.

2. Some requirements are based on technical aspects of the Project which are not otherwise conveyed to the Contractor.

B. The provisions of this Section shall not supersede the Bidding Requirements, Contract Forms or Conditions of the Contract.

1.02 MILESTONE DATES

A. The Contractor shall be required to complete the following activities by the indicated date or days after the Notice to Proceed:

Consecutive Calendar Days after Notice to Proceed	Milestone Liquidated Damages per Calendar Day
30 Days	Completion of Administrative Period
210 Days	Substantial Completion of All Work $1,000
240 Days	Final Completion of All Work $250

Revise per specific contract term

B. Substantial Completion, for the purposes of assessing liquidated damages, shall be defined as the time at which the work (or a specified part thereof) has progressed to the point where, in the opinion of Construction Manager, the work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the work (or a specified part thereof) can be utilized for the purposes for which it is intended.

C. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof. At minimum, Substantial Completion shall be defined as:

1. That degree of completion of the Project’s operating facilities or systems sufficient to provide the Owner full time, uninterrupted, continuous operation of the work; and

2. All required functional, performance, and operational or startup testing has been successfully demonstrated for all components, devices, equipment, systems, including instrumentation and controls to the satisfaction of the Construction Manager in accordance with the requirements of the Specifications; and

3. All inspections required have been completed. Specific items of work that must be completed prior to the Construction Manager's issuance of a certificate of Substantial Completion include, but are not limited to, the following:

   a. Correcting deficient work items listed by any regulatory agencies.

   b. All submittals must be received and approved by the Construction Manager, including, but not necessarily limited to, the following:

      1) Record documents.

      2) Factory test reports.

      3) Equipment and structure test reports.

      4) Manufacturer's Certificate of Proper Installation.

      5) Operating and Maintenance information, instructions, manuals, documents, drawings, diagrams, and records.

      6) Spare parts lists.

   c. All additional warranty or insurance coverage requirements have been provided.

1.03 STANDARDS

A. Existing pavement, sidewalks and curb and gutter, driveways or storm sewer, if affected by the construction, shall be replaced, in accordance with the relevant City and/or the Georgia Department of Transportation specifications and standards to match existing conditions at a minimum.

1.04 SUBMITTALS

A. Sequence Submittal

1. Submit a proposed sequence in accordance with Section 01 32 16 with appropriate times of starting and completion of tasks to Construction Manager for review.

2. The Contractor may propose alternatives to the sequencing constraints to that shown in this Section in an attempt to reduce the disruption of the operation of the existing facility or streamline the tasks of this Contract.

3. The Owner and Construction Manager are not obligated to accept any of these alternatives.

B. All requested submittals must be approved by the Owner or Construction Manager, prior to any on site work.

1. This includes, but is not limited to the construction sequencing schedule, Erosion and Sedimentation Control Plan, Tree Protection Plan, Traffic Management Plan, product shop drawings, and health and safety and loss prevention programs.

1.05 EXISTING FACILITY OPERATIONS

A. All existing services and continuity of water service must be maintained during the time construction activities are in progress.

B. Facilities may NOT be taken out of service between and May 15 and September 15 of any year.

C. For water tank projects, only one tank may be taken out of service at any time.

D. The Contractor shall coordinate all work with the Construction Manager, so that the construction will not restrain or hinder the operation of the existing services.

1. If, at any time, any portion of the existing service will be interrupted, the Contractor must obtain approval from the Construction Manager, five (5) days in advance, as to the date, time and length of time that portion of the services will be interrupted, until the services are restored.

E. Connections to the existing facilities or alteration of existing facilities will be made at times when the facility involved is not in use or at times, established by the Owner, when the use of the facility can be conveniently interrupted for the period of time needed to make the connection or alteration.

F. After having coordinated the work with the Owner, the Contractor shall prepare a submittal in accordance with Section 01 33 23 to include the time, time limits and methods of each connection or alteration and have the approval of the Construction Manager before any work is undertaken on the connections or alterations.

G. The Contractor shall comply with the stipulations contained in permits obtained from the relevant or applicable government entity, pertaining to work hours, lane closures, noise pollution, traffic detours, and road closures.

H. Before driveways are interrupted, the Contractor is responsible to coordinate their work activities with the property residence, so that construction will not hinder excess to the property.

I. Before any roadway or facilities are blocked off, the Owner's approval shall be obtained to coordinate operations for the Work.

J. The Contractor shall not open or close valves or take any other such actions concerning the operation of existing systems.

1.06 SEQUENCING

A. General

1. The Contractor is responsible for all construction activities sequencing, unless adjustment to any construction activity sequencing, is due to the Project's constraint, and/or requested by Construction Manager.
2. The completion of specific preliminary sequencing tasks will be required, prior to any construction activities.
3. The Contractor is responsible to verify the project's existing topography, prior to the procurement and delivery of pipe materials.
4. The Contractor is responsible to keep the road fully operational and functional, during the execution of the Project, unless approval is given by the relevant governing authority.

B. The Contractor shall notify the Construction Project Manager in writing at least 72 hours, prior to starting work that will require taking existing facilities out of service.

C. The Contractor may utilize multiple crews to construct the pipeline concurrently at various locations with the approval of the Construction Manager, in order to maintain the Project's completion schedule, or as required by the Construction Manager.

D. The Contractor is responsible to make their own assessment and determination of requirements that affect or may affect the work progress and sequencing.

E. Prior to the procurement of the proposed water line materials, the Contractor is responsible to field locate the starting and ending, tie-in points and connections locations of existing water pipe line. Field stake the horizontal center line of the proposed pipe line, in order to better procure the total amount of proposed water line linear footage.

F. The Contractor is responsible to provide, as an attachment to their Progress Payment Request Submittals, the applicable to date As-Built progress drawing of the installed water line that will support linear footage water main, to be approved for payment.

1.07 SEQUENCING CONSTRAINTS

A. The following construction sequencing constraints are to emphasize critical tasks of the work in this Contract. It is not a complete list of all work to be completed.

1. <add constraints>

1.08 SITE PHYSICAL CONDITIONS

A. The Contractor shall field verify the locations of existing subsurface structures, utilities, services, and depth of underground facilities, prior to the start of excavation and construction.

B. The Contractor is responsible to identify, locate, and make the necessary exploratory excavations where existing underground utilities, services, and structures may potentially conflict with propose construction.

C. All exploratory excavations shall be conducted sufficiently ahead to avoid possible delays to the Contractor's proposed water main installation schedule, and project's Contract Time.

D. The Contractor is responsible to field locate accurately and document, prior to start of work, the existing site condition of all landscaping features, walls, sidewalk, and curb and gutter alignment, including any existing features that may be impacted

1.09 TRAFFIC CONTROL

A. The Contractor is responsible to furnish the necessary traffic flagmen and/or escorts to direct traffic in the roadway areas affected by their construction operations, whenever and wherever, in the opinion of the Construction Manager traffic is sufficiently congested or public safety is endangered.

B. Under the Contract Terms, the employment or presence of traffic flagmen or escort, shall not in way relieve the Contractor of their responsible and/or liability.

1.10 CONSTRUCTION STAKING

A. The Project Construction Drawings show the alignment of the water main, and the location of valves, washouts, and other appurtenances.

B. The base line shall be defined as the centerline to which the location of the water line is referenced, or survey line. The Contractor shall be responsible for performing all survey work required for constructing the water main, including the establishment of its base line and/or centerline, and any details surveys needed for the water main installation and construction.

C. This work shall include the staking out of permanent and temporary easements, to ensure that the Contractor is not deviating from the designated easements.

D. The water main level of detail of survey shall be that the correct location, as described on the Construction Drawings or as laid out in the field can be established for construction and can be verified in the field by the Construction Project Manager.

1.11 REFERENCE POINTS

A. The Contractor shall take all precautions necessary, which includes, but not limited to, installing reference points, in order to protect and preserve the centerline or baseline established.

B. Reference points shall be placed at or no more than three (3) from the outside of the construction easement or right-of-way.

C. The location of the reference points shall be recorded in a log with a copy provided to the Construction Project Manager, prior to reference point locations verification.

D. The distances between reference points and the water main centerline shall be accurately measured to 0.01 foot.

E. The Contractor shall give the Construction Project Manager reasonable notice to field verify the set reference points.

1.12 ADMINISTRATION PERIOD

A. During the Administration Period the Contractor shall be limited in site access to only the following:

1. Nondestructive field verification of existing conditions.
2. Construction of Contractor's temporary field offices.

B. During the Administration Period the Contractor shall complete, as a minimum, the following:

1. Issuance of contracts, subcontracts, and purchase orders for all major products and systems.
2. Complete all submittals, release for manufacture, and schedule delivery for the products or systems referenced above.
3. Prepare and submit approvable documents required by Section 01 32 16, including OPS and the Schedule of Values.
4. Install Contractor's temporary field offices complete with all required utilities, internet, network, supplies, and furnishings required.
5. Complete and submit all preconstruction photos, videos, and initial aerial photographs.

C. The duration of the Administration Period is 30 consecutive calendar days, after which time the Construction Period shall automatically begin.

D. Construction Period may begin prior to the 30 days, provided all requirements of the Administration Period have been completed, submitted, and approved by the Construction Manager.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 35 29

HEALTH, SAFETY AND EMERGENCY RESPONSE PROCEDURES

PART 1 – GENERAL

1.01. CONTRACTOR'S RESPONSIBILITY FOR SAFETY

A. The Contractor shall determine the safety hazards involved in prosecuting the Work and the precautions necessary to conduct the Work safely.

1. If the Contractor is unsure as to any special hazards which may be unique to the various processes and facilities involved in water conveyance and treatment, it shall be Contractor's responsibility to determine such information prior to beginning the Work.

B. The Contractor shall conduct its operations and perform all work safely and perform all work necessary to ensure the safety of its personnel and others and shall be solely and completely responsible for the conditions on the jobsite, including the safety of all persons and property, both public and private, during the Contract period.

C. This protection shall be provided for all persons including but not limited to his employees, employees of other contractors or subcontractors, members of the general public, Owner's employees including the Construction Manager, Engineer's employees, and regulatory agencies' personnel that may be on or about the work. Protection of public and private property including but not limited to utilities, pipes, equipment, motor vehicles, and structures.

D. The Contractor's responsibility for protection is described in Article 25 of the General Conditions.

E. These requirements shall apply continuously and not be limited to normal working hours.

F. The Contractor shall bear all risks associated with performing the Work and shall fully indemnify and hold harmless the Owner, the Construction Manager and Engineer.

PART 2 – SAFETY AND HEALTH REGULATIONS

2.01. GENERAL

A. Safety provisions shall conform to the Federal and State Departments of Labor Occupational Safety and Health Act (OSHA), and all other applicable federal, state, county, and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified elsewhere in these Contract Documents.

B. Where any of these are in conflict, the more stringent requirement shall be followed. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations or relieve him of the penalties set forth therein.

C. All construction shall be conducted in accordance with the latest applicable requirements of the following:

1. Part 1926 - Safety and Health Regulations for Construction of the Occupational Safety and Health Act.
2. Section 107 of the Contract Work Hours and Safety Standards Act.
3. Any other local, state or federal safety codes, laws, regulations and standards that apply.

D. Copies of these regulations may be obtained from Labor Building, 14th and Constitution Avenue N.W., Washington, DC 20013.

PART 3 – EXECUTION

3.01. SAFE ACCESS TO THE WORK

A. The Contractor shall at all times provide proper facilities for safe access to the work by the Owner, the Construction Manager, their authorized representatives and by all authorized government officials.

3.02. CONSTRUCTION SAFETY PROGRAM

A. Contractor shall develop a written job safety program specifically suited for this project.

B. The Contractor shall appoint for the duration of this Contract a qualified supervisory employee to develop and supervise the Contractor's job safety program that will effectively implement the required safety provisions.

C. Neither the Owner nor the Construction Manager shall be responsible for safety precautions and programs in connection with the construction work.

D. The Contractor shall provide the Owner and Construction Manager with two copies of the Contractor's safety program within 15 working days after the Notice to Proceed.

3.03. EXCAVATION PLANS

A. In accordance with the governing state and federal requirements, the Contractor shall submit a detailed excavation plan to the Construction Manager before excavation, showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground during the excavation of any trench or trenches five feet or more in depth.

B. The excavation plan shall be prepared, sealed and signed by a licensed engineer registered in the state of Georgia.

C. This submittal is for record purposes only and shall not be reviewed and approved by the Owner or Construction Manager.

D. The plan is the complete responsibility of the Contractor and submitting it to the Owner and Construction Manager shall not relieve the Contractor for overall responsibility and liability for the work.

E. It shall be understood that the above stipulated requirements are considered to be the minimum to be provided. It shall be the Contractor's responsibility to provide the additional strength required to support the side of the excavation against loads which may exceed those employed to derive the criteria set forth in the Industrial Safety Orders.

F. The Contractor shall be solely responsible for any and all liabilities which may arise from his failure to provide adequate shoring, bracing, or sheeting as necessary to support the excavation under any or all of the conditions of loading which may exist, or which may arise during the construction of the project.

3.04. SAFETY EQUIPMENT

A. The Contractor shall maintain at the jobsite safety equipment applicable to the Work as prescribed by the governing safety authorities and all articles necessary for giving first aid to the injured and shall establish the procedure for the immediate removal to a hospital or a doctor's care of persons who may be injured on the jobsite.

B. The performance of all work and all construction, particularly with respect to ladders, platforms, structure opening, scaffolding, shoring, lagging, and machinery guards, shall be in accordance with the requirements of applicable governing safety authorities.

3.05. ACCIDENT REPORTS

A. If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner. In addition, the Contractor must promptly report in writing to the Owner all accidents in connection with work, giving full details, names, and statements of witnesses.

B. If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Owner, giving full details of the claim.

3.06. TRAFFIC SAFETY AND ACCESS TO PROPERTY

A. Comply with all rules and regulations of the City, State, and County authorities regarding closing or restricting the use of public street or highways.

B. No public or private road shall be closed, except by express permission of the Owner.

C. Conduct the work so as to assure the least possible obstructions within traveled roadways by installing approved signs, barricades, and lights where necessary for the safety of the public.

D. The convenience of the general public and residents adjacent to the project, and the protection of the persons and property are of prime importance and shall be provided for in an adequate and satisfactory manner.

3.07. FIRE PREVENTION AND PROTECTION

A. The Contractor shall execute all work in a fire-safe manner and shall supply and maintain on the site adequate fire-fighting equipment capable of extinguishing incipient fires.

B. The Contractor shall comply with applicable federal, local, and state fire prevention regulations.

C. Where these regulations do not apply, applicable parts of the National Fire Prevention Standards for Safeguarding Building Construction Operations, (NFPA No. 241) shall be followed.

D. Sufficient number of fire extinguishers of the type and capacity required to protect the Work and ancillary facilities, shall be provided and maintained by the Contractor in readily accessible locations.

3.08. Prior to entering or commencing work in a hazardous area, the Contractor shall ensure that all safety and emergency equipment is in place and in satisfactory operating condition.

3.09. Prior to commencing Work on existing facilities and equipment, the Contractor shall notify the system/facility superintendent and shall ensure that the source of electrical energy to all affected equipment is shut off and locked out at the appropriate motor control center. Local switches and pushbutton stations, where provided, shall be locked in the “off” position.

3.10. EMERGENCY PHONE NUMBERS

A. Emergency phone numbers (fire, medical, police) shall be posted at all telephone locations at the Site of the Work and their locations made known to all.

END OF SECTION

SECTION 01 35 43

ENVIRONMENTAL PROCEDURES

PART 1 – GENERAL

1.01 SITE MAINTENANCE

A. The Contractor shall keep the work site clean and free from rubbish and debris. Materials and equipment shall be removed from the site when they are no longer necessary.

B. Upon completion of the Work and before final acceptance, the work site shall be cleared of equipment, unused materials, and rubbish to present a clean and neat appearance.

1.02 TEMPORARY DAMS

A. Except in time of emergency, earth dams are not acceptable at catch basin openings, local depressions, or elsewhere.

B. Temporary dams of sand bags, asphaltic concrete, or other acceptable material will be permitted when necessary to protect the Work, provided their use does not create a hazard or nuisance to the public.

C. Such dams shall be removed from the site as soon as they are no longer necessary.

1.03 AIR POLLUTION CONTROL

A. The Contractor shall not discharge smoke, dust, and other contaminants, into the atmosphere that violate the regulations of any legally constituted authority.

B. The Contractor shall also abate dust nuisance by cleaning, sweeping, and sprinkling with water, or other means as necessary. The use of water, in amounts that result in mud on public streets, is not acceptable as a substitute for sweeping or other methods.

C. The Contractor shall provide dust control at no additional cost to the Owner.

1.04 NOISE CONTROL

A. Noise from Contractor's operations shall not exceed limits established by applicable laws or regulations and local noise ordinances.

1.05 SEDIMENTATION AND EROSION CONTROL

A. Contractor shall employ best management practices in accordance with Local, State and Federal guidelines and regulations for erosion and sedimentation

control. Unless otherwise noted, Contractor shall obtain related permits or approvals and pay applicable fees.

1.06 STATE OR FEDERAL WATERS

A. State or Federal Waters, wetlands or other environmental features shall not be disturbed without proper approvals, permits or notifications, which are the responsibility of the Contractor.

1.07 HAZARDOUS MATERIALS STORAGE

A. The Contractor shall submit Material Safety Data Sheets (MSDSs) for all hazardous chemicals contained onsite to the Construction Manager.

B. The Contractor shall also maintain a copy of all applicable MSDSs onsite at all times.

C. The Contractor shall notify the Owner and the Construction Manager upon receipt of any hazardous chemicals onsite.

D. All hazardous chemicals onsite must be placed in approved containment with an appropriate leak detection system. Flammable materials such as paints, thinners, solvents, etc. must be stored in approved fire storage cabinets.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.01 SCOPE

A. Permits and Responsibilities: The Contractor shall, without additional expense to the Owner, be responsible for obtaining all necessary licenses and permits, including building permits, and for complying with any applicable federal, state, county and municipal laws, codes and regulations, in connection with the prosecution of the Work. In addition, City Work Permits,

B. Right of Way Encroachment permits, plumbing permits and similar type permits, and all appropriate licenses are the responsibility of the Contractor.

C. If land disturbance permits, DOT permits, or easements are required, they will be obtained by the County as part of the design process.

D. The Contractor shall take proper safety and health precautions to protect the Work, the workers, the Owner and his representatives, the Engineer and his representatives, the public and the property of others.

E. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the Work, except for any completed unit of construction thereof which may heretofore have been accepted.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 42 00

CODES AND STANDARDS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Whenever reference is made to conforming to the standards of any technical society, organization, body, code or standard, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the time of advertisement for Bids. This shall include the furnishing of materials, testing of materials, fabrication and installation practices. In those cases where the Contractor's quality standards establish more stringent quality requirements, the more stringent requirement shall prevail. Such standards are made a part hereof to the extent which is indicated or intended.

B. The inclusion of an organization under one category does not preclude that organization' standards from applying to another category.

C. In addition, all work shall comply with the applicable requirements of local codes, utilities and other authorities having jurisdiction.

D. All material and equipment, for which a UL Standard, an AGA or NSF approval or an ASME requirement is established, shall be so approved and labeled or stamped. The label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.

E. The standards which apply to this Project are not necessarily restricted to those organizations which are listed in Article 1.02.

1.02 STANDARD ORGANIZATIONS

A. PIPING AND VALVES

ACPA	American Concrete Pipe Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
DIPRA	Ductile Iron Pipe Research Association
FCI	Fluid Controls Institute
MSS	Manufacturers Standardization Society
NCPI	National Clay Pipe Institute
NSF	National Sanitation Foundation
PPI	Plastic Pipe Institute
Uni Bell	PVC Pipe Association

B. MATERIALS

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials

C. PAINTING AND SURFACE PREPARATION

NACE	National Association of Corrosion Engineers
SSPC	Steel Structures Painting Council

D. ELECTRICAL AND INSTRUMENTATION

AEIC	Association of Edison Illuminating Companies
AIEE	American Institute of Electrical Engineers
EIA	Electronic Industries Association
ICEA	Insulated Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	The Instrumentation, Systems, and Automation Society
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
REA	Rural Electrification Administration
TIA	Telecommunications Industries Association
UL	Underwriter's Laboratories
VRCI	Variable Resistive Components Institute

E. ALUMINUM

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association

F. STEEL AND CONCRETE

ACI	American Concrete Institute
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
CRSI	Concrete Reinforcing Steel Institute
NRMA	National Ready Mix Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

G. WELDING

ASME	American Society of Mechanical Engineers
AWS	American Welding Society

H. GOVERNMENT AND TECHNICAL ORGANIZATIONS

AIA	American Institute of Architects
APHA	American Public Health Association
APWA	American Public Works Association
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASQC	American Society of Quality Control
ASSE	American Society of Sanitary Engineers
CFR	Code of Federal Regulations
CSI	Construction Specifications Institute
EDA	Economic Development Administration
EPA	Environmental Protection Agency
FCC	Federal Communications Commission
FmHA	Farmers Home Administration
FS	Federal Specifications
IAI	International Association of Identification
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
NBFU	National Board of Fire Underwriters
(NFPA)	National Fluid Power Association
NBS	National Bureau of Standards
NISO	National Information Standards Organization
OSHA	Occupational Safety and Health Administration
SI	Salt Institute
SPI	The Society of the Plastics Industry, Inc.
USDC	United States Department of Commerce
WEF	Water Environment Federation

I. GENERAL BUILDING CONSTRUCTION

AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AITC	American Institute of Timber Construction
APA	American Parquet Association, Inc.
APA	American Plywood Association
BHMA	Builders Hardware Manufacturers Association
BIFMA	Business and Institutional Furniture Manufacturers Association
DHI	Door and Hardware Institute
FM	Factory Mutual Fire Insurance Company
HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute
IME	Institute of Makers of Explosives
ISANTA	International Staple, Nail and Tool Association
ISDSI	Insulated Steel Door Systems Institute
IWS	Insect Screening Weavers Association
MBMA	Metal Building Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers

NAGDM	National Association of Garage Door Manufacturers
NCCLS	National Committee for Clinical Laboratory Standards
NFPA	National Fire Protection Association
NFSA	National Fertilizer Solutions Association
NKCA	National Kitchen Cabinet Association
NWMA	National Woodwork Manufacturers Association
NWWDA	National Wood Window and Door Association
RMA	Rubber Manufacturers Association
SBC	SBCC Standard Building Code
SDI	Steel Door Institute
SIA	Scaffold Industry Association
SMA	Screen Manufacturers Association
SPRI	Single Ply Roofing Institute
TCA	Tile Council of America
UBC	Uniform Building Code

J. ROADWAYS

AREA	American Railway Engineering Association
DOT	Department of Transportation
SSRBC	Standard Specifications for Construction of Transportation Systems, Georgia Department of Transportation

K. PLUMBING

AGA	American Gas Association
NSF	National Sanitation Foundation
PDI	Plumbing Drainage Institute
SPC	SBCC Standard Plumbing Code

L. REFRIGERATION, HEATING, AND AIR CONDITIONING

AMCA	Air Movement and Control Association
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
CGA	Compressed Gas Association
CTI	Cooling Tower Institute
HEI	Heat Exchange Institute
IIAR	International Institute of Ammonia Refrigeration
NB	National Board of Boilers and Pressure Vessel Inspectors
PFMA	Power Fan Manufacturers Association
SAE	Society of Automotive Engineers
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SMC	SBCC Standard Mechanical Code
TEMA	Tubular Exchangers Manufacturers Association

M. EQUIPMENT

AFBMA	Anti Friction Bearing Manufacturers Association, Inc.
AGMA	American Gear Manufacturers Association
ALI	Automotive Lift Institute
CEMA	Conveyor Equipment Manufacturers Association
CMAA	Crane Manufacturers Association of America
DEMA	Diesel Engine Manufacturers Association
MMA	Monorail Manufacturers Association
OPEI	Outdoor Power Equipment Institute, Inc.
PTI	Power Tool Institute, Inc.
RIA	Robotic Industries Association
SAMA	Scientific Apparatus Makers Association

1.03 SYMBOLS

A. Symbols and material legends shall be as scheduled on the Drawings.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 45 29

TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.01 SCOPE

A. This Section includes testing which the Owner may require, beyond that testing required of the manufacturer, to determine if materials provided for the Project meet the requirements of these Specifications.

B. This work also includes all testing required by the Owner to verify work performed by the Contractor is in accordance with the requirements of these Specifications, such as concrete strength and slump testing, soil compaction, etc.

C. This work does not include materials testing required in various sections of these Specifications to be performed by the manufacturer, such as testing of pipes.

D. The testing laboratory or laboratories will be selected by the Owner. The testing laboratory or laboratories will work for the Owner.

1.02 PAYMENT FOR TESTING SERVICES

A. The cost of testing services required by the Contract to be provided by the Contractor shall be paid for by the Owner through the CASH ALLOWANCE, e.g., concrete testing, soil compaction, asphalt testing, etc.

B. The cost of additional testing services not specifically required in the Specifications, but requested by the Owner or Construction Manager, shall be paid for by the Owner through the CASH ALLOWANCE.

C. The cost of material testing described in various sections of these Specifications or as required in referenced standards to be provided by a material manufacturer, shall be included in the price bid for that item and shall not be paid for by the Owner.

D. The cost of retesting any item that fails to meet the requirements of these Specifications shall be paid for by the Contractor. Retesting shall be performed by the testing laboratory working for the Owner.

1.03 LABORATORY DUTIES

A. Cooperate with the Owner, Construction Manager and Contractor.

B. Provide qualified personnel promptly on notice.

C. Perform specified inspections, sampling and testing of materials.

1. Comply with specified standards, ASTM, other recognized authorities, and as specified.
2. Ascertain compliance with requirements of the Contract Documents.

D. Promptly notify the Construction Manager and Contractor of irregularity or deficiency of work which are observed during performance of services.

E. Promptly submit one copy of inspection and/or test reports to the Construction Manager and Contractor with the following information included:

1. Date issued
2. Project title and number
3. Testing laboratory name and address
4. Name and signature of inspector
5. Date of inspection or sampling
6. Record of temperature and weather
7. Date of test
8. Identification of product and Specification section
9. Location of Project
10. Type of inspection or test
11. Results of test
12. Observations regarding compliance with the Contract Documents

F. Perform additional services as required.

G. The laboratory is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.

1.04 CONTRACTOR RESPONSIBILITIES

A. Cooperate with laboratory personnel; provide access to Work and/or manufacturer's requirements.

B. Provide to the laboratory, representative samples and in required quantities, of materials to be tested.

C. Furnish copies of test reports.

D. Furnish required labor and facilities to:

1. Provide access to Work to be tested.
2. Obtain and handle samples at the site.

3. Facilitate inspections and tests.

4. Build or furnish a holding box for concrete cylinders or other samples as required by the laboratory.

E. Notify the laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.

F. Laboratory Tests: Where such inspection and testing are to be conducted by an independent laboratory agency, the sample(s) shall be selected by such laboratory or agency, or the Construction Manager, and shipped to the laboratory by the Contractor at Contractor's expense.

G. Copies of all correspondence between the Contractor and testing agencies shall be provided to the Construction Manager.

1.05 QUALITY ASSURANCE

A. Testing shall be in accordance with all pertinent codes and regulations and with procedures and requirements of the American Society for Testing and Materials (ASTM).

1.06 PRODUCT HANDLING

A. Promptly process and distribute all required copies of test reports and related instructions to insure all necessary retesting or replacement of materials with the least possible delay in the progress of the Work.

1.07 FURNISHING MATERIALS

A. The Contractor shall be responsible for furnishing all materials necessary for testing.

1.08 CODE COMPLIANCE TESTING

A. Inspections and tests required by codes or ordinances or by a plan approval authority, and made by a legally constituted authority, shall be the responsibility of, and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.09 CONTRACTOR'S CONVENIENCE TESTING

A. Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

1.10 SCHEDULES FOR TESTING

A. ESTABLISHING SCHEDULE

1. The Contractor shall, by advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings, and make all arrangements for the testing laboratory to be on site to provide the required testing.
2. Provide all required time within the construction schedule.

B. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the testing laboratory as required.

C. When the testing laboratory is ready to test according to the determined schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra costs for testing attributable to the delay will be back charged to the Contractor and shall not be borne by the Owner.

1.11 TAKING SPECIMENS

A. Unless otherwise provided in the Contract Documents, all specimens and samples for tests will be taken by the testing laboratory or the Construction Manager.

1.12 TRANSPORTING SAMPLES

A. The Contractor shall be responsible for transporting all samples, except those taken by testing laboratory personnel, to the testing laboratory.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 50 10

TEMPORARY FACILITIES

PART 1 – GENERAL

1.01 SCOPE

A. Contractor shall provide temporary facilities required for this Work include, but are not necessarily limited to:

1. Temporary utilities such as water and electricity.
2. First aid facilities.
3. Sanitary facilities.
4. Potable water.
5. Temporary enclosures and construction facilities.

1.02 GENERAL

A. Contractor shall provide first aid facilities, sanitary facilities and potable water. These shall be available on the Project site on the first day that any activities are conducted on site. The other facilities shall be provided as the schedule of the Project warrants.

B. Maintenance: Contractor shall use all means necessary to maintain temporary facilities in proper and safe condition throughout progress of the Work. In the event of loss or damage, immediately make all repairs and replacements necessary, at no additional cost to the Owner.

C. Removal: Contractor shall remove all such temporary facilities and controls as rapidly as progress of the Work will permit.

1.03 STAGING AREAS

A. The Contractor shall establish a staging area for construction as required.

B. Allowable staging areas shall be within site property, road right of way, temporary easements, or permanent easements where approved by the Owner.

C. Any required grading within the staging areas shall be the responsibility of the Contractor and shall be approved by Owner and Construction Manager.

D. The Contractor shall be solely responsible for damages to equipment or materials due to heavy rains or flooding.

1.04 TEMPORARY UTILITIES

A. General

1. Contractor shall provide and pay all costs for all water, electricity and other utilities required for the performance of the Work.
2. Contractor shall pay all costs for temporary utilities until Project completion.
3. Contractor shall pay all costs for temporary utilities and shall include all power, water and the like necessary for testing equipment as required by the Contract Documents.

B. Temporary Water:

1. The Contractor shall coordinate with the Owner in providing metered water suitable for flushing and testing the mains, and for any other construction purposes.
2. The Contractor shall be responsible for providing an Owner approved backflow and metering device.
3. The Contractor shall provide all necessary temporary piping and, upon completion of the Work, remove all such temporary piping.
4. The Contractor is responsible for paying service charges for water used.

C. Temporary Power and Lighting:

1. Provide all necessary wiring for the Contractor's use.
2. The Contractor shall make arrangements with the electrical utility and with the Owner for power takeoff points from the existing service, voltage and phasing requirements, transformers and metering and shall pay the costs and fees arising therefrom.
3. The Contractor shall provide the special connections required for his work.
4. Furnish, locate and install area distribution boxes such that the individual trades may use, their own construction type extension cords to obtain adequate power, and artificial lighting at all points where required by inspectors and for safety.
5. The Contractor shall provide sufficient electrical lighting so that all work may be done in an efficient manner when there is not sufficient daylight.
6. The Contractor shall remove all temporary lighting when such light is no longer necessary.

D. Telephone

1. The Contractor shall provide telephone service for all construction site offices.
2. Cell phones are an acceptable substitute.

1.05 FIRST AID FACILITIES

A. The Contractor shall provide a suitable first aid station, equipped with all facilities and medical supplies necessary to administer emergency first aid treatment.

B. The Contractor shall have standing arrangements for the removal and hospital treatment of any injured person.

C. All first aid facilities and emergency ambulance service shall be made available by the Contractor to the Owner and the Construction Manager's personnel.

1.06 SANITARY FACILITIES

A. Prior to starting the Work, the Contractor shall furnish, for use of Contractor's personnel on the job, all necessary toilet facilities which shall be secluded from public observation. These facilities shall be either chemical toilets or shall be connected to the Owner's sanitary sewer system.

B. All facilities, regardless of type, shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the area in which the Work is performed.

C. Adequacy of these facilities will be subject to the Construction Manager's review and maintenance of same must be satisfactory to the Construction Manager at all times.

1.07 POTABLE WATER

A. The Contractor shall be responsible for furnishing a supply of potable drinking water for employees, subcontractors, inspectors, Construction Manager and the Owner who are associated with the Work.

1.08 ENCLOSURES AND CONSTRUCTION FACILITIES

A. The Contractor shall furnish, install and maintain for the duration of construction, all required storage, scaffolds, tarpaulins, canopies, steps, bridges, platforms and other temporary construction necessary for proper completion of the Work in compliance with all pertinent safety and other regulations.

1.09 PARKING FACILITIES

A. Parking facilities for the Contractor's and Contractor's subcontractors' personnel shall be the Contractor's responsibility.

B. The storage and work facilities provided by the Owner shall not be used for parking by the Contractor's or subcontractor's personnel.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 56 16

DUST CONTROL

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall limit blowing dust caused by construction operations by applying water or employing other appropriate means or methods to maintain dust control, subject to the approval of the Construction Manager.

B. As a minimum, this may require the use of a water wagon twice a day to suppress dusty conditions.

1.02 PROTECTION OF ADJACENT PROPERTY

A. The Contractor shall visit the site and note the buildings, landscaping, roads, parking areas and other facilities near the Work site that may be damaged by their operations.

B. The Contractor shall make adequate provision to fully protect the surrounding area and will be held fully responsible for all damages resulting from Contractor's operations.

C. The Contractor shall protect all existing facilities (indoors or out) from damage by dust, fumes, spray or spills (indoors or out).

D. Protect motors, bearings, electrical gear, instrumentation and building or other surfaces from dirt, dust, welding fumes, paint spray, spills or droppings causing wear, corrosion, malfunction, failure or defacement by enclosure, sprinkling or other dust palliatives, masking and covering, exhausting or containment.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 56 33

JOB SITE SECURITY

PART 1 – GENERAL

1.01 BARRICADES, LIGHTS AND SIGNALS

A. The Contractor shall furnish and erect such barricades, fences, lights and danger signals and shall provide such other precautionary measures for the protection of persons or property and of the Work as necessary.

B. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the Contractor shall furnish and maintain at least one light at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any Work under construction.

C. The Contractor will be held responsible for all damage to the Work due to failure of barricades, signs and lights and whenever evidence is found of such damage, the Contractor shall immediately remove the damaged portion and replace it at Contractor's cost and expense.

D. The Contractor's responsibility for the maintenance of barricades, signs and lights shall not cease until the Project has been accepted by the Owner.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 58 00

PROJECT IDENTIFICATION AND SIGNS

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section shall include the furnishing of a minimum of two painted signs for each Division of work of not less than 32 square feet in area, with painted graphic content that includes:

1. Project title.
2. Owner's name.
3. Names of governmental units participating in the Project.
4. Names and titles of other parties to be directed by the Construction Manager.
5. Logos.

1.02 DESIGN

A. The Contractor shall provide a scale drawing showing the graphic design, style of lettering and colors to the Construction Manager for approval.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Structure and framing: May be new or used, wood or metal in sound condition, structurally adequate to work and suitable for specified finish.

B. Sign Surfaces: Exterior soft wood plywood with medium density overlay, standard large sizes to minimize joints.

C. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.

D. Rough Hardware: Galvanized.

E. Paint: Exterior quality, as specified in the section entitled "Painting" of these Specifications.

PART 3 – EXECUTION

3.01 ERECTION

A. Erect the sign on the site in a high visibility location, adjacent to the Project as approved by the Construction Manager.

3.02 MAINTENANCE

A. Contractor shall maintain the Project Sign in good condition during the Contract period.

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END OF SECTION

SECTION 01 65 00

TRANSPORTATION AND HANDLING

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall provide transportation of all equipment, materials and products furnished under these Contract Documents to the work site.

B. The Contractor shall provide preparation for shipment, loading, unloading, handling and preparation for installation and all other work and incidental items necessary or convenient to the Contractor for the satisfactory prosecution and completion of the work.

C. All equipment, materials and products damaged during transportation or handling shall be repaired or replaced by the Contractor at no additional cost to the Owner prior to being incorporated into the work.

D. The Contractor shall maintain and keep in good repair the Work covered by these Drawings and Specifications until acceptance by the Owner.

1.02 TRANSPORTATION

A. All equipment shall be suitably boxed, crated or otherwise protected during transportation.

B. Where equipment will be installed using existing cranes or hoisting equipment, the Contractor shall ensure that the weights of the assembled sections do not exceed the capacity of the cranes or hoisting equipment.

C. Small items and appurtenances such as gauges, valves, switches, instruments and probes which could be damaged during shipment shall be removed from the equipment prior to shipment, packaged and shipped separately.

D. All openings shall be plugged or sealed to prevent the entrance of water or dirt.

1.03 HANDLING

A. All equipment, materials and products shall be carefully handled to prevent damage or excessive deflections during unloading or transportation.

B. Lifting and handling drawings and instructions furnished by the manufacturer or supplier shall be strictly followed.

1. Eyebolts or lifting lugs furnished on the equipment shall be used in handling the equipment.

2. Shafts and operating mechanisms shall not be used as lifting points.

3. Spreader bars or lifting beams shall be used when the distance between lifting points exceeds that permitted by standard industry practice.

C. Under no circumstances shall equipment or products such as pipe, structural steel, castings, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground.

D. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 66 00

STORAGE AND PROTECTION

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section includes, but is not necessarily limited to, the furnishing of all labor, tools and materials necessary to properly store and protect all materials, equipment, products and the like, as necessary for the proper and complete performance of the Work.

1.02 PIPE

A. Pipe and appurtenances shall be handled, stored, and installed as recommended by the manufacturer. Pipes with paint, tape coatings, linings or the like shall be stored to protect the coating or lining from physical damage or other deterioration. Pipes shipped with interior bracing shall have the bracing removed only when recommended by the pipe manufacturer.

1.03 STORAGE

A. During the interval between the delivery of equipment to the site and installation, all equipment, unless otherwise specified, shall be stored in an enclosed space affording protection from weather, dust and mechanical damage and providing favorable temperature, humidity and ventilation conditions to ensure against equipment deterioration. Manufacturer's recommendations shall be adhered to in addition to these requirements.

B. Equipment and materials to be located outdoors may be stored outdoors if protected against moisture condensation. Equipment shall be stored at least 6 inches above ground. Temporary power shall be provided to energize space heaters or other heat sources for control of moisture condensation. Space heaters or other heat sources shall be energized without disturbing the sealed enclosure.

C. Should the Contractor choose to store material or equipment or use for assembly property which is not owned by the Fulton County or the Contractor, a letter of permission signed by the legal owner of the property shall be obtained by the Contractor and submitted to the Construction Manager a minimum of 24 hours prior to delivery. All material and equipment stored at any facility other than the site shall be tagged with the Owner’s name and the project number. Payment shall not be made for “Stored Materials” for any material stored at locations or in any manner not suitable to the Owner.

D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or

bending between supports. Items such as pipe, structural steel and sheet construction products shall be stored with one end elevated to facilitate drainage.

E. Unless otherwise permitted in writing by the Construction Manager, building products and materials such as cement, grout, plaster, gypsum board, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc., shall be stored indoors in a dry location.

F. Building products such as rough lumber, plywood, concrete block and structural tile may be stored outdoors under a properly secured waterproof covering.

G. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

H. All materials shall meet the requirements of these Specifications at the time that they are used in the work.

I. Store products in accordance with manufacturer's instructions.

1.04 PROTECTION

A. Use all means necessary to protect the materials, equipment and products of every section before, during and after installation and to protect the installed work and materials of all other trades.

B. All materials shall be delivered, stored and handled to prevent the inclusion of foreign materials and damage by water, breakage, vandalism or other causes.

C. Substantially constructed weathertight storage sheds, with raised floors, shall be provided and maintained as may be required to adequately protect those materials and products stored on the site which may require protection from damage by the elements.

1.05 DAMAGE

A. Equipment, products and materials shall be shipped, handled, stored, and installed in ways which will prevent damage to the items. Damaged items will not be permitted as part of the work except in cases of minor damage that have been satisfactorily repaired.

B. In the event of damage, immediately make all repairs and replacements necessary for the approval of the Construction Manager and at no additional cost to the Owner.

C. Damage shall be corrected to conform to the requirements of the Contract before the assembly is incorporated into the Work.

D. All property damaged by reason of storing of material shall be properly replaced at no additional cost to the Owner.

1.06 EXTENDED STORAGE

A. In the event that certain items of major equipment, such as large diameter valves, have to be stored for an extended period of time, the Contractor shall provide satisfactory long-term storage facilities which are acceptable to the Construction Manager.

B. The Contractor shall provide all special packaging, protective coverings, protective coatings, power, nitrogen purge, desiccants, lubricants and exercising necessary or recommended by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

C. All equipment, materials and products shall be carefully handled to prevent damage or excessive deflections during unloading or transportation.

1.07 PACKAGE AND MARKING

A. All equipment shall be protected against damage from moisture, dust, handling, or other cause during transport from manufacturer's premises to site. Each item or package shall be marked with the number unique to the specification reference covering the item.

B. Stiffeners shall be used where necessary to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or sub-assembled units where possible

1.08 IDENTIFICATION

A. Each item of equipment and valve shall have permanently affixed to it a label or tag with its equipment or valve number designated in this contract. Marker shall be of stainless steel. Location of label will be easily visible.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 71 33

PROTECTION AND MAINTENANCE OF PROPERTY AND WORK

PART 1 – GENERAL

1.01. SUMMARY

A. This Section specifies protection and maintenance of underground and above ground utilities, structures, fences, parking strips, sidewalks, driveways, streets, and other improvements which may be affected by the Work.

1.02. SUBMITTALS

A. Procedures: Section 01 33 00.

B. Action submittal items:

1. Listing and schedule of all potholing.
2. Listing of all utilities/facilities to be physically protected and relocated.

C. Informational submittal items for this section:

1. Shoring for all affected structures and utilities.
2. Submit detail drawings of proposed methods to support, protect, and buttress utilities and structures where the depth of the excavation is greater than the horizontal distance from the structure or utility.

1.03. LOCATION OF EXISTING UNDERGROUND FACILITIES

A. The Drawings indicate the existence of underground facilities known to the Owner.

1. Utilities are shown schematically on the plans and are not necessarily accurate in location as to plan or elevation.
2. Determine the location of all utilities that may be impacted during construction.
3. The Contractor shall familiarize himself with and comply with the provisions of O.C.G.A. Section 25-9-1 et. seq.

B. The Contractor shall call, by law, the Utilities Protection Center, d/b/a Georgia 811 at “811” or 1-800-282-7411 and shall request that all owners of utilities, including, but not limited to, gas companies, electric companies, telephone companies, cable companies and governmental units, prior to starting any excavation of the Project, locate and mark their respective facilities.

C. Locate existing underground utilities. Review with the Owner the locations of existing utilities in relation to the new construction and evaluate areas of conflict.

D. Excavate and expose all major and minor existing utilities prior to new construction to determine utility elevations in relation to the new facilities.

E. Examine and repair all pipelines prior to pipelines being buried.

1.04. EXISTING UTILITIES AND FACILITIES

A. Protect, modify, and/or relocate all existing utilities required to complete the Work.

B. The locations of existing major utilities, whether above ground or underground, are indicated on the Drawings.

1. This information has been obtained from utility maps and field surveys.

2. The Owner does not guarantee the accuracy or completeness of this information, and it is to be understood that other above ground or underground facilities not shown on the Drawings may be encountered during the course of the Work.

C. Contractor shall be responsible for damages resulting from any failure to contact utility owners for location, routing, and marking of a specific utility and its subsequent effects.

D. The Drawings may show underground utilities which are to be relocated. Contractor shall be responsible for all these relocations prior to commencing work in the area.

E. Protect, modify, or relocate existing utilities and facilities required to accommodate Contractor's means and methods.

1. Specific means and methods to be utilized by the Contractor are not known to the Owner. Therefore, the Owner will not be liable for utility protection, modification, and relocation not shown on the Drawings that are required by the Contractor due to its means and methods.

2. It is the Contractor's responsibility to determine the Work required by the Construction Documents and make provision for protection, modification, and relocation required.

3. Coordinate all protection, modification, and relocation work through the affected utility.

4. Complete Work to the utility owner's requirements and standards.

F. Underground Utilities:

1. For the purpose of this Section an underground utility will be defined as a transmission, collection, or distribution line where it would be customary to expect that drawings would exist for the line and the utility owner would be aware of the line.

2. An existing underground utility is considered to be in conflict if it crosses or projects into the specified excavation at an elevation between the top and

bottom of the new facility or when parallel to the new facility, and projects into the specified excavation.

3. Contractor shall be responsible for all protection, affects, and damage on utilities not in conflict with the new construction, whether or not the utilities are shown on the Drawings.

4. When not shown on the Drawings and in conflict with the new construction, meet and agree with the Owner on how to proceed.

5. When not shown on the Drawings and no conflict with the new facility exists, no additional payment will be considered.

6. When in a substantially different location and not in conflict with the new construction, no additional payment will be considered.

7. When in a substantially different location and in conflict with the new construction, reimbursement for additional work per the General Conditions.

G. Abandoned pipelines shown on the Drawings shall be removed and plugged per the local agency requirements when encountered.

H. Locate existing underground utilities with the field staking. Review with the Owner the locations of existing utilities in relation to the new construction and evaluate areas of conflict

I. Storm and Sanitary Sewers:

1. Existing live sewers shall remain in service. Adequate provision shall be made for disposal of existing sewage flow.

   a. Immediately repair construction damage to the existing sewer system and manholes to a condition equal to or better than that existing prior to the damage.

   b. Repair all damage which results from the disturbance of the existing sewer.

2. Remove water accumulating during construction from the new sewers and prevent it from entering existing lines.

J. Aboveground Electrical, Cable, and Communication Facilities:

1. Attention is called to all overhead items including, but not limited to, power, communication and telephone lines, temporary traffic signals, traffic signal mast arms, overhead sign bridges, sign support span wires, signs, and street lights.

2. Observe the location of these overhead facilities and plan and conduct work operations, accordingly.

3. Take precautions to protect and avoid damage to all overhead facilities.

4. Relocate facilities as required to meet the means and methods to be utilized.

5. Observe and investigate the presence of facilities that may be affected by the Work.
    a. Consult with and rely on the information given by utility owners and operators to determine the extent of any hazards and measures required.
    b. Determine the extent of any hazard created by facilities in all areas and follow approved safety procedures during the work.
6. Support poles at risk of being undermined by the Work.
7. Follow the requirements of the local power company for all energized primary conductors.
    a. For 50 kV lines and less, at no time shall personnel or equipment approach closer than 10 feet to any energized primary conductors.
    b. For greater than 50 kV, meet the requirements of the local power company.

K. Underground Electrical, Cable, and Communication Facilities:

1. Determine the protection necessary to proceed safely to protect these underground facilities.

L. Gas:

1. As required by the appropriate utility owner, protect, maintain, support in place, or relocate all gas mains crossing the pipeline trenches.
2. Provide a minimum of 12 inches of clearance, measured from edge to edge, between gas mains or gas service lines and new facilities
    a. If relocating either utility is not practical, a protective wrap shall be provided for the entire distance where less than 12 inches of vertical clearance and less than 6 inches of horizontal clearance are provided.
    b. Wrapping material shall consist of either a split polyvinyl chloride (PVC) pipe or PVC wrapping of at least 0.04 inch in thickness, and shall be applied to either one of the pipes.
3. All abandoned gas mains encountered in the trench area shall be removed.
4. All temporary gas service slack lines shall be protected and maintained during pipeline installation.
5. Notify the Owner and the utility at least two business days (minimum of 48 hours) in advance of any excavation in the vicinity of any gas piping.
6. The utility may require one of its inspectors to be onsite anytime work is conduct near gas lines.

M. Water:

1. As required by the appropriate utility, protect, maintain, support in place, or relocate all water pipelines affected by the Work.
2. Maintain water service along the alignment of work at all times.
3. Thrust blocks may not be shown on the Drawings and shall be assumed to be present at all water line deflections of 11-1/4 degrees or greater.
4. Notify the Owner in writing immediately of any damage. Begin repairs immediately, and work continuously until water service is restored.

N. Roadways:

1. Take adequate precautions to protect existing sidewalks, curbs, pavements, utilities, adjoining property, and structures, and avoid damage.
2. Traffic signage, paint striping, and channelization shall be protected and replaced if damaged.
3. Maintain the existing illumination pattern for signs and roads at all times.
4. Install temporary roadway lighting as necessary.
5. Access for emergency equipment shall be maintained at all times.

1.05. SHORING AND BRACING

A. Shore up, brace, under-pin, and protect as necessary, the foundations and other parts of existing structures adjoining the site of the Work that may be affected by the Work.

B. Contractor is responsible for any damages because of settlements or the loss of lateral or subjacent support of adjoining property and from all loss and damages to adjoining and adjacent structures and their premises.

C. Fully comply with the requirements of the authority having jurisdiction (AHJ) and the State of Georgia, as applicable.

1.06. EMERGENCIES

A. Whenever work endangers the safety of life or property, including adjoining property or property in the immediate proximity of the Work, take all reasonable and prudent actions to prevent threatened loss or injury.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

3.01. GENERAL

A. Contact the Owner and the affected utilities prior to an excavation per the General Conditions.

B. Pothole to locate and expose all utility locations to be affected by the Work prior to new construction in the area of the utility.

C. Adjust work when location of utility is different than shown on the Drawings and materially impacts construction.

D. If the utility requires relocation not shown on the Drawings and the Contractor incurs additional cost, the Owner will consider additional costs.

E. Relocation of minor utilities such as irrigation lines less than 4 inches, water service lines, building drainage pipes will be considered incidental and will not be considered for additional costs.

F. If damage to a utility occurs, repair damage to the requirements of the utility owner prior to backfilling said utility.

END OF SECTION

SECTION 01 74 00

CLEANING AND WASTE MANAGEMENT

PART 1 – GENERAL

1.01 SCOPE

A. This Section covers the general cleaning which the Contractor shall be required to perform both during construction and before final acceptance of the Project unless otherwise shown on the Drawings or specified elsewhere in these Specifications.

1.02 QUALITY ASSURANCE

A. Daily, and more often if necessary, conduct inspections verifying that requirements of cleanliness are being met.

B. In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction.

1.03 HAZARDOUS MATERIAL AND WASTE

A. The Contractor shall handle hazardous waste and materials in accordance with applicable local, state, and federal regulations. Waste shall also be disposed of in approved landfills as applicable.

B. The Contractor shall prevent accumulation of wastes which create hazardous conditions.

C. Burning or burying rubbish and waste materials on the site shall not be allowed.

D. Disposal of hazardous wastes or materials into sanitary or storm sewers shall not be allowed.

PART 2 – PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

A. Provide all required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY

A. Use only the cleaning materials, methods and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Construction Manager.

PART 3 – EXECUTION

3.01 PROGRESS CLEANING

A. General

1. Do not allow the accumulation of scrap, debris, waste material and other items not required for construction of this Work.
2. At least each week and more often if necessary, completely removes all scrap, debris and waste material from the job site.
3. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the environment.

B. Site

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.
2. Restack materials stored on site weekly.
3. At all times maintain the site in a neat and orderly condition which meets the approval of the Construction Manager.

C. Structures

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.
2. Weekly, and more often if necessary, sweep all interior spaces clean. “Clean”, for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by using a hand-held broom.
3. As required preparatory to installation of successive materials, clean the structures or pertinent portions as recommended by the manufacturer of the successive material.
4. Following the installation of finish floor materials, clean the finish floor daily. “Clean”, for the purpose of this Paragraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Construction Manager, may be injurious to the finish floor material.
5. Schedule cleaning operation so that dust and other contaminants resulting from cleaning operations will not fall on wet, recently painted surfaces.

3.02 FINAL CLEANING

A. Definitions: Unless otherwise specifically specified, “clean” for the purpose of this Article shall be interpreted as the level of cleanliness generally provided by

commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.

B. General: Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris and waste. Conduct final progress cleaning as described in 3.01 above.

C. Site: Unless otherwise specifically directed by the Construction Manager, hose down all paved areas on the site and all public sidewalks directly adjacent to the site; rake clean other surfaces of the grounds. Completely remove all resultant debris.

D. Structures

1. Remove all traces of soil, waste material, splashed material, and other foreign matter to provide a uniform degree of exterior cleanliness.
    a. Visually inspect all exterior surfaces and remove all traces of soil, waste material, and other foreign matter.
    b. Remove all traces of splashed materials from adjacent surfaces.
    c. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure.
    d. In the event of stubborn stains not removable with water, the Construction Manager may require light sandblasting or other cleaning at no additional cost to the Owner.
2. Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges and other foreign matter. Remove all paint droppings, spots, stains and dirt from finished surfaces.
3. Clean all glass inside and outside.
4. Polish all surfaces requiring the routine application of buffed polish. Provide and apply polish as recommended by the manufacturer of the material being polished.

E. Post Construction Cleanup: All evidence of temporary construction facilities, haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other evidence of construction, as directed by the Construction Manager.

F. Restoration of Landscape Damage: Any landscape feature damaged by the Contractor shall be restored as nearly as possible to its original condition at the Contractor's expense. The Construction Manager will decide what method of restoration shall be used.

G. Timing: Schedule final cleaning as approved by the Construction Manager to enable the Owner to accept the Project.

3.03 CLEANING DURING OWNER'S OCCUPANCY

A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the Construction Manager in accordance with the Supplementary Conditions of the Contract Documents.

3.04 DISPOSAL OF WASTE

A. The definitions contained in Georgia Environmental Protection Division Rules 391-3-4-.01 shall be applicable to this Project. The term waste shall include excess and surplus materials, and shall include liquid and solid wastes.

B. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

C. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

D. Remove and transport waste in a manner that will prevent spillage on adjacent surfaces and areas.

E. Burning: Do not burn waste materials on site.

F. Waste removed from the Project site shall be disposed of in sites permitted by the Georgia Environmental Protection Division for the acceptance of type of waste being disposed. The acceptable types of permitted disposal facilities are as follows:

1. Inert Waste Landfills
2. Municipal Solid Waste Landfills
3. Municipal Solid Waste Landfills permitted to receive only construction and demolition wastes.

G. Exceptions to Paragraph F are as follows:

1. Hazardous waste shall be disposed of in accordance with Georgia Environmental Protection Division Rules 391-3-11.
2. Asbestos-containing waste shall also be handled and disposed of in accordance with Georgia Environmental Protection Division Rules 391-3-14.

H. No waste shall be placed at a transfer station facility.

I. The Contractor shall maintain records related to all waste removed from the Project site so as to allow the Owner or the Construction Manager to readily determine the following:

1. Date waste removed from Project site.
2. Name of hauler (company and driver) transporting such waste.
3. General description of waste transported.
4. “Truck tickets” indicating the waste disposal site and amount of waste disposed therein.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.01. REQUIREMENTS INCLUDED

A. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.

1.02. REQUIREMENTS

A. Conditions of the contract. Fiscal provisions, legal submittals and additional administrative requirements.

B. Section 01 78 39: Record Documents.

C. The respective sections of Specifications: Closeout Submittals Required of Trades.

1.03. SUBSTANTIAL COMPLETION

A. When Contractor considers the Work is substantially complete, he shall submit the following to the Construction Manager:

1. A written notice that the Work, or designated portion thereof, is substantially complete.
2. A list of items to be completed or corrected.

B. Within a reasonable time after receipt of such notice, the Construction Manager will make an inspection to determine the statue of completion.

C. Should the Construction Manager determine that the work is not substantially complete:

1. Construction Manager will promptly notify the Contractor in writing, giving the reasons therefore.
2. Contractor shall remedy the deficiencies in the Work, and send second written notice of substantial completion to the Construction Manager.
3. Construction Manager will reinspect the work.

D. When the Construction Manager finds that the work is substantially complete, he will:

1. Prepare and deliver to the Owner a tentative Certificate of Substantial Completion, with a tentative list of items to be completed or corrected before final payment.

2. After consideration of any objections made by the Owner as provided in Conditions of the Contract, and when the Construction Manager considers the Work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected.

E. Substantial Completion: The Certificate will identify the date of Substantial Completion and list any incomplete Work.

1.04. FINAL COMPLETION

A. Prior to Final Completion: Final Completion is achieved when all Work is fully complete in accordance with the Construction Documents.

B. Tasks to complete include, but are not limited to, the following:

1. All Work is complete and correct to the satisfaction of the Owner.
2. All temporary facilities and controls removed.
3. All final cleaning complete per Cleaning Specification.
4. Final Operation and Maintenance Manuals provision per Section 01 78 23.
5. Warranties and Bond Manual submission per Section 01 78 36.
6. Submittal of the Project Record Documents per Section 01 78 39.
7. Spare parts delivery and acceptance.
8. Landscaping complete.
9. All final permits submitted, including Certificates of Occupancy.
10. All Change Orders are approved and signed by both parties.
11. Draft Final Application for Payment submitted.

C. FINAL INSPECTION

1. When Contractor considers the work is complete, he shall submit written certification that:
   a. Documents have been reviewed.
   b. Work has been inspected for compliance with Contract Documents.
   c. Work has been completed in accordance with Contract Documents.
   d. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
   e. Work is completed and ready for final inspection
2. Construction Manager will make the final inspection to verify the status of completion with reasonable promptness after receipt of such certification.
3. Should the Construction Manager consider that the work is incomplete or defective:

a. Construction Manager will promptly notify the Contractor in writing, listing the incomplete or defective work.

b. Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to the Construction Manager that the work is complete.

c. Construction Manager will reinspect the work.

4. When the Construction Manager finds that the work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

1.05. REISNPECTION FEES

A. When the Construction Manager performs reinspections due to failure of the work to comply with the claims of status of completion made by the Contractor:

1. Contractor shall compensate the Owner for expenses incurred by the Construction Manager for such additional services.

2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.06. CLOSEOUT SUBMITTALS TO CONSTRUCTION MANAGER

A. Evidence of compliance with requirements of governing authorities.

B. Record Documents: To requirements of Section 01 78 39.

C. Evidence of payments and Release of Liens: To requirements of General and Supplementary Conditions.

D. Certificate of Insurance for Products and Completed Operations.

1.07. FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to Construction Manager.

B. Statement shall reflect all adjustments to the Contract Sum:

1. The original Contract Sum.

2. Additions and deductions resulting from:

a. Previous Change Orders.

b. Allowances.

c. Unit Prices.

d. Deductions for uncorrected work.

e. Penalties and Bonuses.

f. Deductions for liquidated damages.

g. Deductions for re-inspection payments.

h. Other adjustables.

3. Total Contract Sum as adjusted.

4. Previous payments.

5. Sum remaining due.

C. Construction Manager will prepare a final Change Order reflecting approved adjustments to the Contract Sum which were not made by previous Change Orders.

1.08. APPLICATION FOR PAYMENT

A. Contractor shall submit the final Application for Payment in accordance with procedures.

1.09. FINAL ACCEPTANCE

A. Final Application for Payment approved and payment made to Contractor.

B. The Owner will establish the date of Final Acceptance and issue the Letter of Final Acceptance after the Contractor completes all Construction Document requirements.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 SCOPE

A. Operation and maintenance (O&M) instructions shall be provided in accordance with this section and as required in the technical sections of this project manual. O&M information shall be provided for each maintainable piece of equipment, equipment assembly or subassembly, and material provided or modified under this contract.

B. O&M instructions must be submitted and accepted before on-site training may start.

1.02 TYPES OF INFORMATION REQUIRED

A. General:

1. O&M information shall contain the names, addresses, and telephone numbers of the manufacturer, the nearest representative of the manufacturer, and the nearest supplier of the manufacturer's equipment and parts. In addition, one or more of the following items of information shall be provided as applicable.

B. Operating Instructions:

1. Specific instructions, procedures, and illustrations shall be provided for the following phases of operations:

a. Safety Precautions: List personnel hazards for equipment and list safety precautions for all operating conditions.

b. Operator Prestart: Provide requirements to set up and prepare each system for use.

c. Start-Up, Shutdown, and Post-shutdown Procedures: Provide a control sequence for each of these operations.

d. Normal Operations: Provide control diagrams with data to explain operation and control of systems and specific equipment.

e. Emergency Operations: Provide emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.

f. Operator Service Requirements: Provide instructions for services to be performed by the operator such as lubrication, adjustments, and inspection.

g. Environmental Conditions: Provide a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which equipment should not be allowed to run.

C. Preventive Maintenance:

1. The following information shall be provided for preventive and scheduled maintenance to minimize corrective maintenance and repair:

a. Lubrication Data: Provide lubrication data, other than instructions for lubrication in accordance with paragraph 1.02 Operator Service Requirements.

1) A table showing recommended lubricants for specific temperature ranges and applications;

2) Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities; and

3) A lubrication schedule showing service interval frequency.

b. Preventive Maintenance Plan And Schedule: Provide manufacturer's schedule for routine preventive maintenance, inspections, tests, and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair. Provide manufacturer's projection of preventive maintenance man-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft.

D. Corrective Maintenance:

1. Manufacturer's recommendations shall be provided on procedures and instructions for correcting problems and making repairs.

a. Troubleshooting Guides And Diagnostic Techniques: Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

b. Wiring Diagrams And Control Diagrams: Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job-specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type identically to actual installation numbering.

c. Maintenance And Repair Procedures: Provide instructions and list tools required to restore product or equipment to proper condition or operating standards.

d. Removal And Replacement Instructions: Provide step-by-step procedures and list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings, and adjustments required. Instructions shall include a combination of test and illustrations.

e. Spare Parts And Supply Lists: Provide lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonably delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead time to obtain.

f. Corrective Maintenance Man-hours: Provide manufacturer's projection of corrective maintenance man-hours including craft requirements by type of craft. Corrective maintenance that requires participation of the equipment manufacturer shall be identified and tabulated separately.

E. Appendices:

1. The following information shall be provided; include information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment.

a. Parts Identification: Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies.

b. Warranty Information: List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents to keep warranties in force.

c. Personnel Training Requirements: Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.

d. Testing Equipment and Special Tool Information: Provide information on test equipment required to perform specified tests

and on special tools needed for the operation, maintenance, and repair of components.

1.03 TRANSMITTAL PROCEDURE

A. Unless otherwise specified, O&M manuals, information, and data shall be transmitted in accordance with Section 01 33 00 accompanied by Transmittal Form 01 78 23-A and Equipment Record Forms 01 78 23-B and/or 01 78 23-C, as appropriate, all as specified in Section 01 99 90. The transmittal form shall be used as a checklist to ensure the manual is complete. Only complete sets of O&M instructions will be reviewed for acceptance.

B. One (1) electronic and six (6) hard copies of the specified O&M information in final format, with all prior comments addressed to the satisfaction of the Construction Manager, shall be provided following preliminary review and pre-final review of the O&M information.

1. Electronic copies of O&M manuals also shall be provided per Section 01 33 00. For electronic copies, files shall be proved on flash drive in an indexed PDF file format.

2. For ease of identification, each manufacturer's brochure and manual shall be appropriately labeled with the equipment name and equipment number as it appears in the project manual.

3. The information shall be organized in the binders in numerical order by the equipment numbers assigned in the project manual.

4. The binders shall be provided with a table of contents and tab sheets to permit easy location of desired information.

5. Binders shall be heavy-duty, d-ring.

C. If manufacturers' standard brochures and manuals are used to describe O&M procedures, such brochures and manuals shall be modified to reflect only the model or series of equipment used on this project. Extraneous material shall be crossed out neatly or otherwise annotated or eliminated.

1.04 PAYMENT

A. Acceptable O&M information for the project must be delivered to the Construction Manager prior to the project being 65 percent complete. Progress payments for work in excess of 65 percent completion will not be made until the specified acceptable O&M information has been delivered to the Construction Manager.

1.05 FIELD CHANGES

A. Following the acceptable installation and operation of an equipment item, the item's instructions and procedures shall be modified and supplemented by the Contractor to reflect any field changes or information requiring field data.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 78 36

WARRANTIES AND BONDS

PART 1 – GENERAL

1.01 SUMMARY

A. This Section specifies general administrative and procedural requirements for warranties required by the Construction Documents, including manufacturer's Standard Product Warranties and Special Warranties.

B. Refer to the General Conditions for terms of the Contractor's Warranty of Construction.

C. If there is any discrepancy in the Construction Documents regarding the warranty period or its date of commencement, the passage granting the Owner the longest warranty period ending on the latest date shall govern.

D. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and Subcontractors that are required to countersign Special Warranties with the Contractor.

1.02 DEFINITIONS

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by, or incorporated in, the Construction Documents, either to extend time limits provided by Standard Product Warranties or to provide greater rights to the Owner. Refer to individual sections of the Specifications for Special Warranty requirements.

1.03 PROJECT MAINTENANCE AND WARRANTY

A. The Contractor shall maintain and keep in good repair the Work covered by these Drawings and Specifications until acceptance by the Owner.

B. The Contractor shall warrant for a period of two years, except where specified otherwise, from the date of Owner's written acceptance of certain segments of the Work and/or Owner's written final acceptance of the Project, as defined in the Contract Documents that the completed Work is free from all defects due to faulty products or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects.

1. The Owner will give notice of observed defects with reasonable promptness.

2. In the event that the Contractor should fail to make such repairs, adjustments or other work that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost thereby incurred.

3. The Performance Bond shall remain in full force and effect throughout the warranty period.

C. The Contractor shall not be obligated to make replacements which become necessary because of the following:

1. Ordinary wear and tear.

2. As a result of improper operation or maintenance.

3. As a result of improper work or damage by another Contractor or the Owner.

4. Any work performed by personnel other than a maintenance crew during operation.

D. In the event of multiple failures of major consequences prior to the expiration of the two year warranty described above, the affected unit shall be disassembled, inspected and modified or replaced as necessary to prevent further occurrences.

1. All related components which may have been damaged or rendered non serviceable as a consequence of the failure shall be replaced.

2. A new 24 month, except where specified otherwise, warranty against defective or deficient design, workmanship, and materials shall commence on the day that the item is reassembled and placed back into operation.

3. As used herein, multiple failure shall be interpreted to mean two or more successive failures of the same kind in the same item or failures of the same kind in two or more items.

4. Major failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts, broken or chipped gear teeth, premature bearing failure, excessive wear or excessive leakage around seals.

5. Failures which are directly and clearly traceable to operator abuse, such as operations in conflict with published operating procedures or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant over or under lubrication and using maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the one year warranty.

6. Should multiple failures occur in a given item, all products of the same size and type shall be disassembled, inspected, modified or replaced as necessary and re-warranted for two years.

E. The Contractor shall, at Contractor's own expense, furnish all labor, materials, tools and equipment required and shall make such repairs and removals and shall perform such work or reconstruction as may be made necessary by any structural

or functional defect or failure resulting from neglect, faulty workmanship or faulty materials, in any part of the Work performed by the Contractor.

1. Such repair shall also include refilling of trenches, excavations or embankments which show settlement or erosion after backfilling or placement.

F. Except as noted on the Drawings or as specified, all structures such as embankments and fences shall be returned to their original condition prior to the completion of the Contract.

1. Any and all damage to any facility not designated for removal, resulting from the Contractor's operations, shall be promptly repaired by the Contractor at no cost to the Owner.

G. The Contractor shall be responsible for all road and entrance reconstruction and repairs and maintenance of same for a period of one year from the date of final acceptance. In the event the repairs and maintenance are not made immediately and it becomes necessary for the owner of the road to make such repairs, the Contractor shall reimburse the owner of the road for the cost of such repairs.

H. In the event the Contractor fails to proceed to remedy the defects upon notification within 15 days of the date of such notice, the Owner reserves the right to cause the required materials to be procured and the work to be done, as described in the Drawings and Specifications, and to hold the Contractor and the sureties on Contractor's bond liable for the cost and expense thereof.

I. Notice to Contractor for repairs and reconstruction will be made in the form of a registered letter addressed to the Contractor at Contractor's home office.

J. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the Contractor's liability within the law of the place of construction.

K. Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

L. The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Construction Documents.

M. The Owner reserves the right to refuse to accept Work for the Project where a Special Warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

N. Owner acceptance of warranties does not relieve the Contractor of the warranty requirements specified in the General Conditions.

O. Ensure all Standard Product Warranties and Special Warranties are transferrable to Owner.

1.04 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Warranties and Bonds Manual: Assemble executed licenses, certificates, warranties, bonds, and any required service and maintenance contracts from the respective manufacturers, suppliers, and Subcontractors. Provide two (2) preliminary review copies, identified “Preliminary.” Provide four (4) final signed copies of the Warranties and Bonds Manual following review and acceptance of the preliminary manual by the Owner.

1. Out of the four final signed copies, one (1) shall be an original.
2. Provide one (1) flash drive with scanned Adobe Acrobat (.pdf) files, including an index with hyperlinks to the individual sections.

C. Include complete information for each of the following:

1. Neatly typed Table of Contents, in a complete and orderly sequence.
2. Product or work item, including applicable specification section number(s) per the Construction Documents.
3. Firm, with name of principal, address, telephone number, email address, and web site address.
4. Scope of warranty.
5. Start date of warranty or service and maintenance contract.
6. Duration of warranty or service and maintenance contract.
7. Proper procedure in case of failure.
8. Instances which might affect validity of warranty or bond.
9. Contractor, name or responsible principal, address, and telephone number.
10. For Special Warranties, prepare a written document containing all pertinent information and ready for execution by the required parties.

D. Copies shall be bound in slant-D, 3 ring view binders with an insert accepting clear vinyl overlay on the front cover and spine.

1. Provide cover slip sheet typed with "WARRANTIES AND BONDS", Project name, Project number, Contractor, and blank field for the date. Label volumes consecutively.
2. Each copy shall have a typewritten index and tabbed dividers between equipment categories or specification sections.
3. The contents of the manual shall be printed on white 8-1/2” x 11” acid free, recycled copy paper and shall not exceed 75% capacity of the binder.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 78 39

RECORD DOCUMENTS

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section includes, but is not necessarily limited to, the compiling, maintaining, recording and submitting of project record documents as herein specified.

B. Record documents refer to those documents maintained and annotated by the Contractor during construction and are defined as:

1. A neatly and legibly marked set of contract drawings showing the final location of piping, equipment, structures, electrical conduits, outlet boxes and cables.
2. Specifications annotated with addenda and change order items, by section.
3. Change orders and other modifications to the Contract.
4. Construction Manager field orders or written instructions, including Requests for Information (RFI) and Clarification Memorandums.
5. Reviewed shop drawings, product data and samples.
6. Daily work reports.
7. Field test data.
8. Additional documents such as schedules, lists, drawings, and electrical and instrumentation diagrams included in the Specifications

C. The Contractor shall maintain on the Project site throughout the Contract Time an up to date set of Record Drawings.

1.02 GENERAL REQUIREMENTS

A. Unless otherwise specified, record drawings shall be full size and maintained in a clean, dry, and legible condition.

B. Record documents shall not be used for construction purposes and shall be available for review by the Owner and Construction Manager during normal working hours.

C. At the completion of the Work, prior to final payment, all record drawings and any CAD files shall be submitted to the Construction Manager.

D. The record documents shall be maintained continuously.

E. Prior to each request for partial progress payment, Construction Manager will review record drawings with Contractor.

F. Progress payment requests will not be processed unless record drawings are current.

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Storage

1. The Contractor shall store documents and samples in the Contractor's field office, apart from documents used for construction.
2. The Contractor shall provide files and racks for storage of documents.
3. The Contractor shall provide locked cabinet or secure storage space for storage of samples.

B. The Contractor shall file documents and samples in accordance with format of these Specifications.

C. Maintenance

1. The Contractor shall maintain documents in a clean, dry, legible condition and in good order.
2. Do not use record documents for construction purposes.
3. The Contractor shall maintain at the site for the Owner one copy of all record documents.

D. Failure to maintain the Record Documents in a satisfactory manner may be cause for withholding of a certificate for payment.

1.04 QUALITY ASSURANCE

A. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain Record Documents.

B. Accuracy of Records:

1. Unless noted otherwise, Record Drawings shall provide dimensions, distances and coordinates to the nearest 0.1 foot.
2. Unless noted otherwise, Record Drawings shall provide elevations to the nearest 0.01 foot for all pertinent items constructed by the Contractor.
3. Coordinate changes within Record Documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
4. Purpose of Project Record Documents is to document factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement

C. Make entries within 24 hours after receipt of information that a change in Work has occurred.

D. Prior to submitting each request for progress payment, request Construction Manager's review and approval of current status of Record Documents. Failure to properly maintain, update, and submit Record Documents may result in a deferral by Owner to recommend the whole or any part of the Contractor's Application for Payment, either partial or final.

1.05 CONTRACTOR MARK-UPS AND DATA ENTRY REQUIREMENTS

A. The Contractor shall provide one set of the Contract drawings, with all changes recorded in that one set.

B. Marking of the drawings shall be kept current and shall be done at the time the material and equipment are installed.

C. Annotations to the record drawings shall be made with an erasable colored pencil conforming to the following color code:

1. Additions – Red
2. Deletions – Green
3. Comments – Blue
4. Dimensions – Graphite

D. Legibly mark drawings to record actual construction, including:

1. Changes of dimension and detail.
2. Changes made by Requests for Information (RFI), field order, work change directives, clarification memorandums or by change order.
3. Details not on original Drawings.

E. Legibly mark to record actual depths, horizontal and vertical location of underground facilities, piping, taps, fitting, valves, underground structures, equipment, raceways, cables, and appurtenances referenced to permanent surface improvements. The horizontal locations shall be referenced to at least two easily identifiable, permanent landmarks (e.g., power poles, valve markers, etc.) or benchmarks.

F. Horizontal and vertical locations of all exposed and underground utilities and appurtenances, both new facilities constructed and those utilities encountered, referenced to permanent surface improvements.

G. Location of and dimensions of roadways and parking areas, providing dimensions to back of curb when present.

H. Provide elevation of piping through vaults / structures, invert elevation of all pipes entering manholes, junction boxes, valves, clean outs, etc. Provide center of manholes, and corners of facilities or structures with northing, easting and bottom / top elevations.

I. The Contractor shall provide offset staking for the centerline of the water main every 50 feet along the pipe (including all fittings and bends) – as installation of the pipeline progresses. The staking shall identify the distance to the centerline of the pipe and the depth of cover to the top of pipe. At the completion of construction, the Contractor shall provide coordinates for the centerline of the pipe, include depth of bury, based on staked offsets.

J. The Contractor shall obtain a set of signed/sealed as-built drawings from the Georgia registered surveyor and submit to the Owner. Survey shall accurately reflect installed location, depth, pipe size and other pertinent details.

K. Record Drawings shall be prepared using a survey that ties the site and improvements horizontally and vertically to the following state plane coordinate system or as amended by the Owner.

1. Horizontal Control: North American Datum 83 (NAD83) (HARN) 1994
2. Vertical Control: North American Vertical Datum of 1988 (NAVD88).
3. Grid Zone: Georgia West 1002 (US Survey feet)

L. As-built drawings shall include GPS coordinates for valves, fittings and other above grade appurtenances and elevation of top of water main at least every 100 feet or as directed by the Construction Manager.

M Label each document “Project Record” in neat, large printed letters.

N. Specifications

1. Legibly mark each section to record:
   a. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.

b. Changes made by Requests for Information (RFI), field order, clarification memorandums, or by change order.

1.06 SUBMITTAL

A. At contract closeout, deliver Record Documents to the Construction Manager for the Owner.

B. Accompany submittal with transmittal letter containing:

1 Date

2. Project title and number

3. Contractor's name and address

4. Title and number of each record document

5. Signature of Contractor or Contractor's authorized representative

C. Cad Files

1. All as-built plans submitted to the Fulton County Department of Public Works must be provided in electronic computer aided design (CAD) format. CAD files to be submitted in accordance with Appendix A – "Fulton County As-Built CAD Standards".

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

APPENDIX A

Fulton County As-Built CAD Standards
Effective Date: JANUARY 01, 2010
Version 0.2

Revised: 20 Feb 2009

As of *01 JANUARY 2010*, all water and wastewater as-built plans submitted to the Fulton County Department of Public Works must be provided in electronic computer aided design (CAD) format. The following standards must be followed for all plans. Construction will not be approved until these standards are met.

Template (or seed) drawing file available at http://www.fultoncountyga.gov/county/dpw under Developer Information on the left side-bar.

Table of contents

1) General Requirements
2) Layers
3) Drawing
4) Table Specifications
5) Symbolization
6) Annotation
7) File Names and Revisions
8) Deliverable Formats

1) General Requirements

a) All as-built drawings must be georeferenced to the US State Plane coordinate system, NAD 83, GA West Zone, US Survey Feet. All drawings must contain two reference pins (i.e. property corners), which are labeled and tied to the Fulton County (FULCO) GPS monument network (please identify referenced GPS monuments with the monument number and coordinates). Reference pins must be able to be field verified using GPS and must be easily accessible (i.e., must not be in a creek). The survey method (GPS or conventional) used to place the reference pins should be identified in the HORIZONTAL_AND_VERTICAL_TEXT layer. Information on the FULCO GPS survey monuments can be found using the FULCO Monument Locator map application web site at: http://wms.co.fulton.ga.us/ms/gps/ or may be obtained in person at the

Fulton County Government Center, Department of Public Works.

b) All features depicted in the as-built drawings must be surveyed *after* construction. FULCO will spot check all coordinates to ensure accuracy. Table 1 specifies the features that must be surveyed. Water system features must be surveyed at a horizontal accuracy of ≤ 0.3 ft and vertical accuracy of ≤ 0.5 ft. Sewer system features must be surveyed at a horizontal accuracy of ≤ 0.5 ft and a vertical accuracy of ≤ 0.1 ft.

c) The following feature geometry types must be shot directly using the survey instrument and tied to the FULCO GPS monument network:

1) All point features (hydrants, valves, sewer manholes, etc.),
2) All line features at all endpoints, bends, and turns (pipes, etc.),
3) All polygon features at all corners and bends (project boundaries, lots, right-of- ways, etc.)

d) The following feature types are acceptable: Lines, Polylines, Text, Insert/Blocks. The Leaders as feature types must not be used. Where there is a need for Leaders they shall be drawn using *Line* features and must be put on a text layer. For example, the leader for the diameter of a water pipe should be on the WATER_LINE_TEXT layer, not the WATER_LINE layer.

e) A template (or seed) drawing file, file containing the required FULCO blocks and AutoCAD tool pilot will be provided through the Department of Public Works website http://www.fultoncountyga.gov/county/dpw.

f) The project boundary must be labeled on the PROJECT_BOUNDARY_TEXT layer, and the label must be within the extent of the project boundary.

2) Layers:

a) Layer names for required layers must appear exactly as in Table 1.

b) All required layers listed in FULCO CAD layers must contain only the features that are described for that layer. For example, the BOUNDARY_LINE layer must only contain the boundary line and not such features as north arrows or parcels.

c) All required layers must be present in the drawing except for features that do not pertain to a particular project. For example, some commercial projects or apartment complexes may not contain sewer taps as part of the construction and should not be included in the drawing.

d) All layers must be clearly differentiated from each other.

1) Two layers having the names "WATER_LINE" and "WATER_LINES" should not exist in the same drawing.

e) SEWER_LINE_TEXT and SEWER_TEXT should not exist in the same drawing. All text must appear on separate layers from the layers they annotate. For example, text describing a sewer line must be on the SEWERLINE_TEXT layer, not the SEWER_LINE layer.

3) Drawing

a) All layers must conform to the proper geometry type (insert/block, line, polygon, text) as indicated in Table 1 below.

Table 1: Layer Names and Geometry Types

Layer Name	*Type*	*Layer Contents*	*Surveyed*
ADDRESS_TEXT	Text	Street postal address number	No
BLOCK_LETTER_TEXT	Text	Indicates the block letter of a subdivision	No
CITY_BOUNDARY	Line	City boundary line	No
CITY_BOUNDARY_TEXT	Text	City names associated with the CITY_BOUNDARY	No
COUNTY_BOUNDARY	Line	County boundary lines	No
COUNTY_BOUNDARY_TEXT	Text	County Names for the COUNTY_BOUNDARY layer	No
CONTOUR	Line	Topological delineation information	
CONTOUR_TEXT	Text	Description info for contour layer	
CORNER_POINTS	Point	Establishing Reference points	
FIRE_HYDRANT	Insert	Fire Hydrants	Yes
FIRE_HYDRANT_TEXT	Text	Text Associated with FIRE_HYDRANT layer	No
FLOODPLAIN_100YR	Line	Existing floodplain delineation	
FLOODPLAIN_100YR_FUTURE	Line	Proposed floodplain delineation	
FLOODPLAIN_100YR_FUTURE_TEXT	Text	Text for proposed floodplain delineation	
FLOODPLAIN_100YR_TEXT	Text	Text for existing floodplain delineation	
FLOW_ARROW	Insert	Sewer line flow arrows	No
GABION_WALL	block	Any retaining type wall construction	
GREASE_TRAPS	block	Grease traps	
HORIZONTAL_AND_VERTICAL_CONTROL_POINT	Point	Survey control points (rebar or monuments) with x,y,z	Yes
HORIZONTAL_AND_VERTICAL_TEXT	Text	Corresponding text (coordinate values, monument number, Survey method etc.).	No
LAND_LOT_LINE	Line	Layer Contents	
LAND_LOT_LINE_TEXT	Text	Land lot numbers and other text.	No

Table 1: Layer Names and Geometry Types			
LOT_NUMBER_TEXT	Text	Individual lot numbers	No
PROJECT_BOUNDARY	Poly	The boundary line of the subdivision or property.	Yes
PROJECT_BOUNDARY _TEXT	Text	Project (Development) Name	No
PROPERTY_ID_TEXT	Text	Property Information	
PROPERTY_LINE	Poly	Property Lines (parcel lines)	Yes
PUMP_STATION	Point	Represents the centermost point of a pump station	Yes
PUMP_STATION_TEXT	Text	Text associated with PUMP_STATION	No
RAILROAD_LINE	Line	Railroad Lines	Yes
RAILROAD_TEXT	Text	Text Associated with RAILROAD	No
ROAD_EDGE_OF_PAVEMENT	Poly	Street Edge of Pavement (not back of curb); this layer should not include parking lots or curbing	Yes
ROAD_TEXT	Text	Road Names	No
ROAD_RIGHT-OF-WAY	Poly	Road Right-of-Way	Yes
ROAD_RIGHT-OF-WAY_TEXT	Text	Text relating to the road right of way layer	No
SEWER_END-OF-LINE	Insert	End of sewer line.	Yes
SEWER_END-OF-LINE_TEXT	Text	Text associated with SEWER_END-OF-LINE	No
SEWER_EXISTING	Line	Sewer lines present before the subdivision/project	Yes
SEWER_EXISTING_TEXT	Text	Text associated with the SEWER_EXISTING layer	No
SEWER_MANHOLE_EXISTING	Block	Existing Sewer Manholes	Yes
SEWER_MANHOLE_ EXISTING_TEXT	Text	Text for the SEWER_MANHOLE EXISTING layer	No
SEWER_FORCE_MAIN	Line	Sewer force mains	Yes
SEWER_FORCE_MAIN_TEXT	Text	Text associated with SEWER_FORCE_MAIN	No
SEWER_LINE	Line	Sewer lines built as part of the subdivision/project.	Yes
SEWER_LINE_TEXT	Text	Text associated with the SEWER_LINE layer.	No
SEWER_MANHOLE	Block	Sewer Manholes	Yes
SEWER_MANHOLE_TEXT	Text	Text associated with the SEWER_MANHOLE layer	No
SEWER_SEPTIC_TANK	Line	Septic tank	
SEWER_TAP	Line	Sewer taps	Yes
SEWER_TAP_TEXT	Text	Distance between taps in feet	Yes
SEWER_TUNNEL	Line	Subsurface Sewer tunnel construction	
STORM_BMP	Poly	Engineered structures designed to improve management of Stormwater system (see section e-I)	
STORM_BMP_TEXT	Text	Label showing the BMP_ID (see section e-II)	No
STORM_BMP_EXISTING	Poly	Engineered structures designed to improve management of Stormwater system (see section e-I)	No
STORM_BMP_EXISTING_TEXT	Text	Text associated with the STORM_BMP_EXISTING	No
STORM_CULVERT	Poly	A polygon representing the extent of pipe culvert or box Culvert structure (see section e-III)	Yes
STORM_CULVERT_TEXT	Text	Label for the features ID (see section e-III)	No

Table 1: Layer Names and Geometry Types			
STORM_CULVERT_EXISTING	Poly	A polygon representing the extent of a culvert structure (see section e-III), prior to construction	Yes
STORM_CULVERT_EXISTING_TEXT	Text	Label for the features (see section e-III)	No
STORM_CULVERT_CHART	n/a	Describes the required parameters (e-III)	n/a
STORM_DROPINLET	Block	Stormwater drop inlet. (see section e-IV)	Yes
STORM_DROPINLET_TEXT	Text	Text describing layer (i.e. Invert Elevation)	No
STORM_DROPINLET_EXISTING	Block	Stormwater drop inlet (see section e-IV) that existed prior to construction	Yes
STORM_DROPINLET_EXISTING_TEXT	Text	Text describing layer	No
STORM_FLUME	Line	The centerline drawn in flow direction (see section V)	Yes
STORM_FLUME_TEXT	Text	Text for: material (lining), slope (see section e-VI)	No
STORM_FLUME_EXISTING	Line	The centerline that existed prior to construction Must be drawn in flow direction (see section V).	Yes
STORM_FLUME_EXISTING_TEXT	Text	Text associated with layer (see section e-VI)	No
STORM_HEADWALL	Block	Proposed new placement point of construction	
STORM_HEADWALL_TEXT	Text	Text associated with new headwall	
STORM_HEADWALL_EXISTING	Block	Headwall which existed prior to construction	
STORM_HEADWALL_EXISTING_TEXT	Text	Text associated which existed prior to construction	
STORM_JUNCTION_BOX	Insert	Block in the location of a Stormwater Junction Box	Yes
STORM_JUNCTION_BOX_TEXT	Text	Text for layer that must at least show: Rim Elevation, Invert Elevation, and Junction Box material.	No
STORM_JUNCTION_BOX_EXISTING	Insert	Pre-existing block for the Storm Junction Box	Yes
STORM_JUNCTION_BOX_EXISTING_TEXT	Text	Text for layer that must at least show: Rim Elevation, material, Invert Elevation, and Junction Box	No
STORM_LINE	Line	Pipe (i.e. Pipe line or driveway pipe) (see section e-VII)	Yes
STORM_LINE_TEXT	Text	Text for layer (i.e. slope, diameter, material)	No
STORM_LINE_EXISTING	Line	Pre-existing stormwater line (pipe line or driveway pipe) drawn in the direction of flow (see section e-VII)	Yes
STORM_LINE_ EXISTING_ TEXT	Text	Text associated with layer (i.e. slope, diameter, material)	No
STORM_OPEN_CHANNEL	Line	Centerline drawn in the direction of flow (see section e-V)	Yes
STORM_OPEN_CHANNEL_TEXT	Text	Text layer: material (lining), slope (see section e-VI)	No
STORM_OPEN_CHANNEL_EXISTING	Line	Centerline of structure. Must be drawn in the direction of flow (see section e-V)	Yes
STORM_OPEN_CHANNEL_EXISTING_ TEXT	Text	Text associated with layer (see section e-VI)	No
STORM_LINE_END	Insert	The structure at the Line End or a node representing the bare end of pipe (see section e-VIII)	Yes
STORM_LINE_END_TEXT	Text	Text layer (i.e. slope, diameter, material)	No
STORM_LINE_END_EXISTING	Insert	The structure at the Line End or a node representing the	Yes
		bare end of pipe (see section e-VIII)	
STORM_LINE_END_EXISTING_TEXT	Text	Text associated with layer	No
STRUCTURE	Line	Above ground construction (Buildings, apartments, etc.)	

Table 1: Layer Names and Geometry Types			
STRUCTURE_TEXT	Text	Name, or other information associated with the structure	
TANK_PROPOSED	Line	Any proposed tank construction	
TRASH_RACKS	Block	Trash Racks	
UTILITY_EASEMENT	Poly	Utility line easements	Yes
UTILITY_EASEMENT_TEXT	Text	Text Associated with Utility Easements	No
WATER_CAP	Insert	Cap at the end of water line.	Yes
WATER_CAP_TEXT	Text	Text associated with WATER_CAP_TEXT	No
WATER_EXISTING	Line	Water lines before the subdivision/project was built	Yes
WATER_EXISTING_TEXT	Text	Text associated with WATER_EXISTING	No
WATER_LINE	Line	Water lines built as part of the subdivision/project.	Yes
WATER_LINE_TEXT	Text	Text associated with WATER_LINE	No
WATER_METER	Insert	Customer water meters	Yes
WATER_METER_TEXT	Text	Text associated with WATER_METER	No
WATER_REDUCER	Insert	Water line reducer	Yes
WATER_REDUCER_TEXT	Text	Text associated with WATER_REDUCER	No
WATER_SERVICE	Line	Water service lines	Yes
WATER_SERVICE_TEXT	Text	Text associated with WATER_SERVICE	No
WATER_STORAGE_SYSTEM	Block	Water Storage System construction	
WATER_STORAGE_SYSTEM_TEXT	Text	Text for Water Storage System construction	
WATER_VALVE_EXISTING	Insert	Existing water valves	Yes
WATER_VALVE_EXISTING_TEXT	Text	Text associated with WATER_VALVE_EXISTING	No
WATER_VALVE	Insert	Water valves	Yes
WATER_VALVE_TEXT	Text	Text associated with WATER_VALVE	No
WATER_VAULT	Insert	Large meter or fire connection vault	Yes
WATER_VAULT_TEXT	Text	Text associated with WATER_VAULT	No
WETLAND	Line	Wetland area	
WETLAND_TEXT	Text	Text associated with the Wetland	

b) All Polygon type features must be completely closed. Lines may need to be duplicated on more than one layer.

1) Subdivision/project parcels must to be closed figures on their layer (not closed with the subdivision/project boundary).

2) Road edge-of-pavement and road right-of-way must be drawn as closed polygons.

3) Where a polygon feature extends beyond the edge of the plan, the property boundary (repeated on the polygon feature's layer) will be

used to close the polygon.

4) All edges on polygon features must be snapped together at the vertices. Gaps in polygon boundaries will not be accepted.

c) Sewer Features

1) Sewer Lines and Sewer Taps need to be digitized with proper directionality: lines must be drawn from the uphill node to the downhill node or flipped after the lines have been digitized.

2) All tangents between sewer manholes need to be drawn with a single line. Lines must not continue for more than one tangent.

3) All tangents must be snapped at endpoints intersecting at the exact center of the manhole. No gaps should exist between tangents.

4) Manholes need to be symbolized consistently with an insert centered and snapped on the tangent endpoints.

5) Sewer tap locations must be snapped to the sewer tangent and accurately placed. Placement shall be based on the televising reports. FULCO will verify tap placement against the televising report. The as-built engineer is responsible for obtaining the televising report.

d) Water Features

1) Water lines must be digitized with all straight-line pipes consisting of only two end points. Straight-line pipes will begin and end at the following features (nodes): hydrants, valves, meters, pumps, tees, crosses, and valves. Polylines should be used wherever a water line contains elbows or bends (i.e., when the line does make a straight run from node to node).

2) Curves may be digitized with enough vertices to capture the curve geometry, but they must be single, continuous lines. Curves or arcs may also be used to designate curved pipe.

3) Hydrants must be shown in their true, surveyed location, and must be connected to the water main via a valved fire hydrant line.

4) All water lines must be continuous, with pipe endpoints snapped to each other at endpoints (nodes).

5) End-of-line caps must be drawn to differentiate end-of-lines from lines that extend beyond the extent of the drawing. Caps should be drawn for lines that are to be permanently capped when the project is complete, not for lines that are temporarily capped pending inspection.

e) Stormwater F**eatures**

1) The entire BMP must be represented on the Storm_BMP layer using a polygon. The following are the examples of BMPs: Enhanced Swale, Stormwater Pond, Stormwater Wetland, Sand Filter, Bioretention Cell, Infiltration Trench, Filter Strip, Gravity Oil-Grit Separator, Proprietary Structural Control, Underground Detention, Porous Concrete, Modular Porous Paver System. Please consult with the FULCO water resources engineer for a list of currently accepted BMPs.

2) A BMP_ID is going to be assigned to each STORM_BMP feature by the FULCO engineer during the plan review process. The contractor must clearly mark every BMP feature with the assigned BMP_ID in the STORM_BMP_TEXT layer of the asbuilt.

3) In the STORM_CULVERT and STORM_CULVERT_EXISTING layers, the structures must be drawn as polygons to show their length, width, location, and orientation. All the corners of the culvert extents must be surveyed. All culverts must be labeled in the corresponding STORM_CULVERT_TEXT or STORM_CULVERT_EXISTING_TEXT layer with the number matching the culvert chart shown on the asbuilt. The storm culvert chart shall be put in the STORM_CULVERT_CHART layer. For Culvert Chart contents see the Stormwater Development Guidelines.

4) In the STORM_DROPINLET and STORM_DROPINLET_EXISTING layers, the structures shall be drawn with different inserts (blocks) according to the type of the Drop Inlet: Single Wing Catch Basin, Double Wing Catch Basin, Square Catch Basin, Rectangular Catch Basin, Grate Cover Inlet, Catch Basin with Grate, Curb Inlet, Circular Weir Inlet, Rectangular Weir Inlet. The contractor must only use the blocks provided by FULCO for these features..

5) In the STORM_OPEN_CHANNEL, STORM_OPEN_CHANNEL-EXISTING, STORM_FLUME and STORM_FLUME_EXISTING layers, the feature shall be represented by a line reflecting the centerline of the structure and must be drawn in the direction of flow. The lines shall be broken at any point where the slope percent

changes. All endpoints (including the points of slope changes) shall be surveyed.

6) STORM_OPEN_CHANNEL_TEXT, STORM_OPEN_CHANNEL_EXISTING_TEXT, STORM_FLUME_TEXT and STORM_FLUME_EXISTING TEXT layers shall contain a label indicating the percent slope and a type of material (lining) of the corresponding open channel or flume.

7) In the STORM_LINE or STORM_LINE_EXISTING layers, the features must be drawn in the direction of flow. This feature must be digitized with all straight-line pipes consisting of only two end points. Straight-line pipes will begin and/or end at the following features: STORM_LINE_END, STORM_JUNCTION_BOX, STORM_DROP_INLET.

8) In the STORM_LINE_END and STORM_LINE_END_EXISTING layers, the structures must be drawn with different inserts (blocks) according to the type: Straight Headwall, U-type Headwall, Tapered Headwall, L-Type Headwall, Flared- End Section, Straight Wingwall, Angled Wingwall, Bare End and BMP Outlet. STORM_LINE_END and STORM_LINE_END_EXISTING features must be snapped to the ends of the STORM_LINE or STORM_LINE _EXISTING or the centers of STORM_CULVERT or STORM_CULVERT_EXISTING openings. The contractor must only use the blocks provided by FULCO for these features (see section 4) Symbolization)

4) Table Specifications

a) A table with the following attribute data for each **sewer line**

1) Unique identifier matching the identifier in the as-built drawing

2) Unique identifier matching upstream manhole identifier in the as-built drawing

3) Upstream Measure Down - Distance from the upstream manhole lid top to invert of pipe as measured in feet

4) Upstream Invert – Elevation (z) of the invert of the upstream end of the pipe

5) Unique identifier matching downstream manhole identifier in the as-built drawing

6) Downstream Measure Down - Distance from downstream manhole lid top to invert of pipe as measured in feet

7) Downstream Invert – Elevation (z) of the invert of the downstream end of the pipe

8) Pipe diameter measured in inches

9) Pipe Material (CI, DI, PVC, VC, RCP, UNK, IRON, TRAN, PE, TR)

10) Pipe Length measured in feet

Example Table: Sewer Line

Pipe ID	Upstr MH ID	Upstr Measure Down	Upstr Invert	Downstr MH ID	Downstr Measure Down	Downstr Invert	Pipe Diameter	Pipe Material	Pipe Length
Pipe#1	SSMH#1	6.1	906.78	Pump Station	10.2	905.06	8	PVC	291
Pipe#2	SSMH#2	7.1	908.33	SSMH#1	6.05	906.83	8	PVC	238
Pipe#3	SSMH#3	8	908.76	SSMH#2	7.1	908.03	8	PVC	64

b) A table with the following attribute data for each **water line**

1) Unique identifier matching the identifier in the as-built drawing

2) Pipe diameter measured in inches

3) Pipe Material (CI, PVC, DI, GV, PB, CO, UNK, TRAN,CP, SC.)

4) Pipe Length measured in feet

5) End1 ID (Valve, Meter, Reducer, etc.)

6) End2 ID (Valve, Meter, Reducer, etc.)

Example Table: Water Line

Pipe ID	Pipe Diameter	Pipe Material	Pipe Length	End1 ID	End2 ID
WL #1	8	PVC	291	WV #2	FH #23
WL #2	8	PVC	238	WM #43	WV #2
WL #3	8	PVC	64	WV #2	WV #54

c) A table with the following attribute data for each **storm line**

1) Unique identifier matching the identifier in the as-built drawing

2) Unique identifier matching upstream structure identifier in the as-built drawing

3) Upstream Measure Down - Distance from the upstream structure elevation to invert of pipe measured in feet

4) Upstream Invert – Elevation (z) of the invert of the upstream end of the pipe

5) Unique identifier matching downstream structure identifier in the as-built drawing

6) Downstream Measure Down - Distance from downstream structure elevation to invert of pipe measured in feet

7) Downstream Invert – Elevation (z) of the invert of the downstream end of the pipe

8) Pipe Shape (Box, Elliptical, Circular, etc.)

9) Pipe height measured in inches

10) Pipe width measured in inches

11) Pipe Material (BCCMP, RCP, HDPE, CMP.)

12) Pipe Length measured in feet

Example Table: Storm Line

Pipe ID	Upstr-ID	Upstr Measure Down	Upstr Invert	Downstr-ID	Downstr Measure Down	Downstr Invert	Pipe Shape	Pipe Height	Pipe Width	Pipe Material	Pipe Length
Pipe #1	DI #1	6.1	906.78	JB #3	10.2	905.06	Circular	24	24	BCCMP	291
Pipe #2	CB #2	7.1	908.33	FES #1	6.05	906.83	Ellipse	38	24	BCCMP	238
Pipe #3	HW #1	0	908.76	HW #2	0	908.33	Box	60	84	RCP	64

5) Symbolization

a) Symbols must be standardized according to examples provided in the FULCO template file. The following “point” features must be symbolized using standard FULCO CAD symbols and drawn as inserts:

1) Vault

2) Valve

3) Hydrant

4) Manhole

5) Meter

6) End of Line/Cap

7) Reducer

8) Junction Box

9) Grease Traps

10) Trash Racks

11) Water Cap

b) All blocks used in the STORM layers must be drawn as inserts. The blocks must be standard and symbolized using only FULCO CAD blocks provided on the FULCO CAD Digital Data Submission Standards template available through the Department of Public Works website http://www.fultoncountyga.gov/county/dpw.

1) Single Wing Catch Basin
2) Double Wing Catch Basin
3) Square Catch Basin
4) Rectangular Catch Basin
5) Grate Cover Inlet
6) Catch Basin with Grate
7) Curb Inlet
8) Circular Weir Inlet
9) Rectangular Weir Inlet
10) Straight Headwall
11) U-type Headwall
12) Tapered Headwall
13) L-type Headwall
14) Flared-End Section
15) Straight Wingwall
16) Angled Wingwall
17) Bare End
18) BMP Outlet
19) Junction Box
20) Rectangular Weir Inlet

6) Annotations

a) Any non-standard water and sewer lines must be annotated as such. Line diameter, material, ownership, etc. that does not conform to standard practice should be noted in the corresponding annotation layer. For example, standard subdivision sewer lines are 8" in diameter. Any other diameter must be annotated on the SEWER_LINE_TEXT layer.

b) All addresses and lot numbers must be number data type (that is no text or symbols: #, -, ft, _, “, ‘, etc.). If the lot does not have a number, this layer should be blank.

c) All required text must be single line text. Project (Development) name shall be on one line.

d) All annotation for polyline (polygon) features must be bounded by the polyline it annotates. For example, the project name must be within the project boundary, and not extend beyond it.

7) File naming and revisions

a) File names should correspond exactly to the subdivision or project name and should be consistent from one version to the next. The file name should contain the drawing revision date (in YYMMDD format) as part of the name. There should be no blanks spaces in the name, only underscores. An example file name for the May 12, 2008 revision for the third phase of the Peaceful Valley subdivision is: “Peaceful_Valley_3_080512”. If a development name changes from that of indicated in the originally approved plans, the original name shall also be provided with the submittal of the as-built.

b) File revision dates should only be updated by the contractor/developer and not by FULCO or Fulton County.

8) Deliverable Format

a) All files shall be delivered in AutoCAD (release 14 or higher), DXF or DWG format (for projects created in Microstation) in a single flash drive. Files should not be spanned over more than one drive.

b) All deliverables will be labeled with the file name, company name, contact name, and phone number. A transmission letter restating this information along with a statement requesting as-built review will also accompany the disk.

SECTION 01 99 90

REFERENCE FORMS

PART 1 – FORMS

1.01 DESCRIPTION

A. The forms listed below and included in this section are referenced from other sections of the project manual:

Form No.	Title
01 33 00-A	Submittal Transmittal Form
01 78 23-A	Operation and Maintenance Transmittal Form
01 78 23-B	Equipment Record Form
01 78 23-C	Equipment Record Form
43 05 11-A	Manufacturer's Installation Certification Form

01 33 00-A. SUBMITTAL TRANSMITTAL FORM

Submittal Transmittal

Submittal Description:	Submittal No:[1]	Spec Section:

	Routing	Sent	Received
Owner:	Contractor/CM		
Project:	CM/Engineer		
	Engineer/CM		
Contractor:	CM/Contractor		

We are sending you:
☐ Attached
☐ Under separate cover via _____
☐ Submittals for review and comment
☐ Product data for information only

Remarks: _____

Item	Copies	Date	Section No.	Description	Review action[a]	Reviewer initials	Review comments attached

[a]*Note: NET = No exceptions taken; MCN = Make corrections noted; A&R = Amend and resubmit; R = Rejected*
Attach additional sheets if necessary.

Contractor

Certify either a or b:

a. ☐ We have verified that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work, specified (no exceptions).

b. ☐ We have verified that the material or equipment contained in this submittal meets all the requirements specified except for the attached deviations.

No.	Deviation

[1]See *Section 01 33 00-1.04. A, Transmittal Procedure.*

Certified by:

Contractor's Signature:

01 78 23-A. OPERATION AND MAINTENANCE TRANSMITTAL FORM

Date:	Submittal No:[2]
To:	Contract No:
	Spec. Section:
	Submittal Description:
Attention:	From:

Checklist	Contractor		Construction Manager	
	Satisfactory	N/A	Accept	Deficient
1. Table of contents				
2. Equipment record forms				
3. Manufacturer information				
4. Vendor information				
5. Safety precautions				
6. Operator prestart				
7. Start-up, shutdown, and post-shutdown procedures				
8. Normal operations				
9. Emergency operations				
10. Operator service requirements				
11. Environmental conditions				
12. Lubrication data				
13. Preventive maintenance plan and schedule				
14. Troubleshooting guides and diagnostic techniques				
15. Wiring diagrams and control diagrams				
16. Maintenance and repair procedures				
17. Removal and replacement instructions				
18. Spare parts and supply list				
19. Corrective maintenance man-hours				
20. Parts identification				
21. Warranty information				
22. Personnel training requirements				
23. Testing equipment and special tool information				

[2] *See Section 01 33 00-1.04.A, Transmittal Procedure*.

Remarks:

Contractor's Signature :

01 78 23-B. EQUIPMENT RECORD FORM

Equip Description		Equip Location	
Equip No.	Shop Dwg No.	Date Inst	Cost
Mfr		Mfr Contact	
Mfr Address			Phone
Vendor		Vendor Contact	
Vendor Address			Phone

Maintenance Requirements	D	W	M	Q	S	A	Hours

Lubricants: Recommended:

Alternative:

Misc. Notes:

Recommended Spare Parts					Electrical Nameplate Data			
Part No	Quan	Part Name	Cost		Equip			
					Make			
					Serial No.		Id No.	
					Model No.		Frame No.	
					Hp	V	Amp	Hz
					Ph	Rpm	Sf	Duty
					Code	Insl. Cl	Des	Type
					Nema Des	C Amb	Temp Rise	Rating
					Misc.			
					Mechanical Nameplate Data			
					Equip			
					Make			
					Serial No.		Id No.	
					Model No.		Frame No.	
					Hp	Rpm	Cap	Size
					Tdh	Imp Sz	Belt No.	Cfm
					Psi	Assy No.	Case No.	
					Misc			

01 78 23-C. EQUIPMENT RECORD FORM

Equip Description		Equip Location	
Equip No.	Shop Dwg No.	Date Inst	Cost
Mfr		Mfr Contact	
Mfr Address			Phone
Vendor		Vendor Contact	
Vendor Address			Phone

Maintenance Requirements	D	W	M	Q	S	A	Hours

43 05 11-A. MANUFACTURER'S INSTALLATION CERTIFICATION FORM

Contract No: Specification section:

Equipment name:

Contractor:

Manufacturer of equipment item:

The undersigned manufacturer of the equipment item described above hereby certifies that he has checked the installation of the equipment and that the equipment, as specified in the project manual, has been provided in accordance with the manufacturer's recommendations, and that the trial operation of the equipment item has been satisfactory.

Comments:

Manufacturer	Contractor
Signature of Authorized Representative	Signature of Authorized Representative
Date	Date

SECTION 02 41 13.33

PAVING REMOVAL

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes

1. Equipment
2. Trench paving removal
3. Milling Operations

1.02 REFERENCES

A. Drawings and general provisions of the Contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this section.

B. Georgia Department of Transportation Standard Specifications.

1.03 WORK INCLUDED

A. The Contractor shall furnish all labor, equipment, tools and materials necessary to remove asphalt and/or concrete paving as required for the installation of proposed water mains or sewer mains and related appurtenances under the Contract and as directed by Owner.

1.04 SUBMITTALS

A. The Contractor shall submit for approval to Owner, County DOT and Georgia DOT when work is within a state road right-of-way, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.

B. The Contractor shall submit photographs or videotape, sufficiently detailed, of existing conditions of project site. These shall be used to evaluate project areas that might be misconstrued as damage, caused by debris, or construction material removal.

PART 2 – PRODUCTS

2.01 EQUIPMENT

A. Milling Equipment:

1. Use power-driven, self-propelled milling equipment that is the size and shape that allows traffic to pass safely through areas adjacent to the work. Also use equipment that is:

   a. Designed to mill and remove specified depth of existing asphalt and/or concrete paving

   b. Equipped with grade slope controls operating from a string line or ski and based on mechanical or sonic operation

   c. Capable of removing pavement to an accuracy of 1/8 in.

   d. Furnished with lighting system for night work, as necessary

   e. Provided with conveyors capable of side, rear, or front loading to transfer the milled material from the roadway to a truck.

B. Dust Control

1. Provide power brooms, vacuum sweepers, power blowers, or other means to remove loose debris or dust. Do not allow dust control to restrict visibility of passing traffic or to disrupt adjacent property owners.

PART 3 – EXECUTION

3.01 TRENCH PAVING REMOVAL

A. Where trench excavation within a paved surface is required, the Contractor shall saw cut in a straight line, vertical joints for the entire depth of pavement. The saw cut joints shall extend for the entire length of trench on both sides of the trench. Ragged edges shall be trimmed so as to provide a substantially straight line juncture between the old and new surfaces.

B. The removal of existing pavement shall be performed in accordance with the requirements of the authority within whose jurisdiction such pavement is located.

C. The saw cut joints shall be a minimum of 12 inches outside of the maximum width of excavated trench.

D. Whenever the removal of pavements (other than gravel types) is required, the Contractor shall outline the area to be removed by making straight saw cuts, providing vertical kerfs in straight lines in order to permit removal in a straight line.

E. Should pavement breakage occur beyond the original saw cut, the Contractor shall be required to make a new saw cut beyond the farthest point of breakage.

F. Pavement shall be removed, hauled off site and disposed of in a proper legal manner. Contractor shall be careful not to disturb or damage any pavement that is to remain.

3.02 MILLING OPERATION

A. Follow the Plans to mill the designated areas and depths, as required. Ensure the following requirements are met:

1. Schedule the construction operation. Use milling methods that will produce a uniform finished surface and maintain a constant cross slope between extremities in each lane.
2. Provide positive drainage to prevent water accumulation on the milled pavement, as shown on the Plans or directed by the Construction Manager.
3. Bevel back the longitudinal vertical edges greater than 2 inches that are produced by the removal process and left exposed to traffic. Bevel them back at least 3 inches for each 2 inches of material removed. Use an attached mold board or other approved method.
4. When removing material at ramp areas and ends of milled sections, taper the transverse edges 10 ft to avoid creating a traffic hazard and to produce a smooth surface.
5. Protect with a temporary asphaltic concrete tie-in (paper joint) vertical edges at other areas such as bridge approach slabs, drainage structures, and utility appurtenances greater than ½-inch that are left open to trans versing vehicles. Place the temporary tie-in at taper rate of at least 6 to 1 horizontal to vertical distance.
6. Remove dust, residue, and loose milled material from the milled surface. Do not allow traffic on the milled surface and do not place asphaltic concrete on the milled surface until removal is complete.

B. The reclaimed asphaltic and/or concrete pavement becomes the Contractor's property unless otherwise specified.

END OF SECTION

SECTION 02 42 11

REMOVAL OF CONSTRUCTION MATERIALS

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. Workmanship

1.02 REFERENCES

A. Drawings and general provisions of the Contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this section.

1.03 WORK INCLUDED

A. The Contractor shall furnish all labor, equipment, and materials necessary to remove all unwanted construction material and debris, as directed by Owner and/or Construction Manager.

1.04 SUBMITTALS

A. The Contractor shall submit for approval to Owner and Fulton County DOT, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.

B. The Contractor shall supply identification and license of company hauling/transporting material from the site.

C. The Contractor shall submit photographs and/or videotape, sufficiently detailed, of existing conditions of project site. These shall be used to evaluate project areas that might be misconstrued as damage, caused by debris, or construction material removal.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

3.01 WORKMANSHIP

A. The Contractor shall follow all federal, state, and local regulations related to removal, hauling, and disposal of trash and debris.

B. The Contractor shall comply with any ordinances / regulations for hauling and disposal of all solid waste removed from the site for the duration of the Work.

C. The Contractor shall load, haul away, and dispose of debris, trash, structures, automobiles, etc., that may be pre-existing on the Worksite, to a legally permitted location.

D. The Contractor shall load, haul away, and dispose of construction material that is generated in execution of the Work, to a legally permitted location; including, but not limited to any debris, trash, structures, piping, etc.

E. The Contractor shall remove and dispose of all unused construction materials prior to Final Acceptance of the Work by Owner and the Engineer.

F. No additional payment shall be made for excavation or disposal of excavated material required for placement or removal of backfill placed above the foundation of the pavement; or for preparation of subgrade. The cost thereof shall be considered included in the pavement unit prices bid.

END OF SECTION

SECTION 03 30 00

CAST IN PLACE CONCRETE

PART 1 – GENERAL

1.01 SUMMARY

A. This Section specifies cast in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures and finishes.

1.02 SUBMITTALS

A. In accordance with specification Section 01 33 23 and in addition to the requirements of that section, the following submittals shall be provided.

B. Design Mixtures: For each concrete mixture.

C. Shop Drawings: For steel reinforcement. Material test reports.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C 94M requirements for production facilities and equipment.

B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 – PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A 615M, Grade 60, deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A185, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded Wire Reinforcement: ASTM A497, flat sheet.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.03 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C150, Type I/II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class C.

B. Normal-Weight Aggregates: ASTM C33, graded, 1-inch (25-mm) nominal maximum coarse-aggregate size.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C94/C 94M and potable.

D. Air-Entraining Admixture: ASTM C260.

2.04 VAPOR RETARDERS

A. Plastic Vapor Retarder: ASTM E1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.05 RELATED MATERIALS

A. Expansion- and Isolation- Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.

2.06 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Cementitious Materials: Use fly ash and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

2.07 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.08 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85° F and 90° F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes.
2. When air temperature is above 90° F, reduce mixing and delivery time to 60 minutes.

PART 3 – EXECUTION

3.01 FORMWORK

A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Chamfer exterior corners and edges of permanently exposed concrete.

3.02 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded

3.03 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.04 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.05 JOINTS

A General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8 inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

3.06 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.07 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections

that exceed specified limits on formed-surface irregularities. Revise locations in subparagraph below to suit Project. Retain rubbed finish option if additional finishing is required.

1. Apply to concrete surfaces exposed to public view.

B. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.

2. Do not apply cement grout other than that created by the rubbing process

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.08 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4 inch (6 mm).

3.09 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to

manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer. Retain subparagraph below if requiring removal of curing compounds that may interfere with adhesion of floor coverings. Curing and sealing compound in subparagraph below is usually for floors and slabs and may act as a permanent surface finish.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Construction Manager. Remove and replace concrete that cannot be repaired and patched to Construction Manager's approval.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports. Testing Services: Tests shall be performed according to ACI 301.

END OF SECTION

SECTION 03 40 00`

PRECAST CONCRETE

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope

1. This section specifies the materials and labor required for the manufacture and erection of precast concrete structures.

B. Type

1. Precast concrete includes precast boxes, manholes and precast structural concrete.

1.02 QUALITY ASSURANCE

A. General

1. The Contractor shall provide certification from the precast concrete manufacturer that the materials and manufacture of precast work supplied conforms to these specifications. The certification shall be signed by an officer of the manufacturer's corporation.
2. The responsibility for furnishing and installing precast concrete conforming to the specifications is solely that of the Contractor.

B. Testing Laboratory

1. All testing shall be performed by recognized independent laboratories specializing in the particular test to be performed, and conforming to the requirements of the National Bureau of Standards and ASTM E329.

C. Reference Standards

1. The appropriate reference standards are specified in the following documents. They are part of this Section as specified and modified. In case of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.

Reference	Title
ACI 318	Building Code Requirements for Reinforced Concrete
AWS D1.1	Structural Welding Code - Steel
AASHTO	Standard Specification for Highway Bridges
MNL-116	Prestressed Concrete Institute's Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products, third edition

1.03 SUBMITTALS

A. In accordance with specification Section 01 33 23 and in addition to the requirements of that section, the following submittals shall be provided:

B. Concrete Mix

1. Prior to casting any precast elements, concrete mix design shall be submitted to the Construction Manager for acceptance.

C. Shop Drawings

1. Three copies of shop drawings shall be provided showing product location, fabrication details, number identification marks, reinforcement, connection details including field installed anchor sizes and locations, if required, openings, loose or embedded items and inserts, dimensions and relationship to adjacent materials in sufficient detail to cover manufacture, handling, and erection.

2. Shop drawings shall be accompanied by a letter signed by the manufacturer, certifying that, the shop drawings submitted represent construction which meets or exceeds the requirements of the Contract Documents and the requirements of codes and agencies having jurisdiction over the Work.

1.04 LABELING

A. Each precast unit shall have an identification mark indicating its location in the structure as shown on the placing diagrams and date of casting.

1.05 HANDLING AND STORAGE

A. Unless specified otherwise herein, fabrication, handling and erection of precast elements shall be in accordance with the recommendations made by ACI 318 and ACI Committee 533.

B. Precast elements shall be properly supported off the ground to avoid damage during curing, storage, handling and hauling.

C. Lateral support shall be sufficient to prevent bowing, warping, or permanent set due to creep.

D. Edges of the units shall be adequately protected by padding or other means to prevent staining, chipping or spalling of concrete.

E. Lifting devices shall have a minimum safety factor of 4.

PART 2 – PRODUCTS

2.01 PERFORMANCE AND DESIGN REQUIREMENTS

A. Concrete mix design and compressive strength shall meet 4000 psi at 28 days.

B. Design live loads shall be AASHTO H-20.

2.02 PRECAST CONCRETE MATERIALS

A. Cement

1. Concrete in contact with soil or liquids shall be formulated using Type II portland cement conforming to ASTM C150.
2. Concrete not in contact with soil or liquids may be formulated using Type I or Type III portland cement.
3. Cement shall contain less than 0.60 percent alkalies and shall be from one source throughout the entire project.

B. Aggregates

1. Aggregates for normal weight concrete shall conform to ASTM C33 with a maximum size of 3/4 inch.

C. Water

1. Water shall be clean, potable, and free from injurious amounts of oil, alkalies, organic materials and other deleterious substances.

D. Admixture

1. Admixture shall be Pozzolith 300 R manufactured by Master Builders, Plastiment manufactured by Sika Chemical Corp. or equal.
2. Admixture shall be used in strict accordance with manufacturer's recommendations.
3. Calcium chloride or any admixture containing calcium chloride shall not be used.

E. Reinforcing Steel

1. Reinforcing steel shall conform to ASTM A615, including supplementary requirements, and shall be Grade 60 except that bars to be welded shall be Grade 40 or ASTM A706.

F. Embedded Items and Anchorage Devices

1. All embedded items, inserts, and anchorage devices exposed to view, moisture or weather shall be hot dipped galvanized steel.
2. Anchorage devices shall be fabricated from ASTM A36 steel.

G. Penetrations

1. All required penetrations and openings larger than 6 inches in diameter or 6 inches square shall be formed in place at the time of casting.
2. Additional reinforcing shall be added where required to meet loading requirements.
3. Openings and penetrations smaller than 6 inches may be core drilled.

H. Molds

1. Material from which molds are to be fabricated shall be steel, concrete, fiberglass, reinforced plastic or wood.
2. The selection of materials for molds shall be at the manufacturer's option, except that wood shall not be used without the express approval of the Construction Manager.
3. All elements shall be cast in molds of rigid construction, accurate in detail with precise corners and arises, and designed to provide a close control of dimensions and details as indicated on the drawings.
4. Prior to casting of precast elements, molds shall have all surface joints, radii, corners, etc., filled, ground, filed, straightened or otherwise removed to provide a finished concrete surface that is smooth and dense, free of honeycombing, large air pockets, offsets, sinkages or other irregularities.

I. Parting Compound

1. All molds shall be coated with parting compound to facilitate removal of elements from molds.
2. Parting compound shall be non-petroleum, nonstaining and shall be of a nature and composition not deleterious to concrete.

J. Manhole Steps

1. Manhole steps shall be the cast aluminum type or extruded aluminum type.
2. Manhole steps are only allowed where specifically required.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Casting

1. Casting shall be accomplished by methods and equipment that are in conformance with generally acceptable systems for this type of work.
2. All precast concrete shall be manufactured by a plant thoroughly experienced in this type of work.
3. The manufacturer shall meet all production schedules.
4. Surfaces on which units are cast shall be level and free from any imperfections detrimental to the surface appearance of the finished units.
5. Parting compound shall be applied evenly as per manufacturer's recommendations.
6. Concrete shall be so handled as to prevent segregation of materials and shall be continuously vibrated during casting, either internally or externally, to achieve proper compaction, finish and distribution of concrete.
    a. All precautions must be taken to keep the reinforcing steel in the proper location during placing and consolidation of the concrete.
    b. Unless shown otherwise and except at concrete faces exposed to soil or liquids, all reinforcing steel shall have a minimum cover of 3/4 inch.
    c. At concrete faces exposed to soil or liquids, cover shall be 1-1/2 inches minimum.
    d. Embedded items shall be accurately placed and maintained in their proper location during the casting operation.
    e. Special inserts or other devices for handling of the units for the convenience of the manufacturer shall not be exposed to view after members are erected.
    f. Embedded anchors, inserts, plates, angles and other cast in items shall have sufficient anchorage and embedment for design requirements.
7. Precast sections shall be manufactured to contain wall and roof openings of the minimum size to receive the ends of the pipes and such openings being accurately set to conform to line and grade of the pipelines.
    a. Subsequent cutting or tampering in the field, for the purpose of creating new openings or altering existing openings, will not be permitted except as directed by the Construction Manager.
8. No more than four lift holes may be cast or drilled in each section.
9. Casting, bowing, warpage and dimensional tolerances shall be in accordance with MNL 116, current edition.

B. Curing

1. All precast units shall be steam cured for a period of at least 12 hours. Fog spraying may be used when reviewed by the Construction Manager

2 Precast elements shall not be removed from molds for a minimum period of 12 hours after casting, or until concrete has attained a minimum compressive strength of 3500 pounds per square inch, whichever governs.

3. After removal from the forms, curing by steam or fog spraying shall be continued until concrete has attained specified strength and confirmed by standard tests.

4. Curing procedures shall be consistent and uniform throughout the entire project.

C. Welding

1. The quality of material and fabrication of all welded connections shall conform to the latest AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings."

2. All weldments shall be made in accordance with the applicable provisions of AWS.

   a. All welding, other than tacks, shall be done by certified welders. All units shall be protected from damage by field welding or cutting operations.

   b. Noncombustible shields shall be provided as necessary for this purpose.

D. Joints and Joint Sealants

1. In all instances, the edges of precast concrete units and of adjacent material shall be sound, smooth, clean and free of all contaminants prior to joint treatment.

2. Sealant and primer shall be supplied by the same manufacturer and the primer, when required, shall be as recommended for the particular sealant used.

3. All sealant compounds shall be delivered to the job in the manufacturer's original sealed containers with labels intact and shall be applied in strict accordance with the manufacturer's recommendations.

E. Miscellaneous

1. All exterior surfaces of the concrete units shall be given a minimum of one shop coat of bituminous damp-proofing.

2. Gasket materials shall be top grade (100% solids, vulcanized) butyl rubber and shall meet or exceed AASHTO M 198.

3.02 ERECTION

A. Any errors or misalignment in the structure which would prevent the proper setting of the elements shall be corrected by the Contractor before the erection is commenced.

B. Erection shall be supervised and performed by workmen skilled in this type of Work.

C. Each element shall be set in the proper position, carefully plumbed and anchored securely to the structural frame.

D. Adjustments or changes in connections which could involve additional stresses in the products or connections shall not be permitted without approval of the Construction Manager.

E. All bearing surfaces shall be true to line and grade.

F. Erection tolerances shall be in accordance with MNL 116.

G. All joints shall be uniform and straight.

3.03 CLEANING AND REPAIRING

A. After installation, precast elements shall be protected from all damage until final acceptance by the Owner.

B. Precast units with cracks, spalls, and other defects shall be subject to rejection. Units reviewed for repair shall be repaired to the satisfaction of the Construction Manager.

3.04 ALTERNATIVE DESIGN

A. The Contractor may offer an alternative design for any precast element.

B. Such design shall be comparable in terms of strength, deflection, finish and all other design criteria indicated.

C. Complete drawings prepared and sealed by a Structural engineer registered in the State of Georgia where applicable shall be submitted to the Construction Manager for his review in accordance with specification Section 01 33 23 of these Contract Documents.

D. No alternative design will be permitted unless it has been specifically accepted in writing by the Construction Manager.

E. If an alternative design is accepted, all expenses resulting therefrom shall be borne by the Contractor.

END OF SECTION

SECTION 08 31 00

ACCESS DOORS AND FRAMES

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes access doors and frames.

B. Unless indicated otherwise, provide access doors as follows:

1. Type I access doors over spaces intended to be dry such as pipe galleries and pump rooms.
2. Type II access doors over spaces intended to be wet such as wet wells and liquid holding basins.
3. Type III access doors where doors are subject to vehicular traffic.

1.02 REFERENCES

A. This section contains references to the following documents.

1. They are a part of this Section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.
2. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM A666	Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
ASTM B308	Aluminum-Alloy 6061-T6 Standard Structural Profiles
ASTM C578	Rigid, Cellular Polystyrene Thermal Insulation

1.03 SUBMITTALS

A. Action Submittals:

1. Procedures: Section 01 33 00.
2. A copy of this Specification Section with addendum updates included, and all referenced and applicable sections with addendum updates included with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
   a. Check-marks (✓) shall denote full compliance with a paragraph as a whole.

b. If deviations from the specifications are indicated and, therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph.

c. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications.

d. The submittal shall be accompanied by a detailed, written justification for each deviation.

e. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

3. Shop Drawings including profiles, accessories, location, adjacent construction interface and dimensions.

B. Informational Submittals:

1. Procedures: Section 01 33 00

2. Manufacturer's product data.

3. Warranty.

1.04 DELIVERY, STORAGE AND HANDLING

A. Procedures: Sections 01 65 00 and 01 66 00

1.05 SPECIAL WARRANTY

A. Special Warranty: manufacturer shall warrant access doors and frames against defects in materials and workmanship for 5 years.

PART 2 – MATERIALS

2.01. MANUFACTURERS

A. Manufacturers: Candidate manufacturers are listed below. The manufacturer's standard product may require modification to conform to specified requirements:

1. Bilco

2. Halliday

3. Approved Equal

2.02. GENERAL

A. Door leaf(s) shall withstand a live load of 300 pounds per square foot.

B. Where access doors are subject to vehicular traffic, Door leaf(s) shall withstand an AASHTO H-20 wheel load with a maximum deflection of 1/150th of the span.

C. All aluminum plate and structural shapes shall conform to ASTM B308, Type 6061-T6.

D. Hardware shall be ASTM A666 Type 316 stainless steel.

E. Aluminum in direct contact with concrete shall receive a protective coating on all surfaces that will be in contact with concrete.

F. The door shall open to 90 degrees and lock automatically in that position.

2.03. ACCESS FOOR LEAF

A. Door leaf(s) shall be minimum 1/4 inch thick aluminum diamond pattern plate stiffened with aluminum members as required. Finish of door leaf(s) and frame shall be mill.

B. Door leaf hinges shall be forged stainless steel with stainless steel pins.

1. Door leaf hinges shall be through bolted to the door leaf with tamperproof stainless steel lock bolts and to the frame with stainless steel bolts and locknuts.
2. Stainless steel hinges shall be bolted to the underside and pivot on torsion bars that counterbalance the door for easy operation.

C. Door leaf latches shall be stainless steel slam lock with fixed interior handle and removable exterior turn/lift handle. Latch release shall be protected by a flush, gasketed, removable screw plug.

D. Double leaf access doors shall have a stainless steel chain on both sides of the door opening for personnel protection.

E. Door leaf(s) shall have compression spring lifting operators enclosed in telescopic tubes and automatic hold-open arm with release handle to automatically lock the door leaf(s) in the open (90 degree) position.

F. Door leaf(s) over spaces intended for human occupancy shall be insulated with 2 inches preformed, cellular polystyrene thermal insulation, Type X or Type IV, conforming to ASTM C578.

1. Insulation shall be fully enclosed within door leaf with minimum 1/8 inch aluminum plate.

G. A vinyl grip handle shall be provided to release the cover for closing.

H. Door shall be equipped with a snap lock and removable handle.

I. Where specifically indicated on the drawings, provide a recessed padlock hasp lock with a flush hinged lid and fully welded receptacle designed to receive a standard padlock.

2.04. SAFETY GRATE

A. All access doors shall have a safety grate directly under the door leaf(s).

1. Safety grate shall be located directly under the door leaf(s), of aluminum or fiberglass construction and shall be lockable independent of the door leaf.

2. Safety grate shall hinged to match the access door leaf(s): one piece for single access doors and two-piece for double access doors.

3. The spacing of the grid shall be no greater than five inches square.

4. The safety grate shall be designed to withstand a live load of 150 pounds per square foot.

2.05. ACCESS DOOR FRAME

A. The frame shall be ¼ inch extruded aluminum alloy 6063 T6, with built in neoprene cushion.

B. Door frame shall be on all four sides of the openings, of aluminum construction, with anchor tabs around the perimeter.

C. Where specifically indicated on the drawings, provide an EPDM gasket system that will provide an air infiltration rate of less than 1 cubic foot per minute per linear foot of cover perimeter

D. Door frame shall have a channel profile to capture water. A 1 1/2-inch drainage coupling shall be provided in at least one corner of the frame.

PART 3 – EXECUTION

3.01. INSTALLATION

A. Install in strict accordance with manufacturer's instructions and approved submittals.

B. Access doors and frames shall be level, plumb and square. Adjust as necessary for proper operation. Repair damaged finishes to like new appearance.

C. Frames with drainage coupling shall be piped with PVC pipe to location as indicated on the drawings or prescribed by the Owner.

3.02. CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer.

END OF SECTION

SECTION 31 10 00

SITE PREPARATION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Specification Sections, apply to this Section.

1.02 DEFINITIONS

A. Subsoil:

1. All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil:

1. Soil that is present at the top layer of the existing soil profile at the Project site.
    a. In undisturbed areas, the surface soil is typically topsoil.
    b. In disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil:

1. Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.
2. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

D. Plant-Protection Zone:

1. Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

E. Tree-Protection Zone:

1. Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

F. Vegetation:

1. Trees, shrubs, groundcovers, grass, and other plants.

1.03 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.04 SUBMITTALS

A. Existing Conditions:

1. Documentation of existing trees and plantings, adjoining construction, and site improvements that establish preconstruction conditions that might be misconstrued as damage caused by site clearing.

a. Use sufficiently detailed photographs and/or videotape.

b. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings:

1. Identifying and accurately showing locations of capped utilities and other structural, electrical, and mechanical conditions.

1.05 QUALITY ASSURANCE

A. Pre-installation Conference:

1. Conduct conference at Project site.

1.06 PROJECT CONDITIONS

A. Traffic:

1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Construction Manager and authorities having jurisdiction.

b. Provide alternate routes around closed or obstructed traffic ways if required by Construction Manager or authorities having jurisdiction.

B. Salvable Improvements:

1. Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service:

1. Utilize a utility locator service for area where Project is located before site clearing.
2. Do not commence site clearing operations until temporary erosion and sedimentation control and plant-protection measures are in place.

D. Protection Zones

1. The following practices are prohibited within protection zones:
   a. Storage of construction materials, debris, or excavated material.
   b. Parking vehicles or equipment.
   c. Foot traffic.
   d. Erection of sheds or structures.
   e. Impoundment of water.
   f. Excavation or other digging unless otherwise indicated.
   g. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
2. Do not direct vehicle or equipment exhaust towards protection zones.
3. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

E Soil Stripping, Handling, And Stockpiling:

1. Perform only when the topsoil is dry or slightly moist.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Satisfactory Soil Material:

1. Requirements for satisfactory soil material are specified in Section 31 23 00 – Trench Excavation and Fill.
2. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

B. Antirust Coating:

1. Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #79, Alkyd Anticorrosive Metal Primer or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.

PART 3 – EXECUTION

3.01 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to the Construction Manager.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion and sedimentation control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion and sedimentation control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.03 TREE AND PLANT PROTECTION

A. General:

1. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by the Construction Manager.

3.04 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.

2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Interrupting Existing Utilities:

1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

a. Notify Owner and Construction Manager not less than two days in advance of proposed utility interruptions.

b. Do not proceed with utility interruptions without Owner or Construction Manager's written permission.

2. Excavate for and remove underground utilities indicated to be removed.

3. Removal of underground utilities as included on the drawings.

3.05 CLEARING AND GRUBBING

A. The sites of all excavation and grading shall be first cleared of all paving, trees, stumps, roots, brush, organic matter, crops, paving, structures, fences, sidewalks, rubbish, debris, etc., which shall be removed or disposed of in a satisfactory manner in a legally permitted location.

B. Refer to Section 31 11 10 for detailed Clearing and Grubbing requirements.

3.06 TIMBER

A. Salvage all timber within cleared area having a marketable value.

B. The timber within the cleared area shall become the property of the Contractor and the Contractor shall be responsible for selling and/or disposing the timber.

3.07 DISPOSAL OF CLEARED AND GRUBBED MATERIALS

A. Dispose of the cleared and grubbed materials by burning or chipping. Burning shall be permitted during approved burning seasons only. During non-burning season periods, use chipping for debris disposal. Remove chipped material from the site or disposed of in areas approved by Owner.

B. If burning is allowed, do not allow a fire to be unattended. The Contractor is responsible for damage caused by such fires. Do not bury burned and nonflammable materials.

1. All Contractors should be aware that the Georgia Environmental Protection Division has issued a burning ban for thirteen (13) Metro Atlanta Counties. The ban went into effect in 1996 and shall continue each year from May 1 through September 30. This ban should be considered when bidding

projects that require clearing and debris removal. It is the Contractor's responsibility to remove all construction debris from the jobsite. Any costs incurred as a result of the burning ban are the sole responsibility of the Contractor.

C. Disposal of materials in streams will not be permitted. Do not pile materials in stream channels or along the banks where it might be washed away by flood.

D. Remove all fence material within the areas to be cleared from the job site. Fence materials become the property of the Contractor.

3.08 DISCING

A. After grubbing is complete, discing of the entire area is required. Perform discing in two directions at approximate right angles. Generally, perform the second discing along the contour.

B. The construction area is to be left free-draining with a finished agricultural appearance.

3.09 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to a depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, other objects more than 2 inches in diameter, trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to 72 inches.
2. Do not stockpile topsoil within protection zones.
3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
4. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.10 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.11 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property and/or Project site.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION

SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 – GENERAL

1.01 SCOPE

A. Clearing and grubbing includes, but is not limited to, removing from the Project site, trees, stumps, roots, brush, structures, abandoned utilities, trash, debris and all other materials found on or near the surface of the ground in the construction area and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated.

B. Precautionary measures that prevent damage to existing features including trees, to remain are part of the Work.

C. The sites of all excavation and grading shall first be cleared of all paving, trees, walls, fences, sidewalks, stumps, brush, rubbish, and crops, which shall be removed and disposed of in a satisfactory manner.

D. On all lawns and other improved grass areas, the sod shall be carefully removed, kept alive when possible, and replaced after the backfilling is completed.

E. The Contractor shall also remove all spoil from such areas as quickly as possible after the excavation is backfilled, and shall leave the premises in as good a condition as before undertaking the work.

F. Fences which have been removed, damaged, or broken down shall be replaced at or before completion of the work to pre-construction quality or better.

G. Clearing and grubbing operations shall be coordinated with temporary and permanent erosion and sedimentation control procedures.

1.02 QUALITY ASSURANCE

A. The Contractor shall comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction over the Project. All required permits of a temporary nature shall be obtained for construction operations by the Contractor.

B. Open burning, if allowed, shall first be permitted by the local authority having jurisdiction. The Contractor shall notify the local fire department and abide by fire department restrictions.

C. All Contractors should be aware that the Georgia Environmental Protection Division has issued a burning ban for thirteen (13) Metro Atlanta Counties. The ban went into effect in 1996 and shall continue each year from May 1 through September 30. This ban should be considered when bidding projects that require

clearing and debris removal. It is the Contractor's responsibility to remove all construction debris from the jobsite. Any costs incurred as a result of the burning ban are the sole responsibility of the Contractor.

1.03 JOB CONDITIONS

A. Location of the Work: The area to be cleared and grubbed is shown schematically on the Drawings or specified below. It includes all areas designated for pipeline construction.

PART 2 – PRODUCTS

2.01 EQUIPMENT

A. The Contractor shall furnish equipment of the type normally used in clearing and grubbing operations including, but not limited to, tractors, trucks, loaders and root rakes.

PART 3 – EXECUTION

3.01 SCHEDULING OF CLEARING

A. The Contractor shall clear at each construction site only that length of the right-of-way, permanent or construction easement which would be the equivalent of two week's pipe laying. This length shall be determined from the Contractor's Progress Schedule.

B. The Construction Manager may permit clearing for additional lengths of the pipe line provided that temporary erosion and sedimentation controls are in place and a satisfactory stand of temporary grass is established. Should a satisfactory stand of grass not be possible, no additional clearing shall be permitted beyond that specified above.

C. A satisfactory stand of grass shall have no bare spots larger than one square yard. Bare spots shall be scattered and the bare area shall not comprise more than one percent of any given area.

3.02 CLEARING AND GRUBBING

A. Clear and grub no more than 3 feet on each side of the pipeline before excavating. Remove all trees, growth, debris, stumps and other objectionable matter. Clear the construction easement or road right-of-way only if necessary.

B. Materials to be cleared, grubbed and removed from the Project site include, but are not limited to, all trees, stumps, roots, brush, trash, organic matter, paving, miscellaneous structures, houses, debris and abandoned utilities.

C. Grub, stockpile, and/or place in embankments surface rocks and boulders from the soil in accordance with the Specifications.

D. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

E. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

1. When it is necessary to cut tree roots on the surface of the ground, the ends shall be cut off smooth, without splitting or shattering and scars greater than one inch in diameter shall be sealed with an approved asphalt sealant tree paint.

2. The trunks of the trees shall be carefully protected from damage, and if unavoidable damage occurs, the injured portions shall be neatly trimmed and covered with an application of an approved asphalt sealant tree paint.

3. Excavating machinery, cranes, etc., shall be handled with care to prevent damage to trees, particularly to overhanging branches, and branches shall not be cut off except by permission of Owner.

F. Grubbing shall consist of completely removing roots, stumps, trash and other debris from all graded areas so that topsoil is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.

G. All stumps, roots, foundations and planking embedded in the ground shall be removed and disposed of. Piling and butts of utility poles shall be removed to a minimum depth of two feet below the limits of excavation for structures, trenches and roadways or two feet below finish grade, whichever is lower.

H. Grind down stumps and remove roots, obstructions, and debris to a depth of 24 inches below exposed subgrade.

I. Use only hand methods for grubbing within protection zones.

J. Chip removed tree branches and stockpile in approved areas or dispose of offsite, as directed by Owner.

K. Landscaping features shall include, but are not necessarily limited to, fences, cultivated trees, cultivated shrubbery, property corners, man-made improvements, subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.

L. Surface rocks and boulders shall be grubbed from the soil and removed from the site if not suitable as rip rap.

M. Where the tree limbs interfere with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility.

N. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.

O. All fences adjoining any excavation or embankment that, in the Contractor's opinion, may be damaged or buried, shall be carefully removed, stored and replaced. Any fencing that, in the Construction Manager's opinion, is significantly damaged shall be replaced with new fence material.

P. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, etc. situated within the limits of the construction area but not directly within excavation and/or fill limits. The Contractor shall be held liable for any damage the Contractor's operations have inflicted on such property.

Q. The Contractor shall be responsible for repairs and/or replacement of all damage to existing improvements resulting from Contractor's operations.

R. Fill depressions caused by clearing and grubbing operations with proper backfill soil material, unless further excavation or earthwork is indicated by the Drawings or directed by Owner.

1. Place fill material in horizontal layers or lifts, not exceeding a loose depth of eight (8) inches, and compact each layer to 85% of maximum dry density – Standard Proctor (ASTM D698).

3.03 DISPOSAL OF DEBRIS

A. The debris resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of federal, state, county and municipal regulations.

B. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley.

C. No debris shall be deposited upon any private property except with written consent of the property owner. In no case shall any material or debris be left on the Project, shoved onto abutting private properties or buried on the Project.

END OF SECTION

SECTION 31 23 00

TRENCH EXCAVATION AND BACKFILL

PART 1 – GENERAL

1.01 SUMMARY

A. Scope

1. The work under this Section consists of furnishing all labor, equipment and materials and performing all operations in connection with the trench excavation and backfill required to install the pipelines as shown on the Drawings and as specified.

B. All excavation shall be by open cut unless otherwise indicated on the Drawings or directed by the Construction Manager.

1. In general, topsoil may be removed by machine method.
2. Excavation below topsoil may also be performed by machine, but shall be supplemented by such hand dressing or leveling as may be required to conform to lines and grades as directed by the Construction Manager.
3. Material so removed shall be used in backfill, making embankments, filling low areas, or as otherwise directed.
4. Hand tool excavation shall be used where necessary to protect existing utilities and structures.

C. Excavation shall include the removal of any trees, stumps, brush, debris or other obstacles which remain after the clearing and grubbing operations, which may obstruct the work, and the excavation, removal, and disposal of all earth, rock or other materials including the existing pipe if any to the extent necessary to install the new pipelines and appurtenances in conformance with the lines and grades shown on the Drawings and as specified.

D. Backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface or road grade at crossing.

E. The trench is divided into five specific areas:

1. Foundation: The area beneath the bedding, sometimes also referenced to as trench stabilization.
2. Bedding: The area above the trench bottom (or foundation) and below the bottom of the barrel of the pipe.
3. Haunching: The area above the bottom of the barrel of the pipe up to a specified height above the bottom of the barrel of the pipe.
4. Initial Backfill: The area above the haunching material and below a plane 18 inches above the top of the barrel of the pipe.

5. Final Backfill: The area above a plane 18-inches above the top of the barrel of the pipe.

F. The choice of method, means, techniques and equipment rests with the Contractor.

1. The Contractor shall select the method and equipment for trench excavation and backfill depending upon the type of material to be excavated and backfilled, the depth of excavation, the amount of space available for operation of equipment, storage of excavated material, proximity of man-made improvements to be protected, available easement or right-of-way and the prevailing practice in the area.

1.02 QUALITY ASSURANCE

A. Density:

1. All references to “maximum dry density” shall mean the maximum dry density defined by the “Maximum Density-Optimum Moisture Test”, ASTM D 698,
2. Except that for non-cohesive materials “maximum dry density” shall mean the maximum index density as determined by the “Maximum Index Density of Soils Using a Vibratory Table”, ASTM D 4253.

B. Determination of the density of foundation, bedding, haunching, or backfill materials in place shall meet with the requirements of:

1. ASTM D 1556, “Density of Soil In Place by the Sand Cone Method”.
2. STM D 2937, “Density of Soil In Place by the Drive-Cylinder Method”.
3. ASTM D 2922, “Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)”.

C. Sources and Evaluation Testing: Testing of materials to certify conformance with the Specifications shall be performed by an independent testing laboratory in accordance with Section 01 45 29 of these Specifications. All imported fill materials shall meet the requirements of on-site fill materials.

1.03 SAFETY

A. Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended.

B. The Contractor shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P “Excavation, Trenching & Shoring” as described in OSHA publication 2226.

PART 2 – PRODUCTS

2.01 RENCH FOUNDATION MATERIALS

A. Crushed stone shall be utilized for trench foundation (trench stabilization) and shall meet the requirements of the Georgia Department of Transportation Specification 800.2.01, Group I (limestone, marble or dolomite) or Group II (quartzite, granite or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

2.02 BEDDING AND HAUNCHING MATERIALS

A. Bedding requirements specified herein shall apply to water and sanitary sewer lines only. These requirements are to be considered minimum bedding requirements and as such, do not relieve the engineer/Contractor of the responsibility to provide any additional bedding necessary for proper support of the sewer and construction

B. Unless specified otherwise, bedding and haunching materials shall be crushed stone as specified below.

C. Crushed stone utilized for bedding and haunching shall meet the requirements of the Georgia Department of Transportation Specification 800.2.01, Group I (limestone, marble or dolomite) or Group II (quartzite, granite or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

D. Earth materials utilized for bedding and haunching shall be suitable materials selected from materials excavated from the trench.

1. Suitable materials shall be clean and free of rock larger than 2-inches at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials.
2. Should the material excavated from the trench be saturated, the saturated material may be used as earth material, provided it is allowed to dry properly and it is capable of meeting the specified compaction requirements.
3. When necessary, earth bedding and haunching materials shall be moistened to facilitate compaction by tamping.
4. If materials excavated from the trench are not suitable for use as bedding or haunching material, provide select material conforming to the requirements of this Section at no additional cost to the Owner.

E. Filter Fabric Woven Type

1. Filter fabric associated with bedding shall be a polypropylene woven fabric.
2. The fabric shall be a high modulus type with good separation capabilities.
3. The fabric shall be inert to biological degradation and naturally occurring chemicals, alkalies and acids.

4. The fabric shall have an equivalent opening size EOS of 20 to 45.

5. The fabric shall also conform to the minimum property values listed in the following table:

Fabric Property	Unit	Test Method	Minimum Value
Grab Tensile Strength	lbs.	ASTM D 4632	200
Grab Tensile Elongation	%	ASTM D 4632	15
CBR Puncture Strength	lbs.	ASTM D 6241	700
Trapezoid Tear Strength	lbs.	ASTM D 4533	75
Permittivity	Sec^{-1}	ASTM D 4491	0.05
Water Flow rate	gpm/ft^2	ASTM D 4491	5
UV Resistance @ 500 Hours	%	ASTM D 4355	70

6. If ordered by the Construction Manager, the filter fabric manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe.

7. This service will be furnished for a minimum of 10 days during initial pipe installation.

8. Filter fabric shall be Mirafi 500X, Amoco 2002 or Exxon GTF-200.

2.03 BACKFILLING – GENERAL

A. Materials used for backfilling shall be free from all perishable and objectionable materials; no stones larger than two (2) inches in the longest dimension shall be placed directly above the pipe. All larger stones must be placed to the sides of the ditch such that the pipe can be excavated for repair without digging through them.

B. Select compactable material shall be used in pipe trenches under roadways and other paved areas. When required on the plans or required by the Owner, graded aggregate base shall be used in pipe trenches under roadways.

2.04 BACKFILLING – INITIAL BACKFILL

A. Initial backfill material shall be crushed stone or earth materials as specified for bedding and haunching materials.

B. When necessary, initial backfill materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are not suitable for use as initial backfill material, provide select material conforming to the requirements of this Section at no additional cost to the owner.

2.05 BACKFILLING – FINAL BACKFILL

A. Final backfill material shall be general excavated earth materials, shall not contain rock larger than 2-inches at its greatest dimension, cinders, stumps, limbs, man-made wastes and other unsuitable materials.

B. If materials excavated from the trench are not suitable for use as final backfill material, provide select material conforming to the requirements of this Section.

2.06 SELECT BACKFILL

A. Select backfill shall be materials which meet the requirements as specified for bedding, haunching or initial backfill materials, including compaction requirements.

2.07 CONCRETE

A. Concrete for bedding, haunching, initial backfill or encasement shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches.

B. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94.

C. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

2.08 FLOWABLE FILL

A. Low strength flowable fill concrete shall meet the requirements of Section 600 of the Georgia Department of Transportation specifications.

2.09 GRANULAR MATERIAL

A. Granular material, where required for trench backfill, shall be sand, river sand, crushed stone or aggregate, pond screenings, crusher run, recycled concrete, or other angular material.

B. Granular material shall meet gradation requirements for Size No. 57 or finer.

PART 3 – EXECUTION

3.01 TRENCH EXCAVATION

A. Topsoil and grass shall be stripped a minimum of 6-inches over the trench excavation site and stockpiled separately for replacement over the finished grading areas.

B. Topsoil shall be removed to its entire depth from all areas to be excavated or graded.

1. The topsoil shall be piled in designated or approved locations where it will not interfere with construction operations.
2. Topsoil as stored shall be reasonably free of subsoil, debris, and stones larger than two (2) inches in diameter.
3. The stored topsoil shall be left in piles to be used for finished grading.

C. Trenches shall be excavated to the lines and grades shown on the Drawings with the centerlines of the trenches on the centerlines of the pipes and to the dimensions which provide the proper support and protection of the pipe and other structures and accessories.

D. All excavations shall be adequately shored to ensure worker safety. All pipe laying operations shall comply with OSHA requirements for trench safety.

E. Trench Width for Pipelines

1. The sides of all trenches shall be vertical to a minimum of one foot above the top of the pipe.
2. Unless otherwise indicated on the Drawings, the maximum trench width shall be equal to the sum of the outside diameter of the pipe plus two feet.
3. In order to limit loads on the pipe, the maximum width of the trench shall not be more than 36 inches wider than the outside diameter of the pipe. This trench width restriction applies to that portion of the trench 4 inches below the bottom of the pipe to 12 inches above the top of the pipe.
4. The minimum trench width shall be that which allows the proper consolidation of the haunching and initial backfill material.
5. Excavation of pipe trenches with sides sloping to the trench bottom will not be permitted.
6. Excavate the top portion of the trench to any width within the construction easement or right-of-way which will not cause unnecessary damage to adjoining structures, roadways, pavement, utilities, trees or private property. Where necessary to accomplish this, provide sheeting and shoring.
7. Where rock is encountered in trenches, excavate to remove boulders and stones to provide a minimum of 9-inches clearance between the rock and any part of the pipe barrel.

8. Wherever the prescribed maximum trench width is exceeded, the Contractor shall use the next higher Class or Type of bedding and haunching as shown on the Drawings for the full trench width as actually cut.

9. The excessive trench width may be due to unstable trench walls, inadequate or improperly placed bracing and sheeting which caused sloughing, accidental over-excavation, intentional over-excavation necessitated by the size of the Contractor's tamping and compaction equipment, intentional over-excavation due to the size of the Contractor's excavation equipment, or other reasons beyond the control of the Construction Manager or Owner.

F. Depth

1. The trenches shall be excavated to the required depth or elevation which allow for the placement of the pipe and bedding to the dimensions shown on the Drawings.

2. Where rock is encountered in trenches for pipelines, excavate to the minimum depth which will provide clearance below the pipe barrel of 8-inches for pipe 21-inches in diameter and smaller and 12-inches for larger pipe and valves.

G. Length of Trench to Be Opened

1. The length of trench to be opened, or the areas of the surface to be disturbed or unrestored at any one time, shall be limited with regard both to expeditious construction, and to the convenience, safety, and comfort of citizens directly or indirectly affected by the Work.

2. New trenches will not be permitted to be excavated if there are previously excavated trenches that require backfilling, or surface areas that require restoration.

3. In any event, no additional work of any kind will be permitted if there are existing streets or roadways that require attention to return them to a safe and proper condition.

4. IN GENERAL, NO TRENCH SHALL BE OPEN MORE THAN 500 FEET AHEAD OF PIPE LAYING AND BACKFILLING.

H. Excavated Materials

1. Excavated materials shall be placed adjacent to the work to be used for backfilling as required.

2. Top soil shall be carefully separated and lastly placed in its original location.

3. Excavated material shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and not cause any drainage problems.

4. Excavated material shall be placed so as not to damage existing landscape features or man-made improvements.

I. Storage of Materials:

1. All salvageable materials which may be removed from the site, together with all materials taken from the trenches, shall be stored in an approved, suitable place, or as directed by the Owner.

2. The Contractor shall be responsible for any loss of, or damage to, salvageable materials through careless removal or neglectful or wasteful storage of such materials.

3. In the storing of excavated material, which is to be used as backfill, the Contractor shall exercise care so as to avoid inconveniencing the public.

a. If, in the opinion of the Construction Manager, it is necessary to remove this excavated material from the streets or lots, the Contractor shall be required to do so.

3.02 SHEETING, BRACING AND SHORING

A. The Contractor shall be responsible for supporting and maintaining required excavations including sheeting and shoring the sides and ends of excavations with timber or other supports.

1. The requirement of sheeting or shoring, or the addition of supports, shall not relieve the Contractor of his responsibility of their sufficiency.

B. The need and adequacy of sheeting, shoring, bracing, or other provisions to protect workmen and equipment in a trench or other excavation, and to meet local and OSHA safety requirements, shall be the sole and exclusive responsibility of the Contractor.

C. Sheeting, bracing and shoring shall be installed in the following instances:

1. Where sloping of the trench walls do not adequately protect persons within the trench from slides or cave-ins.

2. In caving ground.

3. In wet, saturated, flowing or otherwise unstable materials.

4. Where necessary to prevent damage to adjoining buildings, structures, roadways, pavement, utilities, trees or private properties which are required to remain.

5. Where necessary to maintain the top of the trench within the available construction easement or right-of-way.

D. In all cases, excavation protection shall strictly conform to the requirements of the Occupational Safety and Health Act of 1970, as amended.

E. Timber: Timber for shoring, sheeting, or bracing shall be sound and free of large or loose knots and in good, serviceable condition. Size and spacing shall be in accordance with OSHA regulations.

F. Steel Sheeting and Sheet Piling

1. Steel sheet piling shall be the continuous interlock type.
2. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations and live loads.
3. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times.
4. The Contractor shall provide closure and sealing between sheet piling and existing facilities.

G. Trench Shield

1. A trench shield or box may be used to support the trench walls. The use of a trench shield does not necessarily preclude the additional use of bracing and sheeting.
2. When trench shields are used, care must be taken to avoid disturbing the alignment and grade of the pipe or disrupting the haunching of the pipe as the shield is moved.
3. When the bottom of the trench shield extends below the top of the pipe, the trench shield will be raised in 6-inch increments with specified backfilling occurring simultaneously.
4. At no time shall the trench shield be “dragged” with the bottom of the shield extending below the top of the pipe or utility.

H. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the pipe and adjacent property.

1. Leave sheeting in place when, in the opinion of the Construction Manager, it cannot be safely removed or is within three feet of an existing structure, utility, or pipeline.
2. Cut off any sheeting left in place at least two feet below the surface.

I. Sheet piling within three feet of an existing structure or pipeline shall remain in place, unless otherwise directed by the Construction Manager.

3.03 ROCK EXCAVATION

A. Definition of Rock: Solid mineral material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 3/4 cubic yard for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Late-model, track-mounted hydraulic excavator equipped with a 42-inch wide, maximum, short-tip-radius rock bucket.

a. Rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf.

b. With extra-long reach boom measured according to SAE J-1179.

B. Unless otherwise directed by the Owner, rock shall be fully taken out at least twenty-five (25) feet in advance of pipe laying, at least 6" below the invert of the pipe, and to a trench width for the size of the pipe to be laid, as specified in Fulton County Standard Details.

C. All pipe installed within rock excavation shall be laid upon a minimum of six (6) inches of # 57 stone coarse aggregate.

D. Blasting may be allowed for removing rock for excavation when properly permitted.

1. Blasting will only be allowed with pre-approval from Fulton County.
2. Typically, blasting will not be approved.
3. When blasting, the Contractor must use all possible precautions against accidents or damages due to use or storage of explosives, and assumes all responsibility/liability associated with blasting activities.
4. ONLY **LICENSED** EMPLOYEES OR SUBCONTRACTORS WILL BE ALLOWED TO CONDUCT BLASTING ACTIVITIES – PROOF OF SUCH LICENSING **MUST BE** PROVIDED TO THE CONSTRUCTION MANAGER **PRIOR TO** ENGAGING IN ANY BLASTING ACTIVITIES.
5. Explosives shall be used, handled and stored as prescribed by the laws and regulations of the State of Georgia, and all applicable local laws and regulations pertaining to such.
6. All explosives shall be stored in a safe place at a sufficient distance from the work so that no damage will occur to any portion of the work should an accident occur relating to the stored explosives.
7. Conduct blasting operations in accordance with all existing ordinances and regulations. Protect all buildings and structures from the effects of the blast. Repair any resulting damage. If the Contractor repeatedly uses excessive blasting charges or blasts in an unsafe or improper manner, the Construction Manager may direct the Contractor to employ an independent blasting consultant to supervise the preparation for each blast and approve the quantity of each charge.
8. Removal of Rock: Dispose of rock off site that is surplus or not suitable for use as rip rap or backfill.
9. The Contractor shall notify the Construction Manager prior to any blasting. Additionally, the Contractor shall notify the Construction Manager and local fire department before any charge is set
10. Furnish all labor, equipment and materials required to drill, blast, loosen, excavate, and dispose material to complete the work shown on the Drawings and specified herein.

11. The work includes, but is not be limited to:

    a. Blast round design.

    b. Planning and execution of appropriate site-specific safety measures to be employed during all blasting operations, and the safe handling and storage of high explosives and blasting agents.

    c. Drilling blast holes, loading blast holes with explosives, and wiring and safe detonation of blast rounds.

    d. Removal from the site of all excess excavated soil, debris, and rock as indicated in the contract Documents, or as directed, and disposal of excess materials at a permitted disposal site.

    e. Dewatering and maintenance of groundwater and surface water in all excavations.

    f. Performance of all surveys necessary to establish and verify the lines and grades and to determine the amount of material removed.

    g. Implementation of monitoring program to monitor condition of existing structures and utilities in vicinity of proposed blasting operations to insure existing features remain undamaged by blasting procedures.

12. Make all excavations in conformance with the lines, grades and cross sections on the Drawings or established by the Construction Manager. Where blasting is required, blasting should ensure removal of six inches (6”) of rock below proposed grade line.

13. All over-blast shall be removed and the resulting over-excavation backfilled and compacted with #57 gradation stone coarse aggregate.

14. Conduct all blasting operations, including transporting and storing of explosives in compliance with the Georgia State Fire Commissioner’s Rules and Regulations for Explosives and Blasting Agents, latest edition and all applicable local codes.

15. Blasting Submittals

    a. Submit the following in accordance with the procedures and requirements set forth in Section 01 33 00 Submittal Procedures, at least thirty (30) working days prior to beginning any blasting operations:

        1) Names, addresses, telephone numbers, and qualifications of the blasting subcontractor(s) and explosives supplier(s) that will be used, including the designated Blaster-In-Charge.

        2) Copies of Training Certificates for the designated Blaster-In-Charge, blasting foreman and any other key personnel that will be responsible for the work, showing that they have received specialized training in the proper handling of explosives.

3) A Blasting Plan, indicating the methods, materials and equipment to be used. The Blasting Plan should indicate the types of explosives to be used, drilling patterns, and a general layout and schedule for executing the work in accordance with state regulations.

4) A ground vibration and air blast monitoring plan, indicating structures that will be monitored, monitoring equipment that will be used, and personnel that will perform the monitoring.

16. At least 24 hours before each blast round, submit a detailed blast round design plan to the Construction Manager's or Owner's on-site representative. The blasting plan submitted is for quality control and record keeping purposes. Review by the Construction Manager does not relieve the Contractor of his responsibilities as provided herein. Include the following in the blast round design submittals:

a. Location (state, grid coordinates) and limits of the shot.

b. Number, diameter, and depth of blast holes to be detonated in the round, and a plan showing the drill hole pattern, spacing and distance to the free face.

c. Depth of overburden.

d. Total weight of explosives in the round and the types of explosives to be used.

e. Loading diagram showing the location of explosives, primers, and initiators; and location, depth, and type of stemming to be used in each hole.

f. Initiation sequence, including delay timer and delay system, total weight of explosive to be detonated on each delay, and a list of the timing of the delays.

g. Manufacturer's data sheet for all explosives, primers, and initiators to be used.

h. Planned seismic monitoring positions, distances from the blast round, and seismograph types to be used to monitor vibrations and air blast overpressures.

i. Type and amount of blasting mats and/or depth of soil cover to be used over the top surface of the shot.

j. Any other information required by applicable state and federal regulations.

17. Within 24 hours after each blast round, submit a blasting report to the Construction Manager. Include the following in the blasting report:

a. Date and time of shot.

b. Foreman's name.

c. Number and depth of holes detonated.

d. Weather conditions at the time of detonation.

e. Type of explosives and detonators used.

f. Peak particle velocity of ground motion and primary frequency for all ground vibration monitoring stations.

g. Peak air blast overpressure measured.

h. Distance from the blast round to each monitoring station for vibrations and air blast.

i. Amount of explosive used in each hole, and maximum weight of explosive detonated on any single delay in the blast round.

E. Pre-Blast Survey

1. Contractor shall have an approved vibration consultant conduct the pre-blast survey on the residences and facilities adjacent to the proposed rock blasting in accordance with the submitted survey and monitoring plan.

2. The survey shall include, but not be limited to the following:

a. A site plan or drawing of the structure to be examined showing the structure in relationship to the proposed rock blasting area and a full description of the structure including type of materials and construction.

b. Examination of the structure (interior and exterior surfaces) by experienced and qualified personnel, noting any visible structural and aesthetic flaws in or on the structure. Note existing cracks and flaws, with significant cracks measured, and all cracks and flaws photographed.

c. Upon completion of the examination, ask the structure's owner to review the report, note any corrections or omissions, and sign a statement that to the best of his knowledge, the examination report reflects the conditions of the structure prior to any rock blasting. If the structure’s owner refuses to sign said report, it should be noted in the report by the examiner.

d. Nothing contained herein shall relieve the Contractor of responsibility for claims arising from his construction operations. Failure to inspect any structure, whether or not required by these Contract Documents, or inadequacy of the inspections shall not relieve the Contractor of his responsibility. The Contractor shall indemnify the County from such claim.

e. In the event that any property owner denies access for the survey of structures and facilities, notify such property owner, by certified mail, stating that this is final notification. Submit to the Construction Manager, copies of all correspondence between the Contractor and the property owner(s). The Construction Manager, upon review of the submitted correspondence may waive requirements set forth above. However, the Contractor is fully responsible for claims and damage arising from his construction operations regardless of property location.

f. Submit two (2) sets of copies of the examination reports to the Engineer for their records.

F. Use of Explosives

1. When the use of explosives is necessary for the prosecution of the Work, exercise the utmost care not to endanger life or property. Be responsible for any and all damage or injury to persons or property resulting from the use of explosives.

2. Store all explosives in a secure manner, in compliance with all laws, and clearly mark all such storage places "DANGEROUS EXPLOSIVES".

3. Notify any public utility company having facilities in close proximity to the site of the Work of the intention to use explosives.

a. Provide this notice sufficiently in advance to enable the utility companies to take whatever steps they may consider necessary to protect their property from injury.

b. Also give the Construction Manager, all occupants of adjacent property, and all other Contractors working in or near the Project, notice of the intention to use explosives.

4. Only non-electric type initiators maybe used.

G. Blasting Operations

1. Provide explosives of such quantity and power and use in such locations as will neither open seams nor otherwise disturb the material outside the prescribed limits of excavation.

2. As the excavation approaches its final limits, reduce the depth of holes for blasting and the amount of explosives used for each hole so that the underlying or adjacent rock will not be disturbed or shattered.

3. Do not perform blasting within 100 feet of newly placed concrete that has cured less than 7 days.

4. Do not perform blasting within 50 feet of any existing structure or any new structure in progress.

H. Blast Monitoring

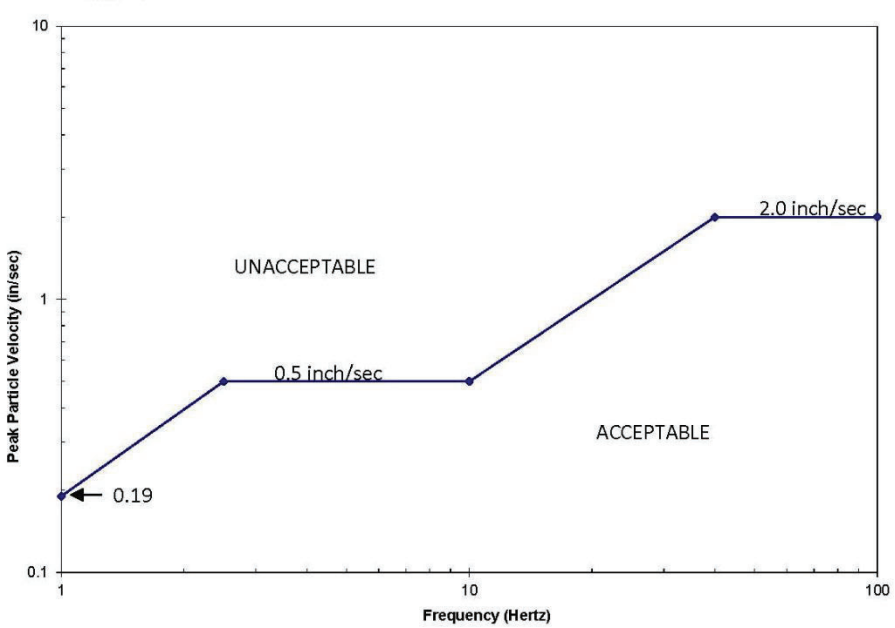
1. Following review by the Construction Manager regarding the proximity of permanent buildings and structures to the blasting site, Construction Manager may direct the Contractor to employ an independent, qualified specialty sub- contractor, approved by the Construction Manager to:

a. Monitor the blasting by use of seismograph,

b. Identify the areas where light charges must be used,

c. Conduct pre-blast and post-blast inspections of structures, including photographs or videos, and maintain a detailed written log.

2. The Contractor shall exercise the utmost care not to damage property on-site and off-site.
   a. Notify each adjoining property owner within 5,000 feet of the site of the anticipated ground vibrations and noise which will occur due to the blasting operations.
   b. Provide this notice 30 days in advance to enable the adjacent property owners to take whatever precautions they may consider necessary.
   c. Limit operations to minimize any disturbance to the adjacent property owners.
   d. Notify motorists on adjacent roadways in accordance with state regulations.
   e. Take responsibility for any damage to any structure or utility line, pipes, etc., on-site and off-site as a result of his operations.
3. For each blast round, monitor and record noise and air blast overpressures at the site perimeter nearest the blast location and at the on-site or off-site structure located nearest to the round.
   a. Peak air blast overpressure shall not exceed 0.018 psi, measured at the site perimeter.
4. Sufficiently cover the site of every blast round with blasting mats or other devices to prevent any flying debris.
   a. The Contractor will be fully responsible for any damage caused by flying debris, both to on-site and off-site properties.
5. Whenever blasting is to be performed within 2,500 feet of any structure, measure the peak particle velocities of ground vibration resulting from each blast at the structure.
6. Monitor vibrations utilizing a seismograph capable of providing a record of particle velocity and frequency along three mutually perpendicular axes utilizing internal calibration.
7. Measured peak particle velocity of ground motion at the monitored structure shall not exceed the values shown in the following graph:



I. Blasting Notification

1. Give twenty-four (24) hour notice to Construction Manager and adjacent residences and/or businesses prior to each blast.

J. Complaints

1. Submit notice of blasting complaints to Owner in writing within twenty-four (24) hours of receipt thereof.

   a. Identify the origin of complaint in the notice and provide a brief description of alleged damage or other circumstances upon which the complaint is predicated.

   b. Assign a number to each complaint consecutively in the order of receipt.

   c. Assign each complaint a separate number and show in each letter complaint all previous complaint numbers registered by the same complainant.

   d. In addition, make a summary report each month to Owner. Indicate date, time and name of person investigating the complaint and amount of damages (or an estimate thereof), if any, in the summary report.

K. Post Blast Survey

1. Contractor shall have the same vibration consultant who performed the pre-blast survey conduct the post-blast survey.

2. The consultant shall examine all structures from which a complaint has originated after the blast. The survey shall include, but not be limited to the following:

a. A full description of the alleged damage caused by the blast.

1) Where appropriate, provide a sketch to more fully describe the location and type of damage.

2) Measure cracks and compare to any original measurements which may have been taken in the Pre-Blast Survey.

b. Take colored photographs of any alleged damage.

c. Submit two (2) copies of the Post Blast Survey report to the Construction Manager. The report shall include the consultant's assessment of the alleged damage and an opinion as to its likely cause.

3.04 DEWATERING EXCAVATIONS

A. Dewater excavation continuously to maintain a water level two feet below the bottom of the trench.

B. The Contractor shall pump out, or otherwise remove and properly dispose of any water (including storm water), which may be found or may accumulate, as fast as it may collect in the excavation. The removal is required regardless of the source.

C. All necessary precautions shall be taken to prevent disturbance of, and to properly drain, any areas upon which concrete is to be poured or pipe is to be laid.

D. There shall be located at the work site at all times during construction, proper and approved equipment with such sufficient capacity for the removal of any water that accumulates in excavations and in such manner as not to withdraw sand or cement from any concrete.

1. Where the utility crosses natural drainage channels, the work shall be conducted in such a manner that unnecessary damage or delays in the prosecution of the work will be prevented.

2. Provision shall be made for the satisfactory disposal of surface water to prevent damage to public or private property.

E. Contractor is also to ensure that removal of any liquids will not interfere with the proper laying of masonry or pipe, or execution of any required work for the complete construction of the project.

F. The flow in storm drains, gutters, or water courses encountered during the construction shall be adequately provided for by the Contractor to ensure these flows do not interfere with the execution of the work, and are maintained in such a manner as to ensure continuity of flow at all times in accordance with the Fulton County Erosion and Sediment Control Ordinance.

G. Unless otherwise permitted, ground water encountered within the limits of excavation shall be depressed to an elevation not less than twelve (12) inches below the bottom of such excavation.

1. This depression is to be performed before pipe laying or concrete work is started and shall be so maintained until concrete and joint materials have attained initial set.

H. Control drainage in the vicinity of excavation so the ground surface is properly pitched to prevent water running into the excavation.

I. In all cases, accumulated water in the trench shall be removed before placing bedding or haunching, laying pipe, placing concrete or backfilling.

J. Where dewatering is performed by pumping the water from a sump, crushed stone shall be used as the medium for conducting the water to the sump.

1. Sump depth shall be at least two feet below the bottom of the trench.
2. Pumping equipment shall be of sufficient quantity and/or capacity to maintain the water level in the sump two feet below the bottom of the trench.
3. Pumps shall be a type such that intermittent flows can be discharged.
4. A standby pump shall be required in the event the operating pump or pumps clog or otherwise stop operation.

K. Dewater by use of a well point system when pumping from sumps does not lower the water level two feet below the trench bottom.

1. Where soil conditions dictate, the Contractor shall construct well points cased in sand wicks.
2. The casing, 6 to 10-inches in diameter, shall be jetted into the ground, followed by the installation of the well point, filling casing with sand and withdrawing the casing.

L. Should sewage or any other odorous liquids be encountered during the work in the excavation, the Owner shall be immediately notified.

1. The Owner will then determine if actions by the Contractor have caused the source of the odorous liquids to leak and will promptly notify the appropriate regulatory agencies, if necessary.
2. In addition, the Owner will instruct the Contractor as to what actions, if any, the Contractor can and cannot perform prior to any directives which may be issued by the regulatory agencies.
3. Any sewage will be pumped and hauled to a manhole, pump station, or water reclamation facility, as directed
4. Any other liquids will be properly disposed of as directed by the Construction Manager and/or any regulatory agencies having jurisdiction.

3.05 TRENCH FOUNDATION AND STABILIZATION

A. The bottom of the trench shall provide a foundation to support the pipe and its specified bedding. The trench bottom shall be graded to support the pipe and bedding uniformly throughout its length and width.

B. Where foundation conditions are such that proper bedding cannot be provided, the Contractor may be directed by the Construction Manager to provide foundation cushion, concrete cradles, or other special provisions as may be required for the proper support of the pipe.

C. If, after dewatering as specified above, the trench bottom is spongy, or if the trench bottom does not provide firm, stable footing and the material at the bottom of the trench will still not adequately support the pipe, the trench will be determined to be unsuitable and the Owner shall then authorize payment for trench stabilization.

D. Should the undisturbed material encountered at the trench bottom constitute, in the opinion of the Construction Manager, an unstable foundation for the pipe, the Contractor shall be required to remove such unstable material and fill the trench to the proper subgrade with crushed stone as directed by the Construction Manager.

E. Where the replacement of unsuitable material with crushed stone does not provide an adequate trench foundation, the trench bottom shall be excavated to a depth of at least two feet below the specified trench bottom.

1. Place filter fabric in the bottom of the trench and support the fabric along the trench walls until the trench stabilization, bedding, haunching and pipe have been placed at the proper grade.
2. The ends of the filter fabric shall be overlapped by one foot above the pipe.

F. Where trench stabilization is provided, the trench stabilization material shall be compacted to at least 90 percent of the maximum dry density, unless shown or specified otherwise.

3.06 BEDDING AND HAUNCHING

A. Prior to placement of bedding material, the trench bottom shall be free of any water, loose rocks, boulders or large dirt clods.

1. Bottoms of trenches in earth must be shaped or molded and compacted to the contour of the outside of the pipe, using bedding materials, as directed, or where indicated on the Drawings, to give full support to the lower segment of the pipe and so that the pipe is firmly supported in the excavation throughout its entire length.
2. This shall be performed in such a manner as to prevent any subsequent settlement of the pipe.
3. Boulders or loose rock which might bear against the pipe will not be permitted in the trench bottom, or in the initial backfill within twelve (12) inches above the top of the pipe.

4. Bottoms of excavations which are of loose granular soils shall be compacted by vibratory compactor prior to laying of pipe.

B. Bedding material shall be placed to provide uniform support along the bottom of the pipe and to place and maintain the pipe at the proper elevation.

1. The initial layer of bedding placed to receive the pipe shall be brought to the grade and dimensions indicated on the Drawings.

2. Bedding shall be carefully placed along the full width of the trench so that the pipe is true to line and grade of the pipe barrel.

a. As used herein “carefully placed” means material that has been spaded or shovel-sliced so that the material fills and supports the haunch area and encases pipe to the limits specified herein.

b. Bedding material shall be carried up the sides of the pipe to the heights shown for the various classes of bedding.

3. The pipe shall be placed and brought to grade by tamping the bedding material or by removal of the excess amount of the bedding material under the pipe.

4. Adjustment to grade line shall be made by scraping away or filling with bedding material.

a. Wedging or blocking up of pipe shall not be permitted.

b. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted.

5. Each pipe section shall have a uniform bearing on the bedding for the length of the pipe, except immediately at the joint.

C. At each joint, bell holes shall be provided in all classes of bedding.

1. Excavate bell holes of ample depth and width to permit the joint to be assembled properly but small enough to ensure that support is provided throughout the length of pipe barrel to relieve the pipe bell of any load.

D. After the pipe section is properly placed, add the haunching material to the specified depth.

1. The haunching material shall be shoveled, sliced, tamped, vigorously chinked or otherwise consolidated to provide uniform support for the pipe barrel and to fill completely the voids under the pipe, including the bell hole.

2. Prior to placement of the haunching material, the bedding shall be clean and free of any water, loose rocks, boulders or dirt clods.

E. Bedding

1. Class “A” (Bedding Factor - 2.8): Excavate the bottom of the trench flat at a minimum depth as shown on the Drawings, below the bottom of the pipe barrel. Lay pipe to line and grade on concrete block. Place concrete to the

full width of the trench and to a height of one-fourth of the outside diameter of the pipe above the invert.

2. Class “B” (Bedding Factor - 1.9): Class ‘B’ Bedding shall be installed by first undercutting the trench an adequate amount to provide bedding underneath the pipe bell as indicated. The trench shall then be brought to grade with compacted #57 Stone Coarse Aggregate placed the full width of the trench, as excavated. Haunching material shall then be carefully placed by hand and compacted to provide full support under the pipe barrel up to Centerline. At a minimum, Class ‘B’ Bedding shall be used for PVC pipe.

3. Class “C” (Bedding Factor - 1.5): Class ‘C’ Bedding shall be installed by first undercutting the trench an adequate amount to provide bedding underneath the pipe bell as indicated. The trench shall then be brought to grade with compacted #57 Stone Coarse Aggregate placed the full width of the trench, as excavated. Haunching material shall then be carefully placed by hand and compacted to provide full support under and up to a height of one-fourth the outside diameter of the pipe above the bottom of the pipe barrel. At a minimum, Class ‘C’ Bedding shall be used for DIP.

4. Type 5: Type 5 Bedding shall be installed by first undercutting the trench an adequate amount to provide bedding underneath the pipe bell as indicated. The trench shall then be brought to grade with compacted #57 Stone Coarse Aggregate placed the full width of the trench, as excavated before installing pipe. Haunching material shall then be carefully placed by hand and compacted to provide full support under and up to the top of the pipe barrel.

5. Groundwater Flow Dams may be required under certain conditions.

   a. If there is a large volume of groundwater which might follow the crushed stone bedding downhill and due to the elevations involved, might build adequate pressure to create problems, flow dams will be required.

   b. Flow dams consist of red clay bedding typically about three feet long and spaced about 100 feet along pipeline.

F. Excessive Width and Depth

1. If the trench is excavated to excess width, provide the bedding class with the next higher bedding factor.

2. Crushed stone haunching and initial backfill may be used in lieu of Class “A” bedding, where Class “A” bedding is necessitated by excessive trench width.

3. If the trench is excavated to excessive depth, provide crushed stone to place the bedding at the proper elevation or grade.

G. Compaction: Bedding and haunching materials under pipe and accessories shall be compacted to a minimum of 90 percent of the maximum dry density, unless shown or specified otherwise.

3.07 BACKFILLING – GENERAL

A. Backfilling shall include initial and final backfilling, re-grading of grounds, restoration of surface and sub-surface materials and structures, including resurfacing of paved areas damaged by the Contractor.

B. Backfilling shall not be performed in freezing weather (below 32 degrees F) except by permission of the Construction Manager and shall not be performed with frozen material or upon frozen materials.

C. All backfilling shall be left with smooth, even surfaces, free of rock on the surface, properly graded and shall be maintained in this condition until final completion and acceptance of the Work.

D. Where directed by the Construction Manager, the backfill shall be mounded slightly above the adjacent ground to allow for settlement.

E. Except as otherwise specified or directed, all forms, bracing, and lumber shall be removed before backfilling.

3.08 BACKFILLING – INITIAL BACKFILL

A. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by subsequent backfill and ensure the uniform distribution of the loads over the top of the pipe.

B. Initial backfilling must be performed properly and before any filling is deposited in large quantities from a machine bucket or other vehicle.

C. Initial backfill material over PVC pipe shall be free of rocks larger than two (2) inches in the largest dimension. Initial backfill material over DIP pipe shall be free of rocks larger than four (4) inches in the largest dimension.

D. During initial backfill, dumping from a bucket must not be allowed to fall from a height of more than one foot upon a pipe, and in all cases the bucket must be lowered so that the shock of the falling earth will not injure the pipe or structure.

E. Place initial backfill material carefully around the pipe in uniform layers to a depth of at least 18-inches above the pipe barrel.

1. Layer depths shall be a maximum of 6-inches for pipe 18-inches in diameter and smaller and a maximum of 12-inches for pipe larger than 18-inches in diameter.

F. Carefully and thoroughly consolidate initial backfill in trenches where pipe has been laid, by tamping simultaneously on both sides of the pipe to prevent side pressures.

1. Compact each layer thoroughly with suitable hand tools or tamping equipment.

2. This backfilling and compacting must be performed before any backfill material is deposited directly from a machine bucket, loaders, trucks, or other mechanical equipment.

3. When utilizing a machine bucket for backfilling, the bucket must be lowered into the trench to deposit the material in such a manner as to avoid the shock of falling earth which could injure or damage the pipe or structure.

4. Under no circumstances should the material be allowed to fall from the machine or loader bucket directly onto the pipe in the trench.

G. Initial backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless shown or specified otherwise.

H. Only after the initial backfill has been placed to a point 18 inches above the top of the pipe, may work proceed in placing the final backfill, which must be carefully placed and compacted by tamping.

3.09 BACKFILLING – FINAL BACKFILL

A. After initial backfill material has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers, compacting each layer thoroughly as follows:

In 6-inch layers, if using light power tamping equipment, such as a “jumping jack”.

In 12-inch layers, if using heavy tamping equipment, such as hammer with tamping feet.

In 24-inch layers, if using a hydra-hammer.

B. Backfill carefully to restore the ground surface to its original condition.

C. All precautions must be taken to avoid having any unincorporated material which may result in future settlement in these areas. Compaction shall be accomplished by approved mechanical tampers

D. The top 6-inches shall be topsoil obtained as specified in “Trench Excavation” of this Section.

E. Excavated material which is unsuitable for backfilling, and excess material, shall be disposed of, at no additional cost to the Owner, in a manner approved by the Construction Manager.

1. Surplus soil may be neatly distributed and spread over the site, if approved by the Construction Manager.

2. If such spreading is allowed, the site shall be left in a clean and sightly condition and shall not affect pre-construction drainage patterns.

3. Surplus rock from the trenching operations shall be removed from the site.

F. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.

G. Settlement: If trench settles, re-fill and grade the surface to conform to the adjacent surfaces.

H. Final backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless specified otherwise.

I. All backfilling shall be left with smooth, even surfaces, properly graded, and shall be maintained in such condition until final completion and acceptance of the work, notwithstanding applicable warranty periods.

J. Where directed by Construction Manager, the Contractor shall mound the backfill slightly above the adjacent ground to allow for settlement.

3.10 CONCRETE ENCASEMENT FOR PIPELINES

A. Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 6-inches clearance from the bell of the pipe.

B. Lay the pipe to line and grade on concrete blocks.

C. In lieu of bedding, haunching and initial backfill, place concrete to the full width of the trench and to a height of not less than 12-inches above the pipe bell. Do not backfill the trench for a period of at least 24 hours after concrete is placed.

3.11 ADDITIONAL MATERIAL

A. Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be as shown on the Drawings.

1. Utilize excess material excavated from the trench, if the material is suitable.
2. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide additional suitable fill material at no cost to the Owner.

B. When acceptable excess material is not available from other parts of the Project for backfill, required fills, embankments, etc., the Contractor shall obtain the necessary “borrow” material at locations off the site of the work.

C, If the Construction Manager determines the original excavated material is unsuitable for use as backfill, such as perishable matter, refuse, building materials, wire, brush, stumps, ashes, large stones, mulch, or other soft materials, the Contractor shall properly dispose of the objectionable materials, and shall furnish, haul, and place borrow material suitable for proper backfill.

D. Locating such acceptable “borrow” sites shall be the sole responsibility of the Contractor. All materials to be used as borrow shall be approved by the Construction Manager.

3.12 BACKFILL UNDER ROADS

A. Final backfill material under roadways and other paved areas shall be compacted to a density of not less than 95 percent of maximum dry density as determined by ASTM D 698 – Standard Proctor. The top 12-inches shall be compacted to a minimum of 98 percent of the maximum dry density.

B. Final backfill material under non-paved areas within the road right-of-way shall be compacted to not less than 90 percent of maximum dry density as determined by ASTM D 698.

C. Final backfill material in non-paved areas outside of road right-of-way shall be compacted to not less than 85 percent of maximum dry density as determined by ASTM D 698 or as directed by the Construction Manager.

3.13 BACKFILL WITHIN GEORGIA DOT RIGHT-OF-WAY

A. Backfill within the Georgia DOT right-of-way shall meet the requirements stipulated in the “Utility Accommodation Policy and Standards”, published by the Georgia Department of Transportation.

3.14 BACKFILL ALONG RESTRAINED JOINT PIPE

A. Backfill along restrained joint pipe shall be compacted to a minimum 90 percent of the maximum dry density.

3.15 BACKFILLING STRUCTURES

A. Backfilling of structures shall proceed as various structures or parts of structures are completed.

1. The Contractor shall refill the space outside and around the wall with material excavated from the site and stored for this purpose.
2. Immediately adjacent to the structure, the backfill material shall be placed in eight inch layers and compacted to avoid future settlement.
3. This filling shall be carried to such height as will bring the finished grade to the required elevations.

3.16 FLOWABLE FILL

A. Where flowable fill is required, excavate the trench to provide a minimum of 6-inches clearance on either side of the pipe barrel.

B. Lay the pipe to line and grade on solid concrete blocks or bricks.

C. In lieu of bedding, haunching and initial backfill, place flowable fill to the full width and depth of the trench.

D. Flowable fill shall be protected from freezing for a period of 36 hours after placement. Minimum temperature of flowable fill at point of delivery shall be 50 degrees F.

E. The Contractor shall provide steel plates over flowable fill in road locations.

3.17 COMPACTED GRANULAR MATERIAL

A. Where compacted granular material is required as initial and final backfill material, it shall be placed after bedding and haunching material specified elsewhere has been placed.

B. Compacted granular material shall be compacted to a minimum 95 percent of the maximum dry density.

3.18 TRENCH SURFACE FINISH

A. Trenches cut in pavement on public roads or in areas that will become under pavement in proposed public roads (such as typical subdivision developments) shall be compacted in accordance with Fulton County Standard Details as applicable.

1. Such compaction shall be verified by an independent soils laboratory. The number, depth and location of such compaction test shall be as required by the Construction Manager.
    a. Compaction tests will generally be required at approximately 400 foot intervals in existing roads and 800 foot intervals in proposed roads.
    b. Compaction tests shall be performed at the Contractors' expense.
2. Trenches located perpendicular within existing public roads shall require an 8 inch thick concrete base course poured over the compacted backfill.
    a. The concrete base course shall extend the full width of the trench cut plus a minimum of 12 inches on either side of the trench.
    b. The existing pavement shall be neatly sawed along both sides of the trench.
    c. The concrete used shall be a minimum 3,000 PSI high early strength concrete.
    d. Once the concrete base course has properly set, the concrete surface shall be cleaned and a minimum 1-½ inch thick bituminous concrete pavement (to match existing pavement), shall be laid matching the level of the adjacent pavement.

B. Trenches cut in driveways or private parking areas shall require a minimum 6 inch thick, fully compacted, graded aggregate base.

1. The existing pavement shall be neatly sawed along both sides of the ditch.

2. Material of the same type and thickness shall be laid matching the level of the adjacent drive surface.
3. n restoring concrete drives, the base course shall be wetted prior to pouring new concrete.
4. Concrete used shall be 3,000 PSI high early strength.

C. Trenches cut through curbs and sidewalks shall be restored in such a manner as to conform in size, line, grade and materials with that adjoining.

1. In restoring curbs and sidewalks, entire slabs or squares shall be removed and replaced.
2. The subsoil and foundation material shall be well compacted.
3. The sub-base shall be thoroughly rolled or tamped and shall be wet just before the concrete is placed, but shall show no pools of water.

D. Should settlements, cracks, or other indications of failure appear in adjoining pavements, drives, curbs, or sidewalks, the adjoining surfaces shall be removed to the extent necessary to secure firm, undisturbed bearing and shall be re-laid in a satisfactory manner.

E. Trenches cut in non-paved areas shall be thoroughly compacted to a level 4 inches below ground surface.

1. All easements shall be adequately re-grassed to prevent soil erosion.
2. Natural topsoil at least 4 inches thick and of a good condition and tillable structure shall be placed atop the compacted trench backfill.
    a. Topsoil shall be free of large stones, plant stumps, large roots, objectionable litter, or other substances potentially harmful to plant growth.
3. Grass seed shall be of a properly proportioned mixture approved for use in Zone Two, as detailed in the Georgia Department of Transportation Standard Specifications.
4. Whenever possible, replace existing grassed areas with grass of similar characteristics and appearance, meeting at a minimum, the specification requirements included herein.
5. All seeded areas shall be uniformly mulched immediately after seeding and within 10 days of construction work completion.
6. Sediment control measures must remain in place and be maintained until a comprehensive vegetative cover is established.

3.19 TESTING AND INSPECTION

A. The Owner may direct tests to be made to determine the density of the compacted material. Cost of the testing laboratory, fieldwork, and analysis shall be paid for by the Contractor.

B. When directed by the Owner, the Contractor shall arrange to have compaction tests conducted by an independent testing firm.

C. The soils testing laboratory is responsible for the following:

1. Compaction tests in accordance with Article 1.02 of this Section.
2. Field density tests for each two feet of lift, one test for each 1,000 feet of pipe installed or more frequently if ordered by the Construction Manager.
3. Inspecting and testing stripped site, subgrades and proposed fill materials.

D. The Contractor's duties relative to testing include:

1. Notifying laboratory of conditions requiring testing.
2. Coordinating with laboratory for field testing.
3. Paying costs for additional testing performed beyond the scope of that required and for re-testing where initial tests reveal non-conformance with specified requirements.
4. Providing excavation as necessary for laboratory personnel to conduct tests.

E. Inspection

1. Earthwork operations, acceptability of excavated materials for bedding or backfill, and placing and compaction of bedding and backfill is subject to inspection by the Construction Manager.

3.20 DISPOSAL OF MATERIAL

A. The Contractor shall be required to remove from the site of the work all earth in excess of that required to backfill the excavation or to create necessary fill.

B. This shall be performed immediately after the backfill is completed to the satisfaction of the Owner.

C. All material removed shall become the property of the Contractor and he shall make his own arrangements for its disposition.

D. All surplus material, shot rock, organics, clearing debris, stumps, and other such material deemed unfit for use as backfill, shall be disposed of by the Contractor, and shall be performed in such manner so as to give a minimum of inconvenience to the public.

E. Comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROL

PART 1 – GENERAL

1.01 SCOPE

A. The Work specified in this Section consists of providing and maintaining temporary and permanent erosion and sedimentation controls as shown on the Drawings. This Section also specifies the subsequent removal of temporary erosion and sedimentation controls.

B. Temporary and permanent erosion and sedimentation controls include grassing and mulching of disturbed areas and structural barriers at those locations which will ensure that erosion during construction will be maintained within acceptable limits.

C. Acceptable limits are as established by the Georgia Erosion and Sedimentation Control Act of 1975, as amended, Section 402 of the Federal Clean Water Act, and applicable codes, ordinances, rules, regulations, and laws of local, state, and municipal authorities having jurisdiction.

D. Land disturbance activity shall not commence until the Land Disturbance Permit has been issued.

1.02 SUBMITTALS

A. Submit product data in accordance with the requirements of Section 01 33 23 of these Specifications.

1.03 QUALITY ASSURANCE

A. The temporary and permanent erosion and sedimentation control measures shown on the Drawings are minimum suggested requirements. Any additional erosion and sedimentation control measures required by the Contractor's means, methods, techniques, and sequence of operation shall be installed by the Contractor at no additional cost to the Owner.

B. Perform all work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated in these Specifications. Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.

C. Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the Georgia Erosion and Sedimentation Control Act of 1975 as amended (OCGA §12-7-1, et. seq.), local ordinances, other permits, local enforcing agency guidelines, and these Specifications.

D. BASIC PRINCIPLES:

1. Coordinate the land disturbance activities to fit the topography, soil types, and conditions.
2. Minimize the disturbed area and the duration of exposure to erosive elements.
3. Provide temporary or permanent stabilization to disturbed areas immediately after rough grading is complete.
4. Safely convey run-off from the site to a stable outlet to prevent flooding and damage to downstream facilities resulting from increased runoff from the site.
5. Retain sediment on-site that was generated on-site.
6. Minimize encroachment upon watercourses.

E. IMPLEMENTATION:

1. The Contractor is solely responsible for the control of erosion within the Project site and the prevention of sedimentation from leaving the Project site or entering waterways.
2. The Contractor shall install temporary and permanent erosion and sedimentation controls which will ensure that runoff from the disturbed area of the Project site shall pass through a filter system before exiting the Project site.
3. The Contractor shall provide temporary and permanent erosion and sedimentation control measures to prevent silt and sediment from entering the waterways and designated wetland areas. The Contractor shall maintain an undisturbed vegetative buffer a minimum of 25 feet from the top of the bank.
4. The Contractor shall limit land disturbance activity to those areas shown on the Drawings.
5. The Contractor shall maintain erosion and sedimentation control measures within disturbed areas on the entire site until the final acceptance of the Project at no additional cost to the Owner.
6. Maintenance shall include mulching, re-seeding, clean-out of sediment barriers and sediment ponds, replacement of washed-out or undermined rip rap and erosion control materials, to the satisfaction of the Owner and Construction Manager.
7. All fines imposed for improper erosion and sedimentation control shall be paid by the Contractor.

PART 2 – PRODUCTS

2.01 SEDIMENT BARRIER

A. SILT FENCE:

1. Type NS silt fence shall meet the requirements of Section 171 of the Georgia Department of Transportation Standard Specifications, latest edition.
2. Type S Silt Fence is a combination of Type NS silt Fence with woven wire reinforcement. Type NS Silt Fence reinforcement shall meet the requirements of Section 171 of Georgia D.O.T. Specifications, latest edition.
3. Silt fence fabric shall be an approved product on the Georgia DOT Qualified Product List No. 36, latest edition.

B. Hay Bales: Hay bales shall be clean, seed-free cereal hay, rectangular in shape, and contain five cubic feet or more of material. Hay bales shall be bound with wire or nylon to securely contain the material.

1. Pine straw bales may be used in lieu of hay bales.
2. Bales shall be placed in a single row, lengthwise, on the contour and embedded in the soil to a depth of four (4) inches.
3. Bales must be securely anchored in place by stake or bars driven through the bales.

C. Concrete Blocks: Concrete blocks shall be hollow, non-load-bearing type.

2.02 CONSTRUCTION EXIT STONE

A. Use sound, tough, durable stone resistant to the action of air and water. Slabby or shaley pieces will not be acceptable.

B. Aggregate size shall be in accordance with the National Stone Association Size R-2 (1.5 to 3.5-inch stone) or Type 3 rip rap stone conforming to Section 805.01 of the Georgia Department of Transportation Standard Specifications.

2.03 RIP RAP

A. Stone Rip Rap: Use sound, tough, durable stones resistant to the action of air and unless noted otherwise, stone rip rap shall be Type 1.

1. Type 1 Rip Rap: Rip rap size and gradation shall conform to Section 805.01 of the Georgia Department of Transportation Standard Specification for Type 1 Stone Dumped Rip Rap.
2. Type 3 Rip Rap: Rip rap size and gradation shall conform to Section 805.01 of the Georgia Department of Transportation Standard Specifications for Type 3 Stone Dumped Rip Rap.

B. Sand Cement Bag Rip Rap: Sand cement bag rip rap shall conform to the Georgia Department of Transportation Standard Specifications, Section 603.

2.04 GABIONS

A. Gabions shall be constructed of heavy galvanized steel wire mesh with a zinc coating of triple hexagon weave. The mesh wire diameter for the galvanized gabions shall be 2.2 mm (0.0866") + 2 1/2%; the mesh edge wire shall be not less than 2.7 mm – 2 1/2%. The lacing wire for binding the netting units together shall be 2.2 mm (0.0866") + 2 1/2%.

B. Geotextiles when used behind gabion structures shall be in accordance with AASHTO M288-96 Section 7.5, “Permanent Erosion Control Requirements.”

2.05 PLASTIC FILTER FABRIC

A. Plastic filter fabric shall conform to the Georgia Department of Transportation Standard Specifications, Section 881, for filter fabrics.

B. Plastic filter fabric shall be an approved product on the Georgia Department of Transportation Qualified Product List No. 28, latest edition.

C. Seams - Fabric may be sewn together with thread of a material having the same chemical requirements as the material forming the fabric or shall be bonded by cementing or by heat. The strength of the seams shall be equal to that of the unaged fabric. Fabrics to be used under riprap are allowed to be bonded or sewn together forming sections not less than 6 feet wide.

2.06 GRASSING

A. Grassing materials shall meet the requirements of the Georgia Department of Transportation Standard Specifications, latest edition; as shown in the table:

Material	Section No.
Topsoil	893.01
Seed and Sod	890
Fertilizer	891.01
Agricultural Lime	882.02
Mulch	893.02
Inoculants	893.04

B. Seed species shall be provided as shown on the Drawings.

C. Mulch Binder: Mulch on slopes exceeding 3 (horizontal) to 1 (vertical) shall be held in place by the use of a mulch binder, as approved by the Construction Manager. The mulch binder shall be non-toxic to plant and animal life and shall be approved by the Construction Manager.

D. Water: Water shall be free of excess and harmful chemicals, organisms, and substances which may be harmful to plant growth or obnoxious to traffic. Salt or brackish water shall not be used. Water shall be furnished by the Contractor.

PART 3 – EXECUTION

3.01 GENERAL

A. The Contractor must utilize Best Management Practices to minimize siltation and erosion consistent with the Manual for Erosion and Sediment Control in Georgia.

B. Temporary and permanent erosion and sedimentation control measures shall prevent erosion and prevent sediment from exiting the site.

1. If, in the opinion of the Owner, Construction Manager, or state inspector, the Contractor's temporary erosion and sedimentation control measures are inadequate, the Contractor shall provide additional maintenance for existing measures or additional devices to control erosion and sedimentation on the site at no additional cost to the Owner.

C. All erosion and sedimentation control devices and structures shall be inspected by the Contractor at least once a week and immediately after each rainfall occurrence. Any device or structure found to be damaged shall be repaired or replaced by the end of the day.

D. All erosion and sedimentation control measures and devices shall be constructed and maintained as indicated on the Drawings or specified herein until adequate permanent disturbed area stabilization has been provided and accepted by the Construction Manager.

E. Once adequate permanent stabilization has been provided and accepted by the Construction Manager, all temporary erosion and sedimentation control structures and devices shall be removed.

3.02 SEDIMENT CONTROL

A. CONSTRUCTION EXIT:

1. Construction exit(s) shall be placed as shown on the Drawings and as directed by the Construction Manager.

a. A construction exit shall be located at any point traffic will be leaving a disturbed area to a public right-of-way, street, alley, sidewalk, or parking area.

b. The construction exit shall consist of a minimum of six (6) inch thick pad of aggregate as specified above and of the necessary length to accomplish the task for which it is intended.

2. Placement of Construction Exit Material: The ground surface upon which the construction exit material is to be placed shall be prepared to a smooth condition free from obstructions, depressions or debris.

   a. Filter fabrics shall be required to keep the aggregate stone from becoming contaminated with subgrade soils and must be placed the full length and width of the entrance.

   b. The plastic filter fabric shall be placed to provide a minimum number of overlaps and a minimum width of one foot of overlap at each joint.

   c. The stone shall be placed with its top elevation conforming to the surrounding ground elevations. The stone shall be dropped from no more than a three feet height during construction.

3. Construction Exit Maintenance: The Contractor shall regularly maintain the exit with the top dressing of stone to prevent tracking or flow of soil onto public rights-of-way and paved surfaces as directed by the Construction Manager.

4. Construction Exit Removal: Construction exit(s) shall be removed and properly disposed of when the disturbed area has been properly stabilized, the tracking or flow of soil onto public rights-of-way or paved surfaces has ceased and as directed by the Construction Manager.

B. SEDIMENT BARRIERS:

1. Sediment barriers shall include, but are not necessarily limited to, silt fences, hay bales, and any device which prevents sediment from exiting the disturbed area.

2. Silt fences and hay bales shall not be used in any flowing stream, creek, or river.

3. Sediment barriers shall be installed as shown on the Drawings and as directed by the Owner or Construction Manager.

4. Sediment barriers shall be maintained to ensure the depth of impounded sediment is no more than one-half of the original height of the barrier or as directed by the Construction Manager.

5. Torn, damaged, destroyed, or washed-out barriers shall be repaired, reinforced, or replaced with new material and installed as shown on the Drawings and as directed by the Owner or Construction Manager.

6. Accumulated sediment shall be removed from the barrier and the barrier replaced and stabilized on-site as directed by the Owner or Construction Manager.

7. Sediment barrier shall be removed once the disturbed area has been stabilized with a permanent vegetative cover and the sediment barrier is no longer required as directed by the Construction Manager.

8. All non-biodegradable parts of the barrier shall be disposed of properly.

9. The disturbed area created by barrier removal shall be permanently stabilized.

C. Sediment Boxes: All inlet grates shall be covered with sediment boxes during grading operations and shall remain so covered until all open areas are permanently stabilized against erosion.

D. Where construction dewatering pumps discharge, the water must be filtered to minimize stream siltation. As a minimum, filter fabrics or silting basins are required.

3.03 EROSION CONTROL

A. RIP RAP

1. Rip rap shall be placed as shown on the Drawings and as directed by the Construction Manager.
   a. Rip rap shall be placed at all points where natural vegetation is disturbed on the banks of active streams.
   b. Compact backfill and place rip rap to prevent subsequent settlement and erosion.
   c. This requirement applies equally to construction alongside a stream as well as crossing a stream or drainage ditch.
2. When trenching across a stream or drainage ditch, place rip rap over the entire disturbed area upstream and downstream of the trench excavation.
   a. Place rip rap across creek bottom, across creek banks, and extend rip rap placement five feet beyond the top of each creek bank.
3. Preparation of Foundations: The ground surface upon which the rip rap is to be placed shall be brought to the correct lines and grades before placement is commenced.
   a. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers.
   b. Unless at creek banks or otherwise shown or specified, rip rap shall begin in a toe ditch constructed in original ground around the toe of the fill or the cut slope.
   c. The toe ditch shall be two feet deep in original ground, and the side next to the fill or cut shall have that same slope. After the rip rap is placed, the toe ditch shall be backfilled and the excess dirt spread neatly on the site.
4. Placement of Plastic Filter Fabric:
   a. Plastic filter fabric shall be placed under all rip rap unless shown or specified otherwise.
   b. Filter fabric shall not be placed under rip rap on stream or drainage ditch crossings.

c. The surface to receive filter fabric shall be prepared to a smooth condition free from obstructions, depressions, and debris.

d. The filter fabric shall be installed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps.

e. The fabric shall be placed to provide a minimum width of one foot of overlap at each joint. The fabric shall be placed so that the upstream strip overlaps the downstream strip.

f. The fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within 3-inches of the centerline of the overlap.

g. The fabric shall be placed loosely to avoid stretching and tearing during placement of the stone.

h. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals, or other contaminants.

i. Contaminated fabric or fabric damaged during installation or during placement of rip rap shall be removed and replaced with uncontaminated and undamaged fabric at no additional cost to the Owner.

5. Placement of Rip Rap: Rip rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric.

a. Rip rap shall be placed with its top elevation conforming to the finished grade or the natural existing slope of the stream bank and stream bottom.

b. The stone shall be dropped from no more than a three foot height during construction.

c. Stone rip rap shall be placed to provide a uniform surface to the thickness shown on the Drawings.

d. The thickness tolerance for the course shall be –3 inches and +6 inches.

B. Grassing:

1. Temporary Stabilization: Temporary stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site.

a. Temporary stabilization shall be provided to any area that will not receive permanent stabilization within the next 14 calendar days.

b. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

2. Permanent Stabilization:

a. Permanent stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion

on the site. Permanent stabilization shall be provided to all areas of land disturbance within seven calendar days of the completion of land disturbance for any area greater than 0.25 acre.

b. Where permanent stabilization cannot be immediately established because of an inappropriate season, the Contractor shall provide temporary stabilization.

c. The Contractor shall return to the site at the appropriate season to provide permanent stabilization in areas that received only temporary stabilization.

3. Grassing shall meet the requirements of Section 700 of the Georgia Department of Transportation Standard Specifications, latest edition, unless specified otherwise.

4. Seed rate, fertilization and other requirements shall be provided as shown on the Drawings.

3.04 CLEAN-UP

A. Dispose of all excess erosion and sedimentation control materials in a manner satisfactory to the Owner and Construction Manager.

B. Final clean-up shall be performed in accordance with the requirements of these Specifications and to the satisfaction of the Owner and Construction Manager.

END OF SECTION

SECTION 32 12 16

REMOVING AND REPLACING PAVEMENT

PART 1 – GENERAL

1.01 SUMMARY

A. The work to be performed under this Section shall consist of removing and replacing existing pavement, sidewalks and curbs in paved areas where necessary for construction of utilities and all other water appurtenances and structures.

B. Existing pavement, sidewalks, and curbs shall be replaced to the current Fulton County standards or to match existing, whichever is more stringent.

1.02 SUBMITTALS

A. Certificates: Provide certificates stating that materials supplied comply with Specifications. Certificates shall be signed by the asphalt producer and the Contractor.

B. Traffic paint manufacturer's application instructions and a description and other data relative to the Contractor's application equipment and methods shall be submitted to the Construction Manager for approval.

1.03 CONDITIONS

A. Weather Limitations

1. Apply bituminous prime and tack coats only when the ambient temperature has been at least 55 degrees F for 12 hours immediately prior to application.
2. Do not conduct paving operations when surface is wet or contains excess of moisture which would prevent uniform distribution and required penetration.
3. Construct asphaltic courses only when atmospheric temperature in the shade is above 40 degrees F, when the underlying base is dry and when weather is not rainy.
4. Place base course when air temperature is above 35 degrees F and rising.

B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

PART 2 – PRODUCTS

2.01 MATERIALS AND CONSTRUCTION

A. Graded Aggregate Base Course: Graded aggregate base course shall be of uniform quality throughout and shall meet the requirements of Section 815.01 of the Georgia Department of Transportation Standard Specifications.

B. Black Base: Black base course shall be of uniform quality throughout and shall conform to the requirements of Section 828 of the Georgia Department of Transportation Standard Specifications.

C. Binder Course: The binder course of all paved roadways shall conform to the requirements of Section 400, 12.5 mm Superpave of the Georgia Department of Transportation Standard Specifications.

D. Surface Course: The surface course for all pavement, including prime or tack coat when required by the Construction Manager, shall conform to the requirements of Section 400, 9.5 mm Superpave of the Georgia Department of Transportation Standard Specifications

E. Concrete: Provide concrete and reinforcing for concrete pavement or base courses in accordance with the requirements of the Georgia Department of Transportation Standard Specifications, Section 430. Concrete shall be of the strength classifications shown on the Drawings.

F. Special Surfaces: Where driveways or roadways are disturbed or damaged which are constructed of specialty type surfaces, such as brick or stone, these driveways and roadways shall be restored utilizing similar, if not original, materials. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

2.02 TYPES OF PAVEMENTS

A. General:

1. All existing pavement removed, destroyed or damaged by construction shall be replaced with the same type and thickness of pavement as that existing prior to construction, unless otherwise directed by the Construction Manager.

2. Materials, equipment and construction methods used for paving work shall conform to the Georgia Department of Transportation specifications applicable to the particular type required for replacement, repair or new pavements.

B. Aggregate Base:

1. Aggregate base shall be constructed in accordance with the requirements of Section 310 of the Georgia Department of Transportation Standard Specifications.
2. The maximum thickness to be laid in a single course shall be 6-inches compacted. If the design thickness of the base is more than 6-inches, it shall be constructed in two or more courses of approximate equal thickness.
3. After the material placed has been shaped to line, grade and cross-section, it shall be rolled until the course has been uniformly compacted to at least 100 percent of the maximum dry density when Group 2 aggregate is used, or to at least 98 percent of maximum dry density when Group 1 aggregate is used.

C. Concrete Pavement:

1. Concrete pavement or base courses shall be replaced with concrete.
2. The surface finish of the replaced concrete pavement shall conform to that of the existing pavement.
3. The surface of the replaced concrete base course shall be left rough.
4. The slab depth shall be equivalent to the existing concrete pavement or base course, but in no case less than 6-inches thick.
5. Transverse and longitudinal joints removed from concrete pavement shall be replaced at the same locations and to the same types and dimensions as those removed.
6. Concrete pavements or concrete base courses shall be reinforced.

D. Asphaltic Concrete Base, Binder and Surface Course:

1. Asphaltic concrete base, binder and surface course construction shall conform to Georgia Department of Transportation Standard Specifications, Section 400.
2. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared, is intact, firm, properly cured, dry and the tack coat has been applied.
3. Apply and compact the base in maximum layer thickness by asphalt spreader equipment of design and operation approved by the Construction Manager.
4. After compaction, the black base shall be smooth and true to established profiles and sections.
5. Apply and compact binder and the surface course in a manner approved by the Construction Manager.

6. Immediately correct any high, low or defective areas by cutting out the course, replacing with fresh hot mix, and immediately compacting to conform and thoroughly bond to the surrounding area.

E. Surface Treatment Pavement:

1. Bituminous penetration surface treatment pavement shall be replaced with a minimum thickness of 1-inch conforming to Section 424, Georgia Department of Transportation Standard Specifications.

F. Gravel Surfaces:

1. Existing gravel road, drive and parking area replacement shall meet the requirements of graded aggregate base course.

2. This surfacing may be authorized by the Construction Manager as a temporary surface for paved streets until replacement of hard surfaced pavement is authorized.

G. Temporary Measures:

1. During the time period between pavement removal and complete replacement of permanent pavement, maintain highways, streets and roadways by the use of steel running plates anchored to prevent movement.

2. The backfill above the pipe shall be compacted, as specified, up to the existing pavement surface to provide support for the steel running plates. All pavement shall be replaced within seven calendar days of its removal.

PART 3 – EXECUTION

3.01 LOCATIONS FOR PAVEMENT REPLACEMENT

A. Pavement shall be removed and replaced with similar type and thickness as the original pavement, for the entire length of pipe laying and up to required trench width as per details shown on drawings.

3.02 REMOVING PAVEMENT

A. General: Remove existing pavement as necessary for installing the pipe line and appurtenances.

B. Marking: Before removing any pavement, mark the pavement neatly paralleling pipe lines and existing street lines. Space the marks the width of the trench.

C. Breaking: Break asphalt pavement along the marks using pavement shearing equipment, jack hammers or other suitable tools. Break concrete pavement along the marks by scoring with a rotary saw and breaking below the score by the use of jack hammers or other suitable tools.

D. Machine Pulling: Do not pull pavement with machines until the pavement is completely broken and separated from pavement to remain.

E. Damage to Adjacent Pavement: Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.

F. Sidewalk: Remove and replace any sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.

G. Curbs: Tunnel under or remove and replace any curb disturbed by construction to the nearest undisturbed joint.

H. Cutting: Before removing any existing pavement, saw cut the pavement in full thickness.

3.03 REPLACING PAVEMENT

A. Preparation of Subgrade: Upon completion of backfilling and compaction of the backfill, arrange to have the compaction tested by an independent testing laboratory approved by the Construction Manager. After compaction testing has been satisfactorily completed, replace all pavements, sidewalks and curbs removed.

1. The existing street pavement or surface shall be removed along the lines of the work for the allowable width specified for the trench or structure.

2. After the installation of the pipelines and after the backfill has been compacted suitably, the additional width of pavement to be removed, as shown on the Drawings, shall be done immediately prior to replacing the pavement.

3. Trench backfill shall be compacted for the full depth of the trench as specified in Section 31 23 00 of these Specifications.

4. Temporary trench backfill along streets and driveways shall include 6-inches of crushed stone or cherty clay as a temporary surfacing of the trenches.

   a. This temporary surface shall be maintained carefully at grade and dust-free by the Contractor until the backfill of the trench has thoroughly compacted in the opinion of the Construction Manager and permission is granted to replace the street pavement.

5. When temporary crushed stone or chert surface is considered by the Construction Manager to be sufficient surface for gravel pavement, the surface shall be graded smooth and to an elevation that will make the final permanent surfacing level with the adjacent surfacing that was undisturbed.

B. Pavement Replacement

1. Prior to replacing pavement, make a final cut in concrete pavement 12-inches back from the edge of the damaged pavement with a concrete saw.
2. Remove asphalt pavement 12-inches back from the edge of the damaged pavement using pavement shearing equipment, jack hammers or other suitable tools.
    a. Pavement cuts shall be parallel or perpendicular to the road centerline as much as practical.
    b. On parallel installations the final cut shall be long and straight and consistent.
3. Replace all street and roadway pavement as shown on the Drawings. Replace driveways, sidewalks and curbs with the same material, to nearest existing undisturbed construction joint and to the same dimensions as those existing.
4. If the temporary crushed stone or chert surface is to be replaced, the top 6-inches shall be removed and the crushed stone surfacing for unpaved streets or the base for the bituminous surface shall be placed.
5. Following this preparation, the chert or crushed stone base shall be primed with a suitable bituminous material and surfaced with the proper type of bituminous surface treatment.
6. Where the paved surface is to be replaced with asphaltic concrete pavement, concrete pavement or with a concrete base and a surface course, the temporary chert or crushed stone surface and any necessary backfill material, additional existing paving and new excavation shall be removed to the depth and width shown on the Drawings.
    a. All edges of the existing pavement shall be cut to a straight, vertical edge.
    b. Care shall be used to get a smooth joint between the old and new pavement and to produce an even surface on the completed street.
    c. Concrete base slabs and crushed stone bases, if required, shall be placed and allowed to cure for three days before bituminous concrete surface courses are applied.
    d. Expansion joints, where applicable, shall be replaced in a manner equal to the original joint.
7. Where driveways or roadways, constructed of specialty type surfaces, such as brick or stone, are disturbed or damaged, these driveways and roadways shall be restored utilizing similar materials.
    a. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition.

b. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

C. Pavement Resurfacing:

1. Certain areas to be resurfaced are specified or noted on the Drawings.

a. After all pipe line installations are complete and existing pavement has been removed and the trench route has been repaired, mill entire area to be resurfaced 1-1/2 inches, then apply tack coat and 1-1/2 inches of 9.5 mm Superpave surface course as specified.

b. Where pavement to be resurfaced has been damaged with potholes, the Contractor shall remove all existing loose pavement material and fill the hole with black base, as specified, to the level of the existing pavement.

2. Resurfacing limits shall be perpendicular to the road centerline.

3. The limits of resurfacing shall be 10 feet beyond the edge of the pavement replacement on the main road being resurfaced, and to the point of tangency of the pavement on the side streets.

D. Pavement Striping:

1. Pavement striping removed or paved over shall be replaced with the same type, dimension and material as original unless directed otherwise by the Construction Manager.

3.04 SIDEWALK AND CURB REPLACEMENT

A. Construction

1. All concrete sidewalks and curbs shall be replaced with concrete.

2. The Contractor shall restore all curbs and combination curbs and gutters which have been removed or disturbed in the progress of the work. Curbing shall be made to conform accurately in size, line, grade, and materials with the adjoining curb.

3. The Contractor shall restore all sidewalks which have been removed or disturbed in the progress of the work.

a. Sidewalks shall be constructed to the same dimensions and materials as the adjoining sections.

b. Where necessary to cut a sidewalk, entire sections shall be removed and replaced unless otherwise directed by the Construction Manager.

4. Preformed joints shall be ½-inch thick, conforming to the latest edition of AASHTO M59 for sidewalks and AASHTO M 123 for curbs.

5. Forms for sidewalks shall be of wood or metal, shall be straight and free from warp, and shall be of sufficient strength, when in place, to hold the concrete true to line and grade without springing or distorting.

6. Forms for curbs shall be metal and of an approved section.
   a. They shall be straight and free from distortions, showing no vertical variation greater than 1/8-inch in 10 feet and no lateral variation greater than ¼-inch in 10 feet from the true plain surface on the vertical face of the form.
   b. Forms shall be of the full depth of the structure and constructed such to permit the inside forms to be securely fastened to the outside forms.
7. Wood forms may be used on sharp turns and for special sections, as approved by the Construction Manager. Where wooden forms are used, they shall be free from warp and shall be the nominal depth of the structure.
8. All mortar and dirt shall be removed from forms and all forms shall be thoroughly oiled or wetted before any concrete is deposited.

B. When a section is removed, the existing sidewalk or curb shall be cut to a neat line, perpendicular to both the centerline and the surface of the concrete slab.

C. Existing concrete shall be cut along the nearest existing construction joints. If such joints do not exist, the cut shall be made at minimum distances shown on the Drawings.

D. Existing concrete sidewalks and curbs that have been cut and removed for construction purposes shall be replaced with the same width and surface as the portion removed.

E. Sidewalks shall have a minimum uniform thickness of 4-inches. The new work shall be neatly jointed to the existing concrete so that the surface of the new work shall form an even, unbroken plane with the existing surfaces.

F. The subgrade shall be formed by excavating to a depth equal to the thickness of the concrete, plus 2-inches.
1. Subgrade shall be of such width as to permit the proper installation and bracing of the forms.
2. Subgrades shall be compacted by hand tamping or rolling. Soft, yielding or unstable material shall be removed and backfilled with satisfactory material.
3. Place 2-inches of porous crushed stone under all sidewalks and curbs and compacted thoroughly, then finish to a smooth, unyielding surface at proper line, grade and cross section.

G. Joint for Curbs
1. Joints shall be constructed as indicated on the Drawings and as specified. Construct joints true to line with their faces perpendicular to the surface of the structure and within ¼-inch of their designated position.

2. Thoroughly spade and compact the concrete at the faces of all joints filling all voids.

3. Install expansion joint materials at the point of curve at all street returns. Install expansion joint material behind the curb at abutment to sidewalks and adjacent structures.

4. Place contraction joints every 10 feet along the length of the curbs and gutters.

   a. Form contraction joints using steel templates or division plates which conform to the cross section of the structure.

   b. Leave the templates in place until the concrete has set sufficiently to hold its shape, but remove them while the forms are still in place.

   c. Contraction joint templates or plates shall not extend below the top of the steel reinforcement or they shall be notched to permit the reinforcement to be continuous through the joint.

   d. Contraction joints shall be a minimum of 1-1/2-inches deep.

H. Expansion joints shall be required to replace any removed expansion joints or in new construction wherever shown on the Drawings. Expansion joints shall be true and even, shall present a satisfactory appearance, and shall extend to within ½-inch of the top of finished concrete surface.

I. Finishing

1. Strike off the surface with a template and finish the surface with a wood float using heavy pressure, after which, contraction joints shall be made and the surface finished with a wood float or steel trowel.

2. Finish the face of the curbs at the top and bottom with an approved finishing tool of the radius indicated on the Drawings.

3. Finish edges with an approved finishing tool having a ¼-inch radius.

4. Provide a final broom finish by lightly combing with a stiff broom after troweling is complete.

5. The finished surface shall not vary more than 1/8-inch in 10 feet from the established grade.

3.05 RESTORING DRIVEWAY PAVEMENTS

A. The Contractor shall repair or replace all driveway sections disturbed by the process of the work.

1. Driveways shall be constructed of the same materials, and to the thickness of the adjoining wearing surface,

2. In restoring driveways, the subsoil and foundation material shall be well compacted so as to prevent any future settlement or cracking of the driveway pavement.

3. Where necessary to cut a concrete driveway, the cuts shall be made with a masonry saw, providing a smooth, straight line completely across the driveway.

4. Partial cut-outs, crooked cuts, or cuts made by any other method other than masonry saw are not permitted. In general, where directed, concrete slab removal shall be made in entire pavement sections to the nearest existing expansion-joint.

B. Driveway and Sidewalk Ramp Openings

1. Provide driveway openings of the widths and at the locations indicated on the Drawings and as directed by the Construction Manager.

2. Provide sidewalk ramp openings as indicated on the Drawings, in conformance with the applicable regulations and as directed by the Construction Manager.

C. Concrete shall be suitably protected from freezing and excessive heat. It shall be kept covered with burlap or other suitable material and kept wet until cured. Provide necessary barricades to protect the work. All damage caused by people, vehicles, animals, rain, the Contractor's operations and the like shall be repaired by the Contractor, at no additional expense to the Owner.

3.06 MAINTENANCE

A. The Contractor shall maintain the surfaces of roadways built and pavements replaced until the acceptance of the Project.

1. Maintenance shall include replacement, scraping, reshaping, wetting and rerolling as necessary to prevent raveling of the road material, the preservation of reasonably smooth surfaces and the repair of damaged or unsatisfactory surfaces, to the satisfaction of the Construction Manager.

2. Maintenance shall include sprinkling as may be necessary to abate dust from the gravel surfaces.

3.07 SUPERVISION AND APPROVAL

A. Pavement restoration shall meet the requirements of the regulatory agency responsible for the pavement. Obtain agency approval of pavement restorations before requesting final payment.

B. Obtain the Construction Manager's approval of restoration of pavement, such as private roads and drives that are not the responsibility of a regulatory agency.

C. Complete pavement restoration as soon as possible after backfilling.

D. Failure of Pavement: Should any pavement restoration or repairs fail or settle during the life of the Contract, including the bonded period, promptly restore or repair defects.

3.08 CLEANING

A. The Contractor shall remove all surplus excavation materials and debris from the street surfaces and rights-of-way and shall restore street, roadway or sidewalk surfacing to its original condition. The right-of-way shall be restored to its original condition.

END OF SECTION

SECTION 32 92 10

TREE REMOVAL AND PROTECTION

PART 1 – GENERAL

1.01 SCOPE

A. The work specified in this Section includes furnishing all labor, equipment and material required to locate, identify, verify condition and remove or protect existing trees as shown on the Drawings and/or as directed by the Construction Manager.

B. The Contractor shall install orange tree protection fencing (barrier) around each tree to be protected, as shown on the Drawings and as ordered by the Construction Manager.

C. No trees or vegetation shall be removed except as specifically exempted or approved by the Construction Manager.

1.02 REFERENCE

A. “Trenching and Tunneling near Trees,” by James R. Fazio. Published by the National Arbor Day Foundation.

B. “Tree Preservation Ordinance and Administrative Guide Lines,” Fulton County, latest edition.

1.03 QUALIFICATIONS

A. Contractor shall have on staff for the project at least one person with a minimum of 5 years’ experience as nurseryman in planting and protecting trees.

1.04 SUBMITTALS

A. Contractor shall walk the site with local City’s Arborist, to understand (in more detail than shown on the Drawings) the scope and requirements of tree protection for this Project.

B. Prepare a Tree Protection Work Plan describing how tree protection will be handled during installation of the water lines. The Work Plan shall include, but is not limited to:

1. Confirmation of identification of specimen trees (shown on the Drawings) and other trees to be protected.
2. Scope of general protection of trees within right-of-ways and along the water line trench alignment.
3. Determination of drip line limits of protected trees and approximate free bore lengths.

4. Scope of general protection of trees outside right-of-ways but in close proximity to work areas.
5. Extent of approved or required tree limb cutting and trimming to make space for work area.
6. Extent of approved or required tree root cutting, if necessary within trench area.
7. Confirmation of the type of protective fencing, other protective measures as required, and installation details.

C. Contractor shall submit five copies of the Tree Protection Work Plan to the Construction Manager for approval. Contractor shall not begin any field activity prior to approval of this Work Plan by the Construction Manager and City Arborist.

PART 2 – PRODUCTS

2.01 PRODUCTS

A. Protective Fencing

1. Orange Safety Fencing: Minimum 4 feet in width and shall be made of high density polyethylene resin, extruded and stretched to provide a highly visible bright orange, non-fading fence.
   a. The fabric shall remain flexible from -60° F to 200° F and shall be inert to most chemicals and acids.
   b. The fabric pattern may vary from diamond to circular with a minimum unit weight of 0.4 lbs. and a maximum opening size of 2 inches.
   c. The fabric shall have minimum tensile yield strength (horizontal) of 2000 psi and ultimate tensile strength of 2680 psi.
2. The fencing material shall be supported by steel pipe tee posts or U posts, that are minimum 5 ½ feet in height and spaced no more than 8 feet on centers. The fabric shall be secured to post by bands or wire ties.

B. Warning Signs: A weather proof warning sign shall be prominently displayed on each tree protection fence at 20-foot intervals. The sign shall be minimum 8.5-inches X 11-inches and clearly state in half inch tall letters: “Warning – Tree Protection Zone”.

C. Silt Fence (Type S): Silt fence shall be installed 2-feet from the outside of the tree protection fence where required or directed by the Construction Manager and City Arborist.

D. Trunk Protection: When directed by the City Arborist, the tree trunk protection shall be provided using either 2x4-inch or 2x6-inch planking or plastic strapping.

E. Tree Dressing: Dressing of any damaged areas shall be accomplished using any approved asphaltic tree wound paint immediately after damage occurs.

PART 3 – EXECUTION

3.01 EXECUTION

A. Protective Fencing:

1. All trees and shrubs in the proximity of the construction site shall be carefully checked for damage prior to initiation of any construction activity.
2. All individual trees, shrubs, and natural areas scheduled for preservation shall be protected during construction with temporary fencing as indicated on the Drawings or directed by the City Arborist.
3. Protective fences shall be installed prior to the start of any site preparation work (clearing, grubbing, or grading), and shall be maintained in functioning condition throughout all phases of the construction project.
4. Protective fence locations in close proximity to intersecting streets or drives shall adhere to the site distance requirements.

B. Protective fences shall be constructed around trees to be protected, at the locations (typically the outer limits of the Critical Root Zone) and with materials indicated on the Drawings to prevent the following:

1. Soil compaction in the root zone area resulting from vehicular traffic or storage of equipment or materials.
2. Root zone disturbances due to grade changes greater than 6-inch cut or fill or trenching not reviewed and authorized by the City Arborist or the Construction Manager.
3. Damage to exposed roots, trunks or limbs by mechanical equipment.
4. Other activities detrimental to trees such as chemical storage, concrete truck cleaning, and fires.

C. Exceptions to the installation of protective fences at the tree drip lines may be permitted in the following cases:

1. Where there is to be an approved grade change, impermeable paving surface, tree well, or other such site development, the fence shall be erected approximately 2 to 4 feet beyond the areas of disturbance.
2. When permeable paving is to be installed within a tree drip line, the fence shall be erected at the outer limits of the permeable paving area prior to any site grading so that this enclosed area is graded separately to minimize root damage.
3. When trees are located close to a proposed building or other construction activity, the fence shall be erected to allow 6 to 10 feet work space between

the fence and the structure and apply organic mulch to a depth of (4) to six (6) inches in the unprotected root zone area;

4. When there are street-side pedestrian walkways, fences shall be constructed in a manner that does not obstruct safe passage;

5. When there are severe space constraints due to tract size or other special requirements, the Contractor shall contact the Arborist or the Engineer to discuss alternatives.

6. When any of the exceptions listed above will result in a fence being located closer than five (5) feet to a tree trunk, the Contractor shall also protect the trunk with strapped-on planking to a height of 8 feet or to the limits of lower branching in addition to the reduced fencing required.

D. Repair of Damage:

1. Tree roots scarred by equipment shall be cut cleanly and covered with topsoil.

2. When tree roots are pruned, a comparable portion of selected branches shall be cut from the tree on the opposite side.

3. Limb pruning shall be made at the branch collar. All limbs greater than 1-inch in diameter shall be precut in accordance with ANSI 300 pruning methods to prevent splitting.

4. All cut limbs shall be treated with an approved tree dressing. Tools shall be disinfected with alcohol or 5 ppm chlorine solution between repairs to trees to prevent the transmission of diseases from one tree to another.

5. All trees damaged during construction shall receive an application of fertilizer within the drip line at the rate of 4 pounds per caliper inch.

E. Cutting and Filling around Trees:

1. When the depth of an excavation or embankment exceeds 6 inches of any tree with a diameter greater than 8 inches, a tree well shall be constructed to protect the tree.

F. Free Bore:

1. Where a pipe is to be installed within critical root zone (CRZ) and inside drip line area, installation of the pipe by free bore method is required to protect trees.

2. The length of free bore shall extend a minimum of five feet beyond drip line on both sides or as recommended length in the table provided on the Drawings, whichever is greater. The depth of free bore shall be such that there is a minimum of 4 feet of cover on top of pipe.

3. The location and procedures shall be approved by the Construction Manager and City Arborist.

G. Paving Around Trees:

1. Where paving within the drip line of any tree greater than a 6 inch diameter is necessary, a permeable pavement and aeration system must be installed except for street construction.

H. Tree Removal:

1. Trees which directly interfere with construction may only be removed if approval of the Construction Project Manager and City Arborist has been obtained.
2. When a tree or shrub is scheduled for removal, it shall be cut to a depth of 12 inches below the surrounding ground line.
3. After removal, soil shall be placed in the hole to a depth matching the existing grade.
4. The tree shall be cut into sections that can be managed, removed from the site and disposed of.
5. All work shall be conducted in such a manner as to protect all facilities, improvements and vegetation in the work area. All damage resulting from tree removal or pruning shall be repaired at the Contractor's own expense.

I. Final cleanup:

1. All temporary tree and shrub preservation and protection measures shall be removed when the construction has been completed.

J. Roots larger than 2-inch diameter shall not be cut without written permission from the City Arborist.

END OF SECTION

SECTION 32 92 19

SEEDING

PART 1 – GENERAL

1.01 SCOPE

A. The work covered by this Section consists of furnishing all labor, equipment and material required to place topsoil, seed, commercial fertilizer, agricultural limestone and mulch material, including seedbed preparation, harrowing, compacting and other placement operations on graded earthen areas as described herein and/or shown on the Drawings.

B. In general, seeding operations shall be conducted on all newly graded earthen areas not covered by structures, pavement or sidewalks; all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces.

C. Areas disturbed by borrow activities shall also be seeded according to these Specifications.

D. The work shall include temporary seeding operations to stabilize earthen surfaces during construction or inclement weather and to minimize stream siltation and erosion.

E. Temporary seeding shall be performed at the times and locations as directed by the Construction Manager.

F. All work shall in accordance with the Manual for Erosion and Sediment Control in Georgia, latest edition.

1.02 QUALITY ASSURANCE

A. Prior to seeding operations, the Contractor shall furnish to the Construction Manager labels or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished.

B. Acceptance of the seed test reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this Section.

C. Prior to topsoil operations, the Contractor shall obtain representative samples and furnish soil test certificates including textural, pH, and organic analysis from the State University Agricultural Extension Services or other certified testing laboratory.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. All materials shall conform to the requirements and standards of this Section.

B. Wood-cellulose fiber mulch shall be manufactured by Weyerhaeuser Company or Conway Corporation.

2.02 TOPSOIL

A. Utilizing designated stockpiles or borrow areas on site, the Contractor shall place a minimum of 4-inches of topsoil over all graded earthen areas and over any other areas to be seeded.

1. Sources of topsoil shall be approved by the Construction Manager prior to disturbance.
2. Importing topsoil from offsite sources shall be at the discretion of the Construction Manager and shall be justification for additional compensation to the Contractor.
3. A change order properly authorized by the Owner shall be agreed upon prior to importing offsite topsoil. No additional compensation will be allowed for spreading of topsoil.

B. Topsoil shall be a friable loam containing a large amount of humus and shall be original surface soil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than 1/2-inch in diameter, lime, cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips or other undesirable material harmful or unnecessary to plant growth.

C. Topsoil shall be reasonably free from perennial weeds and shall not contain objectionable plant material, toxic amounts of either acid or alkaline elements or vegetable debris undesirable or harmful to plant life.

D. Topsoil shall be natural topsoil without admixture of subsoil material, and shall be classifiable as loam, silt loam, clay loam, sandy loam or a combination thereof. The pH shall range from 5.5 to 7.0.

E. Topsoil shall contain not less than five percent nor more than 20 percent, by weight, of organic matter as determined by loss on ignition of oven-dried samples to 65 degrees C.

2.03 SEED

A. Seed shall be delivered in new bags or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.

B. All seeds shall be from the last crop available at time of purchase and shall not be moldy, wet or otherwise damaged in transit or storage.

C. Seed shall bear the growers analysis testing to 98 percent for purity and 90 percent for germination. At the discretion of the Construction Manager, samples of seed may be taken for verification against the grower's analysis.

D. Species, rate of seeding, fertilization and other requirements are shown on Table 1.

2.04 FERTILIZER AND LIMING MATERIALS

A. Fertilizer and liming materials shall comply with applicable state, local and federal laws concerned with their production and use.

B. Commercial fertilizer shall be a ready mixed material equivalent to the grade or grades specified in Table 1. Container bags shall have the name and address of the manufacturer, the brand name, net weight and chemical composition.

C. Agricultural limestone shall be a pulverized dolomitic limestone having a calcium carbonate content of not less than 85 percent by weight. Agricultural limestone shall be crushed so that at least 85 percent of the material will pass a No. 10 mesh screen and 50 percent will pass a No. 40 mesh screen.

2.05 MULCH MATERIAL

A. All mulch materials shall be air dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.

B. Mulch shall be composed of wood cellulose fiber, straw or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch blowing equipment.

C. Straw mulch shall be partially decomposed stalks of wheat, rye, oats or other approved grain crops.

D. Stalks shall be the partially decomposed, shredded residue of corn, cane, sorghum or other approved standing field crops.

2.06 MULCH BINDER

A. Mulch on slopes exceeding 3 to 1 ratio shall be held in place by the use of an approved mulch binder. The mulch binder shall be non-toxic to plant life and shall be acceptable to the Construction Manager.

B. Emulsified asphalt binder shall be Grade SS-1, ASTM D 977. Cutback asphalt binder shall be Grade RC 70 or RC 250.

2.07 LEGUMES

A. All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen-fixing bacteria that is adapted to the particular seed involved.

2.08 WATER

A. Water shall be clean, clear water free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the Contractor.

PART 3 – EXECUTION

3.01 SECURING AND PLACING TOPSOIL

A. Topsoil shall be secured from areas from which topsoil has not been previously removed, either by erosion or mechanical methods. Topsoil shall not be removed to a depth in excess of the depth approved by the Construction Manager.

B. The area or areas from which topsoil is secured shall possess such uniformity of soil depth, color, texture, drainage and other characteristics as to offer assurance that, when removed the product will be homogeneous in nature and will conform to the requirements of these Specifications.

C. All areas from which topsoil is to be secured, shall be cleaned of all sticks, boards, stones, cement, ashes, cinders, slag, concrete, bitumen or its residue and any other refuse which will hinder or prevent growth.

D. In securing topsoil from a designated pit, or elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such material shall be removed from the topsoil or if required by the Construction Manager, the pit shall be abandoned.

E. Before placing or depositing topsoil upon any areas, all improvement within the area shall be completed, unless otherwise approved by the Construction Manager.

F. The areas in which topsoil is to be placed or incorporated shall be prepared before securing topsoil for use.

3.02 SEEDBED PREPARATION

A. Before fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line from unsightly variation, bumps, ridges and depressions and all detrimental material, roots and stones larger than 3-inches in any dimension shall be removed from the soil.

B. No earlier than 24 hours before the seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than 4-inches with a weighted disc, tiller, pulvimixer or other equipment, until the surface is smooth and in a condition acceptable to the Construction Manager.

C. If the prepared surface becomes eroded as a result of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be placed in a condition suitable for seeding.

D. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition, as determined by the Construction Manager.

3.03 FERTILIZATION AND LIMING

A. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded so as to achieve the application rates shown on Table 1.

B. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of 1-inch.

C. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed shall not remain in water containing fertilizer for more than 30 minutes when a hydraulic seeder is used.

D. Agricultural limestone shall be thoroughly mixed into the soil according to the rates shown on Drawings.

1. The specified rate of application of limestone may be reduced by the Construction Manager if pH tests indicate this to be desirable.
2. It is the responsibility of the Contractor to obtain such tests and submit the results to the Construction Manager for adjustment in rates.

E. It is the responsibility of the Contractor to make one application of a maintenance fertilizer according to the recommendations listed in Table 1.

3.04 SEEDING

A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition.

B. Seeding shall be performed during the dates shown in Table 1 unless otherwise approved by the Construction Manager. Seed mixtures may be sown together provided they are kept in a thoroughly mixed condition during the seeding operation.

C. Seed shall be uniformly sown by any approved mechanical method suitable for the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder or approved mechanical power drawn seed drills.

D. Hydro-seeding and hydro-mulching may be used on steep embankments, provided full coverage is obtained.

E. Care shall be taken to adjust the seeder for seeding at the proper rate before seeding operations are started and to maintain their adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.

F. Immediately after sowing, the seeds shall be covered and compacted to a depth of 1/8 to 3/8-inch by a cultipacker or suitable roller.

G. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculant in accordance with the manufacturer's mixing instructions.

3.05 MULCHING

A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding.

B. The mulch shall be applied evenly so as to permit sunlight to penetrate and the air to circulate and at the same time shade the ground, reduce erosion and conserve soil moisture.

1. Approximately 45 percent of the ground shall be visible through the mulch blanket.

C. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:

1. Wood Cellulose Fiber: 1,400 pounds/acre.
2. Straw: 4,000 pounds/acre.
3. Stalks: 4,000 pounds/acre.
4. These rates may be adjusted at the discretion of the Construction Manager at no additional cost to the Owner, depending on the texture and condition of the mulch material and the characteristics of the seeded area.

D. Mulch on slopes greater than 3 to 1 ratio shall be held in place by the use of an approved mulch binder.

1. Binder shall be thoroughly mixed and applied with the mulch.
2. Emulsified asphalt or cutback asphalt shall be applied at the approximate rate of five gallons per 1,000 square feet as required to hold the mulch in place.

E. The Contractor shall cover structures, poles, fences and appurtenances if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.

F. Mulch and binder shall be applied by suitable blowing equipment at closely controlled application rates in a manner acceptable to the Construction Manager.

3.06 WATERING

A. The Contractor shall be responsible for maintaining the proper moisture content of the soil to insure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain an adequate water content in the soil.

B. Watering shall be accomplished by hoses, tank truck or sprinklers in such a way to prevent erosion, excessive runoff and over-watered spots.

3.07 MAINTENANCE

A. Upon completion of seeding operations, the Contractor shall clear the area of all equipment, debris and excess material and the premises shall be left in a neat and orderly condition.

B. The Contractor shall maintain all seeded areas without additional payment until final acceptance of the work by the Owner, and any regrading, refertilizing, reliming, reseeding or remulching shall be done at Contractor's own expense. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is accomplished.

C. Damage resulting from erosion, gulleys, washouts or other causes shall be repaired by filling with topsoil, compacting and repeating the seeding work at Contractor's expense.

TABLE 1

SEEDING REQUIREMENTS

Sowing Season	Species	Rates per 1,000 Square Feet		
		Seed	Fertilizer	Lime
3/15 - 8/14	Common Bermuda (hulled) (Giant Bermuda Seed, including NK-37 is not acceptable) Annual Ryegrass	2lbs. 2 lbs.	35 lbs. 6-12-12	25 lbs.
	Total	4 lbs.		
8/15 - 3/14	Common Bermuda (unhulled) Annual Ryegrass	2lbs. 2 lbs.	45 lbs. 6-12-12	25 lbs.
	Total	4 lbs.		

END OF SECTION

SECTION 32 92 23

SODDING

PART 1 – GENERAL

1.01 SCOPE

A. Sodding shall consist of establishing certain critical areas with sod as designated on the Drawings.

PART 2 – PRODUCTS

2.01 SOD

A. Sod shall consist of a live, dense, well-rooted growth of turf grass species as noted on the Drawings.

B. The sod shall be free from Johnson grass, nut grass and other obnoxious grasses and shall be of suitable character for the purpose intended and for the soil in which it is to be planted.

C. It shall be un-injured at the time of planting.

D. Sod shall be uniform in thickness, having not over 2-inches or less than 1-inch of soil.

E. Sod strips shall have a consistent width of 12 or 18-inches.

2.02 FERTILIZER

A. Fertilizer (10-10-10) used in connection with sodding, shall contain 10 percent nitrogen, 10 percent phosphoric acid and 10 percent potash. The fertilizer shall be furnished in standard containers with the name, weight and guaranteed analysis of the contents clearly marked.

B. The containers shall ensure proper protection in handling and transporting the fertilizer. All commercial fertilizer shall comply with local, state and federal fertilizer laws.

C. Ammonium nitrate shall be a standard commercial product, shall conform to the requirements for other commercial fertilizers as specified above, and shall have a minimum of 32-1/2 percent nitrogen.

2.03 LIME

A. Agricultural limestone shall be dolomitic and contain not less than 85 percent of calcium carbonate and magnesium carbonate combined, and shall be crushed so

that at least 85 percent will pass the No. 10 mesh sieve and 50 percent will pass a No. 40 mesh screen.

2.04 WEATHER LIMITATIONS

A. Sod shall be planted only when the soil is moist and favorable to growth. No planting shall be done between October 1 and April 1 unless weather and soil conditions are considered favorable and permission is granted by the Construction Manager.

PART 3 – EXECUTION

3.01 SODDING

A. The area to be sodded shall be constructed to the lines and grades indicated on the Drawings or as directed by the Construction Manager, and the surface loosened to a depth of not less than 3-inches with a rake or other device.

B. If necessary, it shall be sprinkled until saturated at least 1-inch in depth and kept moist until the sod is place thereon.

C. Immediately before placing the sod, the fertilizer shall be uniformly applied at the rate of 12 pounds of Grade 10-10-10, or equivalent, per 1,000 square feet. Agricultural limestone shall be applied at the rate of 50 pounds per 1,000 square feet.

D. The entire area shall be thoroughly covered with sod. The sod shall be placed on the prepared surface with the edges in close contact and, as far as possible, with staggered joints.

E. The sod shall be maintained moist from time of removal until reset but shall be placed as soon as practicable after removal from place where growing.

F. Immediately after placing it shall be rolled with a light-weight roller or hand tamped to the satisfaction of the Construction Manager.

G. Sod on slopes steeper than 3 to 1 shall be held in place by wooden pins about 1-inch square and 6-inches long, driven through the sod into the soil until they are flush with the top of the sod.

3.02 WATERING AND MAINTENANCE

A. The sod shall be watered as directed by the Construction Manager for a period of two weeks after which ammonium nitrate shall be applied at the rate of three pounds per 1,000 square feet and the sod given a final watering.

B. The Contractor shall not allow any equipment or material to be placed on any planted area and shall erect suitable barricades and guards to prevent Contractor's equipment, labor or the public from traveling on or over any area planted with sod.

C. It shall be the obligation of the Contractor to secure a satisfactory growth of grass before final acceptance of the Project.

END OF SECTION

SECTION 33 05 23

BORE AND JACK CASINGS

PART 1 – GENERAL

1.01. SUMMARY

A. The work covered by this Section includes furnishing all labor, materials and equipment required to bore and jack casings and to properly complete pipeline construction as described herein and/or shown on the Drawings.

B. Work shall include, but not limited to: bore and receiving pits excavation, sheeting, shoring, plating, and safety barriers for the protection of workers, traffic, and the general public.

1. In general, the work shall include carrier pipe, steel pipe casing, excavation, backfill, restoration of site, sheeting, grout, brickwork, earth augers, jacking machine, welder, and other accessories necessary for a complete installation as specified or directed.

C. Supply all materials and perform all work in accordance with applicable American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI) or other recognized standards.

1. Latest revisions of all standards are applicable.
2. If requested by the Construction Manager, submit evidence that manufacturer has consistently produced products of satisfactory quality and performance over a period of at least two years.

1.02. SUBMITTALS

A. Submit shop drawings, product data, and experience in accordance with the requirements of Section 01 33 23 of these Specifications.

B. Material Submittals: The Contractor shall provide shop drawings and other pertinent specifications and product data as follows:

1. Shop drawings for casing pipe showing sizes and connection details.
2. Design mixes for concrete and grout.
3. Casing Spacers.

C. Experience Submittals

1. Boring and jacking casings is deemed to be specialty contractor work.

2. If the Contractor elects to perform the work, the Contractor shall provide evidence as required by the General Conditions.

a. A minimum of five continuous years of experience in steel casing construction is required of the casing installer.

b. Evidence of this experience must be provided with the shop drawings for review by the Construction Manager.

D. The Contractor shall submit for approval, all working drawings and schedules of procedure proposed to be followed in the execution of boring and jacking operations.

1. Schedules shall set forth the sequence of the various operations together with the time proposed to begin and complete the phases of the work.

1.03. STORAGE AND PROTECTION

A. All materials shall be stored and protected in accordance with the manufacturer's recommendations and as approved by the Construction Manager.

PART 2 – PRODUCTS

2.01. CASING PIPE

A. Steel Pipe:

1. Pipe shall be new and unused.

2. The casing shall be made from steel plate having a minimum yield strength of 35,000 psi.

3. The steel plate shall meet the chemical requirements of ASTM A139, Grade B.

4. The wall thickness of the steel casing pipe shall be designed to have sufficient strength to withstand superimposed loads and jacking stresses.

5. The thicknesses of casing shown in Table 1 below are minimum thicknesses.

a. Actual thicknesses shall be determined by the casing installer, based on an evaluation of the required forces to be exerted on the casing when jacking.

b. Any buckling of the casing due to jacking forces shall be repaired at no additional cost to the Owner.

6. The diameters of casing shown in Table 1 below and shown on the Drawings are minimum.

a. Larger casings, with the Construction Manager's approval, may be provided at no additional cost to the Owner, for whatever reasons

the Contractor may decide, whether they be casing size availability, line and grade tolerances, soil conditions, etc.

TABLE 1				
Pipe Diameter, inches	Bell OD Inches	Casing Diameter, inches	Wall Thickness, inches	
			Under Highways	Under Railroads
6	9.19	16	0.250	0.250
8	11.33	18	0.250	0.375
10	13.56	20	0.250	0.375
12	15.74	22	0.375	0.375
14	21.43	28	0.375	0.375
16	23.70	30	0.375	0.406
18	25.82	32	0.375	0.406
20	29.88	36	0.375	0.469
24	34.34	42	0.500	0.469
30	38.30	48	0.500	0.500

2.02. CASING SPACERS

A. Shell

1. Material: Minimum 14 gauge T-304 stainless steel.
2. Surfaces to be treated to reduce chemical reactivity.

B. Risers

1. Material: Minimum 10 gauge T-304 stainless steel.
2. Height shall be such that the pipe does not float within the casing.

C. Fasteners

1. Material: T-304 Stainless steel.

D. Liner

1. Material: PVC.
2. Thickness: 0.09-inch.

3. Hardness: 85-90 durometer.

E. Runners

1. Tensile Strength (ASTM D638): Minimum 3,500 psi.
2. Width: Minimum 2 in.
3. Runners shall be attached to stainless steel risers which shall be properly welded to the shell.
4. The height of the runners shall be such that the pipe does not float within the casing.

F. Casing spacers shall be as manufactured by:

1. Cascade Waterworks Manufacturing Company.
2. Pipeline Seal and Insulator, Inc.
3. Advance Products and Systems, Inc.
4. Approved equal.

2.03. CASING END SEALS

A. The ends of the casing shall be sealed with brick bulkheads using brick and mortar.

2.04. GROUT

A. Grout may be used for filling the void between the casing pipe and the carrier pipe.

B. Cement shall conform to ASTM C 150, Type I or Type II.

C. Grout shall have a minimum compressive strength of 100 psi attained within 24 hours.

2.05. CARRIER PIPE

A. Carrier pipes shall meet requirements as specified in Section 40 05 19 of these Specifications.

B. All pipes installed inside a casing shall be restrained joint pipe.

2.06. SURFACE SETTLEMENT MARKERS

A. Surface settlement markers within pavement areas shall be P.K. nails.

B. Surface settlement markers within non-paved areas shall be wooden hubs.

2.07. EQUIPMENT

A. A cutting head shall be attached to a continuous auger mounted inside the casing pipe.

B. Jacks for forcing the casing pipe through the roadbed shall have a jacking head constructed in such a manner as to apply uniform pressure around the ring of the pipe.

C. The pipe to be jacked shall be set on guides, braced together to properly support the section of the pipe and direct it to the proper line and grade. In general roadbed material shall be excavated just ahead of the pipe.

D. On casing pipe for pipelines over 60 feet in length, the installation equipment shall include a steering head and a grade indicator.

E. The steering head shall be controlled manually from the bore pit.

F. The grade indicator shall consist of a water level attached to the casing which would indicate the elevation of the front end of the casing or some other means for grade indication approved by the Construction Manager.

PART 3 – EXECUTION

3.01. GENERAL

A. The Contractor shall proceed with the work in such a manner as will permit regular transaction of business by the roadway owner and/or property owner without delay or danger of life or property and shall place necessary barricades, warning signs, signal lights, and if necessary, watchmen for the protection of the public.

B. All excavated material will be placed near the top of the working pit and disposed of as required. Use of water or other fluids will be permitted only to the extent necessary for lubrication. Jetting will not be permitted.

C. Contractor shall jack a steel casing pipe as indicated on the approved design, using a special earth auger machine. The casing shall be jacked to the line and grade indicated on the approved design.

D. All jacking/augering operations must be performed in compliance with the rules and regulations of the Fulton County Department of Transportation, Georgia Department of Transportation, or other authorities having jurisdiction.

E. Any sheeting placed for the jacking/auguring operation must be completely removed by the Contractor prior to backfill.

F. When the bore pit excavation and/or jacking/auguring operation occurs along existing rights-of-way, care must be taken to ensure all work is performed within

the right-of-way, or arrangements must be made with the owner of the affected private property to permit any encroachment on the private property.

G. All such arrangements shall be made in writing and a copy provided to the Construction Manager prior to beginning the excavation.

H. The Contractor shall be fully responsible for protecting against surface subsidence, damage or disturbance to adjacent property and facilities from his construction methods.

1. If loose material is encountered and cave-ins occur or are anticipated, all jacking/augering shall be suspended, shoring provided, and all voids filled or pressure grouted.

2. Supplemental measures and alternative methods must receive the Owner's approval before jacking/augering operation re-commences.

3. Any settlement or upheaval of the existing roadway pavements during the boring and jacking operation, and throughout the warranty period for the overall project, shall be repaired/restored by the Contractor immediately upon notification by the Owner of the pavement failure.

I. Interpretation of soil investigation reports and data, investigating the site and determination of the site soil conditions prior to bidding is the sole responsibility of the Contractor.

1. Any subsurface investigation by the Bidder or Contractor must be approved by the appropriate authority having jurisdiction over the site.

2. Rock and/or water, if encountered, shall not entitle the Contractor to additional compensation.

J. Casing construction shall be performed so as not to interfere with, interrupt or endanger roadway surface and activity thereon, and minimize subsidence of the surface, structures, and utilities above and in the vicinity of the casing.

1. Support the ground continuously in a manner that will prevent loss of ground and keep the perimeters and face of the casing, passages and shafts stable.

2. The Contractor shall be responsible for all settlement resulting from casing operations and shall repair and restore damaged property to its original or better condition at no cost to the Owner.

K. Face Protection: The face of the excavation shall be protected from the collapse of the soil into the casing.

L. Casing Design: Design of the bore pit and required bearing to resist jacking forces is the responsibility of the Contractor.

1. The excavation method selected shall be compatible with expected ground conditions.

2. The lengths of the casing shown on the Drawings are the minimum lengths required.

3. The length of the casing may be extended for the convenience of the Contractor, at no additional cost to the Owner.

4. Due to restrictive right-of-way and construction easements, boring and jacking casing lengths less than the nominal 20 foot length may be necessary.

M. Roadway Crossings

1. The Contractor shall be held responsible and accountable for the coordinating and scheduling of all construction work within the roadway right-of-way.

2. Work along or across the roadway department rights-of-way shall be subject to inspection by such roadway department.

3. All installations shall be performed to leave free flows in drainage ditches, pipes, culverts or other surface drainage facilities of the roadway, street or its connections.

4. No excavated material or equipment shall be placed on the pavement or shoulders of the roadway without the express approval of the roadway department.

5. In no instance will the Contractor be permitted to leave equipment (trucks, backhoes, etc.) on the pavement or shoulder overnight.

6. Construction materials to be installed, which are placed on the right-of-way in advance of construction, shall be placed in such a manner as not to interfere with the safe operation of the roadway.

3.02. MAINTAINING TRAFFIC AND PUBLIC SAFETY

A. All working operations of the Contractor, his subcontractors, and/or their agents or employees must be subordinated to the free and unobstructed use of the highway, and structures encountered in the execution of jacking and boring operations.

B. The Contractor shall proceed with the work in such a manner as will permit regular transaction of business by commercial operations adjacent to the project site without delay or danger to persons or property, permit free access to and from private residences, and will allow the safe flow of traffic and pedestrians around the work site.

C. The Contractor shall employ the use of barricades, barriers, warning signs, signals, lights, and if necessary, watchmen, for the protection of the general public.

D. The Contractor, when directed by Construction Manager, shall suspend all operations relating to boring and jacking until necessary safety precautions have been met.

3.03. GROUNDWATER CONTROL

A. The Contractor shall control the groundwater throughout the construction of the casing.

B. Methods of dewatering shall be at the option and responsibility of the Contractor. Maintain close observation to detect settlement or displacement of surface facilities due to dewatering.

1. Should settlement or displacement be detected, notify the Construction Manager immediately and take such action as necessary to maintain safe conditions and prevent damage.

C. When water is encountered, provide and maintain a dewatering system of sufficient capacity to remove water on a 24 hour basis keeping excavations free of water until the backfill operation is in progress.

1. Dewatering shall be performed in such a manner that removal of soil particles is held to a minimum.

2. Dewater into a sediment trap and comply with requirements specified in Section 31 25 00 of these Specifications.

3.04. SAFETY

A. Provide all necessary bracing, bulkheads and shields to ensure complete safety to all traffic, persons and property at all times during the work. Perform the work in such a manner as to not permanently damage the roadbed or interfere with normal traffic over it.

B. Observe all applicable requirements of the regulations of the authorities having jurisdiction over this site. Conduct the operations in such a manner that all work will be performed below the level of the roadbed.

C. Perform all activities in accordance with the Occupational Safety and Health Act of 1970 (PL-596), as amended, applicable regulations of the Federal Government, OSHA 29CFR 1926 and applicable criteria of ANSI A10.16-81, “Safety Requirements for Construction of Tunnel Shafts and Caissons”.

3.05. SURFACE SETTLEMENT MONITORING

A. Provide surface settlement markers, placed as specified and as directed by the Construction Manager.

1. The Contractor shall place settlement markers outside of pavement area, along the centerline of the casing at 20 foot intervals and offset 10 feet each way from the centerline.

2. Markers shall also be placed at each shoulder of the roadway, at each edge of pavement, at the centerline of the pavement and at 10 and 25 feet in each direction from the centerline of the casing.

3. Tie settlement markers to bench marks and indices sufficiently removed as not to be affected by the casing operations.

B. Make observations of surface settlement markers, placed as required herein, at regular time intervals acceptable to the Construction Manager.

1. In the event settlement or heave on any marker exceeds 1-inch, the Contractor shall immediately cease work and using a method approved by the Construction Manager and the authority having jurisdiction over the project site, to take immediate action to restore surface elevations to that existing prior to start of casing operations.

C. Take readings and permanently record surface elevations prior to start of dewatering operations and/or shaft excavation.

1. The following schedule shall be used for obtaining and recording elevation readings:

a. All settlement markers, once a week;

b. All settlement markers within 50 feet of the casing heading, at the beginning of each day; more frequently at the Construction Manager's direction if settlement is identified.

c. Make all elevation measurements to the nearest 0.01 foot.

D. The Contractor shall cooperate fully with jurisdictional personnel. Any settlement shall be corrected by, and at the expense of, the Contractor.

E. Report any settlement and horizontal movement immediately to the Construction Manager and take immediate remedial action.

3.06. BORING AND JACKING

A. Shaft

1. Conduct boring and jacking operations from a shaft excavated at one end of the section to be bored.

a. Where conditions and accessibility are suitable, place the shaft on the downstream end of the bore.

2. The shaft shall be rectangular and excavated to a width and length required for ample working space.

a. If necessary, sheet and shore shaft properly on all sides. Shaft sheeting shall be timber or steel piling of ample strength to safely withstand all structural loadings of whatever nature due to site and soil conditions.

b. Keep preparations dry during all operations. Perform pumping operations as necessary.

3. The bottom of the shaft shall be firm and unyielding to form an adequate foundation upon which to work.

a. In the event the shaft bottom is not stable, excavate to such additional depth as required and place a gravel sub-base or a concrete sub-base if directed by the Construction Manager due to soil conditions.

B. Jacking Rails and Frame

1. Whenever possible, the pipe shall be jacked from the low or downstream end. At each end of the casing pipe, the void between the carrier pipe and casing shall be sealed with brick and mortar.

2. Set jacking rails to proper line and grade within the shaft. Secure rails in place to prevent settlement or movement during operations. The jacking rails shall cradle and hold the casing pipe on true line and grade during the progress of installing the casing.

2. Place backing between the heels of jacking rails and the rear of the shaft. The backing shall be adequate to withstand all jacking forces and loads.

3. The jacking frame shall be of adequate design for the magnitude of the job. Apply thrust to the end of the pipe in such a manner to impart a uniformly balanced load to the pipe barrel without damaging the joint ends of the pipe.

C. Boring and jacking of casing pipes shall be accomplished by the dry auger boring method without jetting, sluicing or wet boring.

D. Auger the hole and jack the casing through the soil simultaneously.

E. Bored installations shall have a bored-hole diameter essentially the same as the outside diameter of the casing pipe to be installed. Any voids which develop during the installation operation shall be filled with pressure grout.

F. Execute boring ahead of the casing pipe with extreme care, commensurate with the rate of casing pipe penetration.

1. Boring may proceed slightly in advance of the penetrating pipe and shall be made in such a manner to prevent any voids in the earth around the outside perimeter of the pipe.

2. Make all investigations and determine if the soil conditions are such as to require the use of a shield.

G. As the casing is installed, check the horizontal and vertical alignment frequently. Make corrections prior to continuing operation.

H. Any casing pipe damaged in jacking operations shall be repaired, if approved by the Construction Manager, or removed and replaced at Contractor's own expense.

I. Lengths of casing pipe, as long as practical, shall be used except as restricted otherwise.

1. Joints between casing pipe sections shall be butt joints with complete joint penetration, single groove welds, for the entire joint circumference, in accordance with AWS recommended procedures.

2. Prior to welding the joints, the Contractor shall ensure that both ends of the casing sections being welded are square.

J. The Contractor shall prepare a contingency plan which will allow the use of a casing lubricant, such as bentonite, in the event excessive frictional forces jeopardize the successful completion of the casing installation.

K. Once the jacking procedure has begun, it shall be continued without stopping until completed, subject to weather and conditions beyond the control of the Contractor.

L. Care shall be taken to ensure that casing pipe installed by boring and jacking method will be at the proper alignment and grade.

M. The Contractor shall maintain and operate pumps and other necessary drainage system equipment to keep work dewatered at all times.

N. Adequate sheeting, shoring and bracing for embankments, operating pits and other appurtenances shall be placed and maintained to ensure that work proceeds safely and expeditiously.

1. Upon completion of the required work, the sheeting, shoring and bracing shall be left in place, cut off or removed, as designated by the Construction Manager.

O. Trench excavation, all classes and type of excavation, the removal of rock, muck, debris, the excavation of all working pits and backfill requirements of Section 31 23 00 are included under this Section.

P. All surplus material shall be removed from the right-of-way and the excavation finished flush with the surrounding ground.

Q. Grout backfill shall be used for unused holes or abandoned pipes.

R. Any replacement of carrier pipe in an existing casing shall be considered a new installation, subject to the applicable requirements of these Specifications.

3.07. FREE BORING

A. Where permitted and directed by the Construction Manager, the Contractor shall use a special earth auger machine to install the pipe by the free bore method.

1. The allowed free bore method will be dry auger boring, without jetting, sluicing, or wet boring.

B. The diameter of the free bore shall not exceed the pipe bell outside diameter or the pipe barrel outside diameter plus 1 inch, whichever is greater.

1. If the annular space between the earthen hole and the carrier pipe exceeds six inches, the Contractor shall fill such space either by pressure grouting or pumping in a flowable fill to eliminate possible settlement.

C. The Contractor shall be responsible for any settlement of the surface (roadway, driveway, or otherwise) caused by the free bore construction activities.

D. Where ordered to use the free bore method to install a segment of pipe, the Contractor may elect to install the pipe by the conventional bore and jack casing method instead.

E. If the Contractor elects to free bore and an acceptable installation does not result for any reason, the Contractor shall install a casing pipe by the bore and jack method at no additional cost to the Owner.

F. At no time shall free bores in excess of forty (40) feet and for pipe larger than 12-inch be permitted.

G. The Contractor may elect to free bore other portions of the project in lieu of open cut installation. However, no additional payment for free bore will be made if the Contractor exercises this option.

3.08. DIRECTIONAL DRILLING

A. Where ordered by the Construction Manager, the Contractor shall install the pipe by directional drilling.

B. The directional drilling method consists of drilling a small diameter pilot hole within the designated tolerances followed by enlargement of the hole to accommodate the ductile iron carrier pipe to be installed.

C. The Contractor shall provide all materials and equipment required, including but not limited to drilling equipment, water pumps, hoses, fittings, storage tanks, filters, hay bales, silt fences, drilling fluids including containment, collection, cleaning and disposal of, fuel and lubricants, bentonite and related mixing equipment, hydrostatic testing equipment and materials, side booms, cranes, backhoes, trucks, and other equipment or materials necessary to load and unload pipe, and to support and smoothly transition the pipe while being pulled into the reamed hole.

D. The Contractor shall submit to the Construction Manager a detailed installation plan including operational sequences, details of the guidance or grade and alignment control system, and a plan and profile of the bore path.

1. The bore path shall ensure that the pipe joints do not deflect more than 50 percent of the manufacturer’s recommended maximum deflection for the ductile iron pipe.

E. The drilling operation shall be conducted in a manner to eliminate the discharge of water, drilling mud, and cuttings to areas not involved in the construction process.

1. The Contractor shall immediately contain and clean-up any inadvertent returns.
2. The Contractor shall also provide equipment and procedures to maximize the recirculation and reuse of drilling mud to minimize waste disposal.
3. Proper disposal of water, drilling fluids, drilling mud, cuttings and muck is the Contractor's responsibility.

F. Ductile iron pipe and fittings, inspection and testing shall be as specified in Section 40 05 19.

3.09. VENTILATION AND AIR QUALITY

A. Provide, operate and maintain for the duration of casing project a ventilation system to meet safety and OSHA requirements.

3.10. ROCK EXCAVATION

A. In the event that rock is encountered during the installation of the casing pipe which, in the opinion of the Construction Manager, cannot be removed through the casing, the Construction Manager may authorize the Contractor to complete the crossing by a method established in a change order.

B. At the Contractor's option, the Contractor may continue to install the casing and remove the rock through the casing at no additional cost to the Owner.

3.11. INSTALLATION OF PIPE

A. After construction of the casing is complete and has been accepted by the Construction Manager, install the carrier pipe in accordance with the Drawings and Specifications.

B. Care shall be exercised at all times to maintain tight, full seated joints in the carrier pipe. The carrier pipe shall be fully supported by pre-fabricated casing spacers when feasible.

C. Check the alignment and grade of the casing and prepare a plan to set the carrier pipe at proper alignment, grade and elevation, without any sags or high spots.

D. The carrier pipe shall be held in the casing pipe by one of the following methods:

1. The carrier pipe shall be held in the casing pipe by the use of hardwood blocks spaced radially around the pipe and secured together so that they remain firmly in place.
    a. The spacing of such blocks longitudinally in the casing pipe shall not be greater than 10 feet or as recommended by the pipe manufacturer.

2. The pipe shall be supported within the casing by use of casing spacers sized to limit radial movement to a maximum of 1-inch.

   a. Provide a minimum of two casing spacers per nominal length of pipe. Casing spacers shall be attached to the pipe at maximum 9 to 10 foot intervals or as recommended by the pipe manufacturer.

E. Fill the void between the carrier pipe and casing pipe with grout. Measures shall be taken by the Contractor to prevent floatation and other movement of the pipe as the grout is filling the void.

F. At each end of the casing pipe, the void between the carrier pipe and casing shall be sealed with 4-inch brick and mortar.

3.12. SHEETING REMOVAL

A. Remove sheeting used for shoring from the shaft and off the job site. The removal of sheeting, shoring and bracing shall be done in such a manner as not to endanger or damage either new or existing structures, private or public properties and also to avoid cave-ins or sliding in the banks.

END OF SECTION

SECTION 40 05 01

WATER MAINS AND ACCESSORIES

PART 1 – GENERAL

1.01 SCOPE

A. This Section describes products to be incorporated into the water mains and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.

B. Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.

1.02 QUALIFICATIONS

A. If requested by the Construction Manager, submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

1.03 SUBMITTALS

A. Complete shop drawings, product data and engineering data for all products shall be submitted to the Construction Manager in accordance with the requirements of Section 01 33 23 of these Specifications.

B. When requested, the Contractor shall furnish the Construction Manager with lists, in duplicate, of all pieces of pipe and fittings received on the project, including copies of shipping documents from the manufacturer and/or supplier.

C. Said lists shall indicate the serial or mark number, weight, class, length, size, and description of each typical piece received.

D. The Contractor shall submit, in conjunction with the construction progress schedule, a schedule of deliveries for materials. The Contractor shall coordinate material shipments with the Owner and the material suppliers.

1.04 TRANSPORTATION AND HANDLING

A. The Contractor shall maintain communication with the material suppliers and the Owner as necessary, to keep informed as to scheduled shipment, and upon delivery of materials, the Contractor shall proceed without delay to unload such materials.

B. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories.

1. Make equipment available at all times for use in unloading.
2. Take great care to prevent the coating and lining from being damaged.
3. Unload ductile iron pipe, fittings, and accessories from the transport vehicle with hoists or by skidding.
4. Do not skid or roll pipe handled on skidways against pipe already on the ground.
5. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification.
6. Should any material be accidentally dropped, it shall be immediately set aside, and thoroughly inspected by the Construction Manager before any decision is made regarding its acceptability.
7. If there is any question regarding acceptability of said suspect materials by the Construction Manager, the Contractor shall remove and replace the questionable materials.

. C. Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage.

1. Handle pipe by rolling on skids, forklift, or front end loader.
2. Do not use material damaged in handling.
3. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior coatings or internal lining of the pipe.

1.05 STORAGE AND PROTECTION

A. Store all pipe which cannot be distributed along the route. Make arrangements for the use of suitable storage areas. Inform Owner and construction Manager of the location, street address, of the storage area.

B. Stored materials shall be kept safe from damage.

1. The interior of all pipe, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.
2. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.

C. Pipe shall not be stacked higher than the limits recommended by the manufacturer.

1. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end.
2. At least two rows of timbers shall be placed between tiers and chocks, affixed to each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipe in adjacent tiers.

D. Stored mechanical and push-on joint gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

E. Mechanical-joint bolts shall be handled and stored in such a manner that will ensure proper use with respect to types and sizes.

F. All tools, materials, machinery, and equipment required for the Work may be stored in a compact, neat, stock-piled manner adjacent to the work site, in a suitable location, and in such a manner as to cause the least inconvenience to the affected property owners, ensure traffic safety, and so as not to endanger the general public in any way.

G. All active, existing fire hydrants must be kept unobstructed and accessible at all times.

H. All water and gas valves, and underground power and telephone manholes must be left uncovered by such storing of materials.

1.06 QUALITY ASSURANCE

A. The manufacturer shall provide written certification to the Construction Manager that all products furnished comply with all applicable requirements of these Specifications.

1. All materials which fail to conform to these Specifications shall be rejected.

B. If ordered by the Construction Manager, each pipe manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe.

1. This service will be furnished for a minimum of five days during initial pipe installation.

C. After delivery to the site, any materials which have been damaged in transit or are unsuitable for use in the Work shall be rejected and removed from the site.

1.07 MATERIAL INSPECTION

A. Upon receipt of materials from the manufacturer, the Contractor shall make an inspection of such materials; check and certify the bill of lading, noting any discrepancies; obtain a proper memorandum signed by the agent of the carrier for any shortage in the shipment, or for any damaged materials received.

1. All bills of lading and any memorandum for shortage or damage of material in the shipment shall be promptly submitted to the Construction Manager.

B. All ductile iron pipe and fittings will be subject to the inspection and approval by the Construction Manager after delivery of the material to the site.

1. Broken, cracked, misshapen, imperfectly coated, unsatisfactory, or otherwise damaged ductile iron pipe or fittings are not permitted to be used in the Work.

C. Such inspection by the Construction Manager does not relieve the Contractor of full responsibility for the materials installed.

D. FAILURE BY CONSTRUCTION MANAGER TO REJECT UNACCEPTABLE MATERIALS SHALL NOT CONSTITUTE AN ACCEPTANCE OF SAID MATERIALS.

E. The Contractor shall be responsible for distribution of all materials as required to complete the Work. Materials delivered to the Contractor shall be in the custody of the Contractor from the time of receipt by the Contractor of such materials from the carrier until final acceptance of the completed Work.

F. The Contractor shall be responsible for any loss or damage to materials.

PART 2 – PRODUCTS

2.01 DUCTILE IRON PIPE (DIP)

A. See Specification Section 40 05 19, Ductile Iron Pipe.

2.02 COPPER PIPE

A. Pipe shall be rolled copper tubing, ASTM B 88, Type K. Fittings shall be sweat type wrought copper, ANSI B16.22. All copper pipe shall be made in the U.S.A.

B. Where required, sweat to screw adapters shall be cast bronze ANSI B16.18, wrought solder joint ANSI B16.22. Unions shall be cast bronze or bronze with solder connections. Joints shall be made with 95/5 solder for Type K pipe.

2.03 STAINLESS STEEL PIPES

A. Stainless steel pipe and fittings shall be used for the air release lines.

B. Pipe shall be 304 ASTM A312 stainless steel and ANSI B36 Schedule 40.

C. Fittings shall be 304 ASTM A312 stainless steel with female NPT ends.

D. Fittings shall be Class 150 with rated working pressure of 300 psi.

E. Flanges shall be ANSI B16.5 Class 150.

F. Bolts shall be stainless steel machine bolts conforming to ASTM A 193, Grade B8M. Nuts shall be heavy hex, stainless steel conforming to ASTM A 194, Grad 8Mc.

G. Gaskets shall be full face type made of 1/8-inch thick, cloth reinforced rubber.

2.04 VALVES

A. Gate Valves (GV): 12-Inches and smaller in Diameter

1. Gate valves shall be resilient wedge type conforming to the requirements of AWWA C509 or AWWA C515.
2. Valves shall have a minimum rated working pressure of 250 psi and be able to withstand a 300 psi pressure test without being damaged.
3. Valves less than 3-inches in diameter shall have threaded ends. Larger buried valves shall be mechanical joint unless shown otherwise on the Drawings.
4. Valves shall be provided with two O-ring stem seals with one O-ring located above and one O-ring below the stem collar.
    a. The area between the O-rings shall be filled with lubricant to provide lubrication to the thrust collar bearing surfaces each time the valve is operated.
    b. At least one anti-friction washer shall be utilized to further minimize operating torque.
    c. All seals between valve parts, such as body and bonnet, bonnet and bonnet cover, shall be flat gaskets or O-rings.
5. The valve gate shall be made of cast or ductile iron having a vulcanized, synthetic rubber coating, or a seat ring attached to the disc with retaining screws.
    a. Sliding of the rubber on the seating surfaces to compress the rubber will not be allowed.
    b. The design shall be such that compression-set of the rubber shall not affect the ability of the valve to seal when pressure is applied to either side of the gate.
    c. The sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.
6. All internal ferrous surfaces shall be coated with epoxy to a minimum thickness of 4 mils. The epoxy shall be non-toxic, impart no taste to the water and shall conform to AWWA C550.
7. Valves shall be non-rising stem type with a 2-inch square wrench nut, except in meter vaults where hand wheels shall be installed, and shall open left.
    a. The manufacturer shall provide an affidavit of compliance with the applicable AWWA standards.
8. Gate valves shall be manufactured by American Flow Control, Mueller or M & H Valve in the U.S.A.

B. Butterfly Valves (BV) 16-Inches to 24-Inches in Diameter

1. See Specification Section 40 05 64, Butterfly Valves.

C. Ball Valves

1. Ball valves shall be utilized for isolation valves on the air release lines as shown on plans.
2. Ball valves shall be of the two-piece body construction, full port with blowout-proof stem and FNPT end connections.
3. Valves shall be rated for 1000 psi non-shock cold working pressure.
4. Valves body and trims shall be of stainless steel as follows:
   a. Handle Nut: Stainless Steel ASTM A 276 Type 304.
   b. Stem: Stainless Steel ASTM A 276 Type 316.
   c. Spring Washer: Stainless Steel 304.
   d. Threaded Pack Gland: Stainless Steel ASTM A 276 Type 316.
   e. Thrust Washer: Carbon Filled PTFE.
   f. Gasket: PTFE.
   g. Body End Piece: Stainless Steel ASTM A 351 Type CF8M.
   h. Ball (Vented): Stainless Steel ASTM A 276 Type 316 or ASTM A 351 Type CF8M.
   i. Seat (2): Reinforced PTFE.
   j. Body: Stainless Steel ASTM A 351 Type CF8M.
   k. Stem Packing (2): Carbon Filled PTFE.
   l. Locking Handle: Stainless Steel ASTM A 240 Type 304.
5. Stainless steel ball valves shall be Model T-585-S6-R-66-LL as manufactures by NIBCO or approved equal.

2.05 FIRE HYDRANTS (FH)

A. Fire hydrants shall be manufactured in full compliance with the AWWA C502, Standard for Dry- Barrel Fire Hydrants and as herein amended.

1. All fire hydrants shall be the compression type, closing with line pressure.
2. The valve opening shall not be less than 5-1/4-inches.

B. Type

1. Three-way, post type, dry top traffic model with compression main valve opening against and closing in the direction of normal water flow.

C. Size

1. Internal main valve diameter shall be a minimum of 5 1/4".

D, Identification

1. Each hydrant shall have the name of the manufacturer, the year when made, and the nominal valve size in legible, raised letters cast on the barrel or bonnet.

E. Dry Top Bonnet

1. Each hydrant shall be constructed with a moisture-proof lubricant chamber which encloses the operating threads and which provides automatic lubrication of the threads and bearing surfaces each time the hydrant is operated.
2. This assembly shall be comprised of a top “O” ring serving as a dirt and moisture barrier and a lower “O” ring which will serve as a pressure seal.

F. Operating Nut

1. The operating nut shall be of regular pentagon shape measuring 1 ½” point to flat (National Standard), and shall open by turning counter-clockwise (left).
2. Nozzle caps shall have the same cross-section as the operating nut, and shall come with heavy duty, non-kinking chains.
3. Chains shall be securely affixed to the hydrant barrel and permit free turning of the nozzle caps.

G. Traffic Design

1. The hydrant barrel sections shall be connected at the ground line in a manner that will prevent damage to the hydrant when struck by a vehicle.
    a. In the event of a traffic accident, the hydrant barrel shall break away from the standpipe at a point above grade and in a manner which will prevent damage to the barrel and stem, preclude opening of the valve, and permit rapid and inexpensive restoration without digging or cutting off the water.
    b. The main valve rod sections shall be connected at the ground line by a frangible coupling.
    c. The standpipe and ground line safety construction shall be such that the hydrant nozzles can be rotated to any desired position without disassembling or removing the top operating components and top section of the hydrant standpipe.

H. Main Valve

1. The main valve shall be made of synthetic rubber and formed to fit the valve seat accurately.

I. Hydrants shall be fully bronze mounted with all working parts of bronze. Valve seat ring shall be bronze and shall screw into a bronze retainer.

1. Main Valve Seat – The main valve seat shall be of bronze and its assembly into the hydrant shall involve bronze to bronze thread engagement.
    a. Two “C” ring seals shall be provided as a positive pressure seal between the bronze set ring and the shoe.
    b. The valve assembly pressure seals shall be obtained without the employment of torque compressed gaskets.
2. The hydrants shall be designed to allow the removal of all operating parts through the hydrant barrel by means of a single disassembly wrench without excavating.

J. Hydrant shall be a non-freezing design and be provided with a simple, positive, and automatic drain which shall be fully closed whenever the main valve is opened.

K. Drain

1. The drain mechanism shall be designed to operate automatically with the operation of the main valve and shall allow momentary flushing of the drain ports.
2. A minimum of two internal and two external bronze lined drain ports shall be required in the main valve assembly to drain the hydrant barrel.

L. Inlet connection

1. The cast iron inlet elbow shall have a 6” mechanical joint connection complete with accessories.

M. Extensions

1. Barrel extension sections shall be available in 6” increments complete with rod, extension coupling, and the necessary flanges, gaskets, and bolts so that extending the hydrant can be accomplished without excavating.

N. Nozzles

1. No lead will be allowed in nozzle construction as a component of the metallic content.

O. Testing

1. All fire hydrants shall be tested in strict accordance with AWWA C502, latest edition, at the point of manufacture. Certificates of Compliance shall be provided to the Construction Manager upon request.

P. The means for attaching the barrel to the standpipe shall permit facing the hydrant a minimum of eight different directions.

Q. All working parts, including the seat ring shall be removable through the top without disturbing the barrel of the hydrant.

R. The operating nut shall match those on the existing hydrants and shall open left. The operating threads shall be totally enclosed in an operating chamber, separated from the hydrant barrel by a rubber O-ring stem seal and lubricated by a grease or an oil reservoir.

S. Hose and pumper connections shall be breech-locked, pinned, or threaded and pinned to seal them into the hydrant barrel.

1. Each hydrant shall have two 2-1/2-inch hose connections and one 4-1/2-inch pumper connection, all with National Standard threads and each equipped with cap and non-kinking chain.

T Hydrants shall be furnished with a mechanical joint connection to the spigot of the 6-inch hydrant lead.

U. Minimum depth of bury shall be 4.5 feet. Provide extension section where necessary for proper vertical installation and in accordance with manufacturer's recommendations.

V. Hydrants shall be traffic model as manufactured by the following manufacturers in the U.S.A.

1. M & H Valve 929 American Flow Control B-84-B
2. E & J WaterMaster 5CD250
3. Mueller Super Centurion

W. Fire hydrants shall be furnished with locking security caps when required.

1. Locking caps shall be Captivater as provided by American Flow Control.
2. Caps shall be provided on each hose and pumper nozzle and incorporate a "free spinning" design that provides security against unauthorized intrusion into the fire hydrant, or water theft from the hydrant.
3. When secured, the cap spins freely until unlocked and removed through the use of a Captivater wrench.
4. When unlocked, the cap shall open in a manner similar to a standard cap.
5. Caps shall be similar in appearance to standard caps and shall use a center placed locking mechanism.
6. The locking mechanism shall be hardened stainless steel and shall be protected from the elements.
7. Caps using magnetic locks are unacceptable.
8. All Captivater wrenches shall have unique serial numbers. Wrenches shall ship direct to the Owner.

X. Painting, Coating and Lubricating

1. All iron parts of the hydrant inside and outside shall be thoroughly cleaned and all surfaces below the ground line shall be factory-coated or painted with an asphalt or bituminous base paint or coating.
2. All outside surfaces of the barrel above grade shall be painted silver with Sherwin Williams KEM 400. The bonnet of hydrants installed on a 12 inch water main shall be painted Yellow; the bonnet of hydrants installed on water mains larger than 12 inch water mains shall be painted Green.
3. All bronze, threaded and contact moving parts shall be lubricated during shop assembly, and protected by a coating of rust proof compound to prevent damage in shipment and storage.

2.06 VALVE BOXES (VB) AND EXTENSION STEMS

A. All buried valves shall be equipped with valve boxes and covers.

1. The valve boxes shall be cast iron two-piece screw type with drop covers. Valve boxes shall have a 5.25-inch inside diameter.
2. Valve box covers shall weigh a minimum of 13 pounds.
3. The valve boxes shall be adjustable to 6-inches up or down from the nominal required cover over the pipe.
4. Valve boxes shall be of sufficient length that bottom flange of the lower belled portion of the box is below the valve operating nut.
5. Ductile or cast iron extensions shall be provided as necessary.
6. Covers shall have “WATER VALVE” or “WATER” cast into them.
7. Valve boxes shall be manufactured in the United States.

B. All valve boxes shall have a concrete collar, minimum 9-inches thick.

1. The collar shall be square or round and sized 24-inches square or 24-inches in diameter.
2. Precast collars may be used, provided that they are grouted in place to the valve box.
3. The box is to be flush with finished grade.
4. The edge of the valve box is to be ½-inch above the edge of the concrete collar.

C. Where the depth of cover is more than 5-feet, the Contractor shall provide suitable, permanently installed valve stem extensions and guides which have been approved by the Owner prior to fabrication and placement.

1. All valves shall be furnished with Type 316 stainless steel extension stems, as necessary, to bring the operating nut to within 24-inches of the top of the valve box.
2. Connection to the valve shall be with a wrench nut coupling and a set screw to secure the coupling to the valve’s operating nut.

3. The coupling and square wrench nut shall be welded or pinned to the extension stem and shall have a centering ring.

4. Extension stems shall be minimum 1-inch diameter.

5. Extension stems shall be equal to Trumbull Industries, M & H Valve, or Penn-Troy Manufacturing/Troy Valve.

2.07 VALVE MARKERS (VM)

A. The Contractor shall provide a concrete valve marker as detailed on the Drawings for each valve installed outside paved areas.

1. The markers shall be Class A concrete of DOT specifications, 4” square by 5-feet long, and shall be of the same construction as that of highway right-of-way markers.

2. The words “WATER VALVE” shall be cast vertically into the marker beginning 2” from the top of the marker.

2. There shall also be a 1-1/4" brass plug cast into the marker 1” below the letter “E” of the word “VALVE”, which shall be stamped in the field by the Contractor, after installation, with the distance, in feet, from the valve marker to the valve box.

4. The markers shall be installed as close to the right-of-way line opposite the valve as is possible, with the brass plug facing the valve.

5. The marker shall be located so as to avoid damage by traffic.

6. The top of the marker shall generally be set 24 inches above finished grade. The marker may be somewhat lower in areas where it may be considered obtrusive, such as lawns, however, at no time shall the marker be installed at less than 18” above finished grade.

7. Valve markers shall be in accordance with County standards.

8. In addition to concrete valve marker where street curbs are installed a saw cut ½” deep “V” notch on top of curb adjacent to water valve location is required.

2.08 TAPPING SLEEVES AND VALVES (TS&V)

A. The Contractor shall furnish and install tapping sleeves and valves suitable for connection to the existing/new water mains at locations indicated on the Drawing, or as directed.

1. The Contractor shall provide the tapping machine and competent supervision for the making of taps.

2. It is the Contractor’s responsibility to verify the type, size, O.D. and class of the existing pipe before ordering the tapping sleeve and valve.

B. Tapping sleeves shall be cast or ductile iron of the split-sleeve, mechanical joint type and shall be capable of withstanding a working pressure of 250 psi.

C. Tapping valves shall conform to the requirements for gate valves herein before specified, except for any modifications necessary to permit the use of full size shell cutters.

1. Tapping valves shall be gate valves furnished with flanged connection to the tapping sleeve and mechanical joint connection to the branch pipe.
2. Resilient seated tapping valves 16” and larger may be supplied without the bypass.
3. When using resilient seated gate valves for making taps 16” and larger, it is the Contractor’s responsibility to determine the finished depth of cover that shall remain over the operating nut of the valve after installation.
4. If finished depth of cover in a standard vertical configuration is less than 2 feet, then the tapping valve shall be supplied in a horizontal configuration with differential operator.

D. The tapping sleeve shall be supplied by the valve manufacturer.

E. Tapping sleeves shall be equal to American Flow Control, Mueller H-615 or M & H Valve and manufactured in the U.S.A.

2.09 TAPPING SADDLES

A. Tapping saddles are not allowed except for service connections.

B. See Section 40 05 06, Water Service Connections.

2.10 CORPORATION COCKS AND CURB STOPS

A. Corporation cocks and curb stops shall be ball type, shall be made of bronze conforming to ASTM B 61 or B 62, and shall be suitable for the working pressure of the system. Ends shall be suitable for compression type joint.

B. Threaded ends for inlet and outlet of corporation cocks shall conform to AWWA C800. Coupling nut for connection to flared copper tubing shall conform to ANSI B16.26.

C. Corporation cocks shall be manufactured by Ford (FB1000-4-G) or equivalent.

D. Curb stops shall be manufactured by Ford (BA21-444W-Full Port) or equivalent in the U.S.A.

2.11 AIR VALVES FOR WATER SERVICE

A. Air release/vacuum relief valve (ARV) shall have compact single chamber tubular body consisting of a barrel and flanged ends secured by tie rods and fasteners sized to provide a passageway with a cross sectional area which exceeds that of the valve’s inlet and outlet connections for the unobstructed flow of air.

B. ARV shall be certified to twice the valve’s rated pressure.

C. ARV body shall be constructed with 6x safety factor.

D. ARV shall be certified per ANSI/NSF 61 and ANSI/NSF 372.

E. The ARV shall be designed for the following conditions:

1. Controlled air evacuation during filling of the water main.
2. High volume vacuum relief to prevent vacuum from developing during emptying of the water main from any causes.
3. Discharge of air from the water main while under pressure.
4. Surge abatement for high velocity start up conditions, column separation and fluid oscillation.
5. Operating pressure shall be 3 to 363 psi.

F. Connections

1. Upper connection shall be fitted with 02WTR-BS perforated screen guard and bias mechanism and 2-inch female NPT connection.
2. Lower connection shall be furnished with 2-inch streamlined toroidal base flange and 2-inch ANSI B16.5 Class 150 studded flange.
3. Breed port shall be 1/2-inch female NPT fitted with 1/2-inch NPT plug.

G. Anti Surge

1. 4 each at 4.5 mm. protected with 316 SS wear-resistant inserts.

H. Materials of construction

1. Except as specified below, all ARV parts shall be of 304L stainless steel.
2. Air release nozzle and protected orifice insert shall be 316L stainless steel.
3. Control float, nozzle float, anti-surge and screen lid shall be UHMW-PE.
4. Screen lid standoff shall be nylon.
5. Nozzle button shall be EDPM.
6. Fiber gaskets shall be Klingersil 4430.

I. Each ARV shall be provide with a 1/2-inch NPT test/bleed cock.

J. Each ARV shall be leak tested to minimum of 150% rated pressure.

K. Each ARV shall be provided with a baffle to minimize whistling noise.

L. An isolation valve between the water main and the ARV shall be installed in accordance with the Drawings.

M. ARV and accessories shall be equal to Vent-Tech Water Combination Air Release Valve Model 02WTR25SBS and manufactured in the U.S.A.

2.12 PRECAST CONCRETE PRODUCTS

A. Precast Concrete Sections

1. Precast concrete sections shall meet the requirements of ASTM C 478 for round shaped and ASTM C 913 for rectangular shaped precast concrete products.
2. The minimum compressive strength of the concrete in precast sections shall be 4,000 psi. The minimum wall thickness shall be one-twelfth of the inside diameter of the base, riser or the largest cone diameter.
3. See Section 03 04 00, Precast Concrete for additional requirements.
4. Transition slabs which convert bases larger than four feet in diameter to four foot diameter risers shall be designed by the precast concrete manufacturer to carry the live and dead loads exerted on the slab.
5. Seal joints between precast sections by means of rubber O-ring gaskets or flexible butyl rubber sealant.
    a. Butyl rubber sealants shall meet the requirements of AASHTO M-198.
    b. Sealant shall be pre-formed type with a minimum nominal diameter of 1-inch.
    c. Butyl rubber sealant shall be equal to Kent Seal No. 2 or Concrete Sealants CS 202.

B. Brick and Mortar:

1. Brick shall be whole and hard burned, conforming to ASTM C 32, Grade MS. Mortar shall be made of one part Portland cement and two parts clean sharp sand.
2. Cement shall be Type 1 and shall conform to ASTM C 150. Sand shall meet ASTM C 144.

C. Iron Castings

1. Cast iron manhole frames, covers and steps shall meet the requirements of ASTM A 48 for Class 30 gray iron and all applicable local standards. All castings shall be tough, close grained, smooth and free from blow holes, blisters, shrinkage, strains, cracks, cold shots and other imperfections.
2. No casting will be accepted which weighs less than 95 percent of the design weight. Shop drawings must indicate the design weight and provide sufficient dimensions to permit checking. All castings shall be thoroughly cleaned in the shop and given two coats of approved bituminous paint before rusting begins.
3. Manhole frames and covers shall be equal to the following:

Type	Design Weight	Manufacturer's Reference	
Bolt Down	400#	Neenah A-1916-F1	Vulcan V-2358

4. All frames and covers shall have machined horizontal bearing surfaces.

5. Bolt-down covers shall be equipped with four ½-inch stainless steel bolts and a 1/8-inch red rubber or rubber O-ring gasket. Covers shall be rotatable and interchangeable.

   a. Bolt holes shall be bored through so that debris entering the bolt hole will fall into the manhole.

   b. Bolt holes shall have the full 360 degree circle within the cover's radius when bored through the cover.

D. Plastic Steps: Manhole steps of polypropylene, molded around a steel rod, equal to products of M.A. Industries may be used.

E. Floor Door

1. Door shall be single or double leaf type as shown on the Drawings.

2. See Specification Section 08 31 00, Access Door and Frame.

3. The floor door shall be manufactured by The Bilco Company or Thompson Fabricating Company in the U.S.A.

F. Vents

1. Where vent pipes are shown on the Drawings, vents shall be of one-piece, welded steel construction.

2. Vent pipes shall equal air valve size, but no less than 4-inches. The vent pipe shall be grouted into a precast hole in the vault. The discharge of the vent pipe shall be provided with a 3/16-inch PVC coated mesh screen.

3. Where vent pipes are not shown on the Drawings, the frame and cover or floor door shall be provided with 1-inch holes to provide equivalent opening as in air valve, but not less than two. The quantity for each valve size is as follows:

   a. 2-inch - 4

   b. 3-inch - 9

   c. 4-inch -16

   d. 6-inch - 36

   e. 8-inch - 64

G. Precast vaults and manholes located in areas subject to vehicular traffic shall be designed for H-20 wheel load on top slab, hatches, and surcharge loading at grade around all sides of the vault.

H. The empty structure shall be designed with adequate safety factor of 1.25 or greater to resist buoyancy force. Buoyancy forces shall be based on groundwater depth 1' below the ground surface.

I. Contractor shall submit design calculations, sealed by a Professional Engineer licensed in State of Georgia, indicating adequate strength to resist the vertical and lateral loadings including "H-20" wheel loadings, and buoyancy forces.

J. Vaults and manholes shall be keyed and gasketed appropriately to provide a water tight seal.

K. Apply bituminous damp-proofing on precast structure exterior.

2.13 RETAINER GLANDS

A. All restrained ductile iron pipe and fittings shall be manufactured restrained joint as specified in Section 40 05 19. Retainer glands shall only be installed on MJ valves and where allowed by Construction Manager.

B. Retainer glands shall be provided at all mechanical joints, including fittings, valves, hydrants and other locations as shown on the Drawings.

C. Anchorage: Where retainer glands are installed or allowed by Construction Manager, the valves, plugs, caps, tees and bends deflecting 11 ¼ degrees or more shall be provided with one of the following two forms of restraint:

1. Retainer glands plus concrete thrust blocking (3,000 psi concrete thrust block sized to withstand line pressures of 300 psi and soil bearing pressures of 2,000 psf)
2. Retainer glands plus rodding to concrete thrust collar (3,000 psi concrete collar and tie rods sized to withstand line pressures of 300 psi and soil bearing pressures of 2,000 psf)

D. Retainer glands for ductile iron pipe shall be manufactured in the U.S.A and equal to:

1. Megalug Series 1100, as manufactured by EBAA Iron,
2. Uni-Flange Series 1400, as manufactured by Ford Meter Box Company,
3. Stargrip Series 3000, as manufactured by Star Pipe Products, or
4. Sigma One LOK Series SLD as manufactured by Nappco-Sigma.

2.14 DETECTION TAPE

A. Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket.

B. Tapes shall be color coded in accordance with APWA color codes with the following legends: “CAUTION WATER MAIN BURIED BELOW”.

1. Color is blue for potable water mains and the color may be solid or striped.
2. Tape shall be permanently printed with no surface printing allowed.
3. Tape width shall be a minimum of 2-inches when buried less than 10-inches below the surface.
4. Tape width shall be a minimum of 3-inches when buried greater than 10-inches and less than 20-inches.

C. Detection tape shall be equal to Lineguard Type III Detectable or Allen Systems Detectatape.

2.15 HYDRANT TEES

A. Hydrant tees shall be equal to ACIPCO A10180 or U.S. Pipe U-592 made in the U.S.A.

2.16 ANCHOR COUPLINGS

A. Lengths and sizes shall be as shown on the Drawings. Anchor couplings shall be equal to ACIPCO A 10895 or U.S. Pipe U-591 made in the U.S.A..

2.17 HYDRANT CONNECTOR PIPE

A. The connector pipe shall be ductile iron meeting the requirements of AWWA C153 and shall be cement lined in accordance with AWWA C104.

B. The pipe shall have a 24-inch offset design so the hydrant can be adjusted to ensure placement at the proper grade and shall have an anchoring feature at both ends so that when used with mechanical joint split glands, a restrained joint is provided.

C. The connector pipe shall be Gradelok as manufactured by Assured Flow Sales, Inc., Sarasota, Florida made in the U.S.A.

2.18 CONCRETE

A. Concrete shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches.

B. For job mixed concrete, submit the concrete mix design for approval by the Construction Manager.

C. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94.

D. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60. Concrete for thrust blocking and thrust collars shall be high early strength concrete.

E. See Section 03 30 00, Cast-In-Place Concrete

2.19 ELECTRONIC MARKERS

A. Electronic markers shall be buried with utilities to serve as a locating device.

1. Electronic markers shall be the active, programmable type.
2. Each marker shall be color coded in accordance with APWA standards and produce an industry specific frequency.
3. Each marker shall contain a passive antenna that requires no internal power source.
4. Markers shall be of water resistant polyethylene shells and impervious to minerals, chemicals, and underground temperature extremes.
5. Electronic markers shall be compatible with 3M Dynatel 1420 EMS-ID Marker Locator.
6. Contractor shall supply one Marker Locator for use during installation and shall turn over Locator to the County upon project completion.
7. Markers shall be 3M Dynatel 1423 XR/ID for water service or equivalent.

2.20 SPECIAL COATINGS

A. Applications

1. Below grade (buried) or where little to no surface preparation can be performed on piping or structural steel.

B. Coating Materials

1. Petrolatum based mastic or wax based wrapping tapes
2. Coating System Manufacturer
   a. Carboline
      1) First Coat - Carbowrap Priming Paste
      2) Finish Coat - Tape A, B, or C (temp. dependent)
   b. Denso
      1) First Coat - Denso Paste
      2) Finish Coat - Densyl Tape

c. Trenton

1) First Coat - Waxtape Primer

2) #1 Wax Tape

PART 3 – EXECUTION

3.01 EXISTING UTILITIES AND OBSTRUCTIONS

A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the County.

1. The Contractor shall call the Utilities Protection Center (UPC) (800-282-7411) as required by Georgia law (Code Section 25-9-1 through 25-9-13) and all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site at least 72 hours (three business days) prior to construction to verify the location of the existing utilities.

B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.

1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law.
2. Field utility locations are valid for only 10 days after original notice. The Contractor shall ensure at the time of any excavation that a valid utility location exists at the point of excavation.
3. Expose the facility, for a distance of at least 200 feet in advance of pipeline construction, to verify its true location and grade.
4. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.
5. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.
6. Maintain a log identifying when phone calls were made, the person called, area for which utility relocation was requested and work order number issued, if any.
7. The Contractor shall provide the Construction Manager an updated copy of the log bi-weekly, or more frequently if required.

C. Conflict with Existing Utilities

1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the water main by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility.

a. The Contractor may change the proposed alignment of the water main to avoid horizontal conflicts if the new alignment remains

within the available right-of-way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the Construction Manager.

b. Where such relocation of the water main is denied by the Construction Manager, the Contractor shall arrange to have the utility, main, or service relocated.

2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed water main does not permit the crossing without immediate or potential future damage to the utility, main, service, or the water main.

a. The Contractor may change the proposed grade of the water main to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written request to and subsequent approval by the Construction Manager.

b. Where such relocation of the water main is denied by the Construction Manager, the Contractor shall arrange to have the utility, main, or service relocated.

D. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

E. Water and Sewer Separation

1. Water mains should maintain a minimum 10 foot edge-to-edge separation from sewer lines, whether gravity or pressure.

a. If the main cannot be installed in the prescribed easement or right-of-way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18-inches above the top of the sewer.

b. Should neither of these two separation criteria be possible, the water main shall be installed below the sewer with a minimum vertical separation of 18-inches.

2. The water main, when installed below the sewer, shall be encased in concrete with a minimum 6-inch concrete depth to the first joint in each direction.

3. Where water mains cross the sewer, the pipe joint adjacent to the pipe crossing the sewer shall be cut to provide maximum separation of the pipe joints from the sewer.

4. No water main shall pass through, or come in contact with, any part of a sanitary sewer manhole.

3.02 CONSTRUCTION ALONG HIGHWAYS, STREETS AND ROADWAYS

A. Install pipe lines and appurtenances along highways, streets and roadways in accordance with the applicable regulations of, and permits issued by, the

Department of Transportation and Fulton County with reference to construction operations, safety, traffic control, road maintenance and repair.

B. The Contractor shall prepare a Traffic Control Plan and submit the plan to the Construction Manager at least 14 days prior to on-site work.

1. The Traffic Control Plan shall include all anticipated lane closures, placement of traffic control devices, barricades, lights, flagmen etc. to clearly show how traffic flow and safety will be maintained throughout the project.

C. Traffic Control

1. The Contractor shall provide, erect and maintain all necessary barricades; suitable and sufficient lights and other traffic control devices; provide qualified flagmen where necessary to direct traffic; take all necessary precautions for the protection of the work and the safety of the public. Flagmen shall be certified by a Georgia DOT approved training program.

2. Construction traffic control devices and their installation shall be in accordance with the current Manual on Uniform Traffic Control Devices for Streets and Highways.

3. Placement and removal of construction traffic control devices shall be coordinated with the Georgia Department of Transportation and Fulton County a minimum of 48 hours in advance of the activity.

4. Placement of construction traffic control devices shall be scheduled ahead of associated construction activities.

   a. Construction time in street right-of-way shall be conducted to minimize the length of time traffic is disrupted.

   b. Construction traffic control devices shall be removed immediately following their useful purpose.

   c. Traffic control devices used intermittently, such as “Flagmen Ahead”, shall be removed and replaced when needed.

5. Existing traffic control devices within the construction work zone shall be protected from damage.

   a. Traffic control devices requiring temporary relocation shall be located as near as possible to their original vertical and horizontal locations.

   b. Original locations shall be measured from reference points and recorded in a log prior to relocation.

   c, Temporary locations shall provide the same visibility to affected traffic as the original location.

   d. Relocated traffic control devices shall be reinstalled in their original locations as soon as practical following construction.

6. Construction traffic control devices shall be maintained in good repair and shall be clean and visible to affected traffic for daytime and nighttime operation. Traffic control devices affected by the construction work zone shall be inspected daily.

7. Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background.

   a. Construction sign panels shall meet the minimum reflective requirements of the Georgia Department of Transportation and Fulton County.

   b. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.

8. Channelization devices shall be positioned preceding an obstruction at a taper length as required by the current Manual on Uniform Traffic Control Devices for Streets and Highways, as appropriate for the speed limit at that location.

   a. Channelization devices shall be patrolled to ensure that they are maintained in the proper position throughout their period of use.

D. Construction Operations

1. Perform all work along highways, streets and roadways to minimize interference with traffic.

2. Stripping: Where the pipe line is laid along road right-of-way, strip and stockpile all sod, topsoil and other material suitable for right-of-way restoration.

3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.

4. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.

5. Construction operations shall be limited to 500 feet along areas, including clean-up and utility exploration.

E. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off of the pavement in a timely manner.

F. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

G. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences; property corners; cultivated trees and shrubbery; manmade improvements; subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.

H. Maintaining Highways, Streets, Roadways and Driveways

1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the Work.

2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates.

a. Running plate edges shall have asphalt placed around their periphery to minimize vehicular impact.

b. The backfill above the pipe shall be compacted as specified elsewhere up to the existing pavement surface to provide support for the steel running plates.

3. Furnish a road grader or front-end loader for maintaining highways, streets, and roadways. The grader or front-end loader shall be available at all times.

4. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the Work.

3.03 PIPE DISTRIBUTION

A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.

B. Pipe may not be strung along the project within existing highway rights-of-way, unless specifically directed to do so by the Owner, and only then after receiving permission from the road authority which has jurisdiction.

C. No pipe shall be strung farther along the route than 1,000 feet beyond the area in which the Contractor is actually working without written permission from the County.

1. The County reserves the right to reduce this distance to a maximum distance of 200 feet in residential and commercial areas based on the effects of the distribution to the adjacent property owners.

D. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities.

1. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.

E. No distributed pipe shall be placed inside drainage ditches.

F. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

3.04 LOCATION AND GRADE

A. The Drawings show the alignment and grade of the water main and the location of valves, hydrants and other appurtenances.

B. Prior to clearing and grubbing, construction staking shall be performed. The Construction Manager will provide a temporary bench mark along the water main route and at all other locations where the alignment of the water main changes significantly.

C. From the information on the Drawings and the survey points found on the Project site, the Contractor shall perform all surveys necessary for the establishment of the horizontal and vertical alignment of the water main.

D. Construction Staking

1. The base lines for locating the principal components of the Work are shown on the Drawings.

a. Base lines shall be defined as the line to which the location of the water main is referenced, including but not limited to, edge of pavement, road centerline, property line, right-of-way or survey line.

b. The Contractor shall be responsible for performing all survey work required for constructing the water main, including the establishment of base lines and any detail surveys needed for construction.

1). This work shall include the staking out of permanent and temporary easements to insure that the Contractor is not deviating from the designated easements.

2. The level of detail of survey required shall be that which the correct location of the water main can be established for construction and verified by the Construction Manager.

a. Where the location of components of the water main, e.g. tunnels and fittings, are not dimensioned, the establishment on the location of these components shall be based upon scaling these locations from the Drawings with relation to readily identifiable land marks such as survey reference points, power poles, manholes, etc.

E. Reference Points

1. The Contractor shall take all precautions necessary, which includes, but is not necessarily limited to, installing reference points, in order to protect and preserve the centerline or baseline established by the Construction Manager.

2. Reference points shall be placed, at or no more than three feet, from the outside of the construction easement or right-of-way.

   a. The location of the reference points shall be recorded in a log with a copy provided to the Construction Manager for use, prior to verifying reference point locations.

   b. Distances between reference points and the water main centerlines shall be accurately measured to the nearest 0.01 foot.

3. The Contractor shall give the Construction Manager reasonable notice that reference points are set. The reference point locations must be verified by the Construction Manager prior to commencing clearing and grubbing operations.

F. After the Contractor locates and marks the water main centerline or baseline, the Contractor shall perform clearing and grubbing.

G. Construction shall begin at a connection location and proceed without interruption. Multiple construction sites shall not be permitted without written authorization from the Construction Manager for each site.

H. The Contractor shall be responsible for any damage done to reference points, base lines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, base lines, center lines and temporary bench marks as a result of the operations.

I. Construction Verification Survey allowance: The Construction Verification Survey cash allowance is solely for the use of the Owner for verification of the Contractor's reference points, centerlines and work performed.

1. The presence of this cash allowance in no way relieves the Contractor of the responsibility of installing reference points, centerlines, temporary bench marks, providing as-built drawings, or verifying that the work has been performed accurately.

3.05 LAYING AND JOINTING PIPE AND ACCESSORIES

A. Water mains, valves, hydrants, and appurtenances shall be installed before the installation of the subbase course or paving or any other utilities except sanitary sewer lines.

B. Lay all pipe and fittings to accurately conform to the lines and grades established by the Construction Manager.

C. Pipe Installation

1. Proper implements, tools and facilities shall be provided for the safe performance of the Work.

   a. All pipe, fittings, valves and hydrants shall be lowered carefully into the trench by means of slings, ropes or other suitable tools or

equipment in such a manner as to prevent damage to water main materials and protective coatings and linings.

b. Under no circumstances shall water main materials be dropped or dumped into the trench.

2. All pipe, fittings, valves, hydrants and other appurtenances shall be examined carefully for damage and other defects immediately before installation.

   a. Defective materials shall be marked and held for inspection by the Construction Manager, who may prescribe corrective repairs or reject the materials.

   b. In the event that defective pipe or fittings are discovered after having been laid, the Contractor shall remove and replace with sound pipe or fittings in a manner satisfactory to the Construction Manager.

3. All lumps, blisters and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and free from dirt, sand, grit or any foreign materials before the pipe is laid.

   a. No pipe containing dirt shall be laid.

4. It is the Contractor's responsibility to maintain a clean work site and clean materials throughout the project.

   a. All pipe and fittings shall be kept free from mud, dirt, and debris while stored on site, and shall be thoroughly cleaned before being laid. No debris, tools, clothing or other materials shall be placed in the pipe at any time.

   b. During any breaks in the laying of pipe, and when ending construction for the day, the Contractor shall install a mechanical or fitted plug in the open end of the pipe to prevent contamination of the pipeline.

   c. Should any accidental contamination occur, the pipe shall be thoroughly cleaned and swabbed out, and inspected by the Construction Manager, before new or further pipe installation may commence.

5. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

6. It is common practice to lay pipe with the bells facing the direction in which work is progressing; however, it is not mandatory.

7. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade, shall not be permitted.

8. Provide electronic marker for all water main.

b. Electronic markers shall be installed in an interval of every 100 linear feet and as needed to establish a change in direction or as directed by the Construction Manager.

c. Electronic marker shall be equal to 3M Dynatel 1423 XR/ID and shall be compatible with 3M Dynatel 1420 EMS-ID Marker Locator System.

D. Alignment and Gradient

1. Lay pipe straight in alignment and gradient or follow true curves as nearly as practicable. Do not deflect any joint more than the maximum deflection recommended by the manufacturer.

2. Maintain a transit, level and accessories on the job to lay out angles and ensure that deflection allowances are not exceeded.

E. Expediting of Work:

1. Excavate, lay the pipe, and backfill as closely together as possible.

2. Do not leave unjointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed.

3. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress.

4. If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either push-on, mechanical joint, restrained joint or as approved by the Construction Manager.

F. Joint Assembly

1. Push-on, mechanical, flange and restrained type joints shall be assembled in accordance with the manufacturer's recommendations.

2. The Contractor shall inspect each pipe joint within 1,000 feet on either side of main line valves to ensure 100 percent seating of the pipe spigot, except as noted otherwise.

3. Each restrained joint shall be inspected by the Contractor to ensure that it has been “homed” 100 percent.

4. The Contractor shall internally inspect each pipe joint to ensure proper assembly for pipe 24 inches in diameter and larger after the pipe has been brought to final alignment.

G. Cutting Pipe:

1. Whenever a pipe requires cutting to fit the line or bring it to the required location, the work shall be performed in a manner so as to leave a smooth end at right angles to the axis of the pipe. Jointing of a field cut pipe shall be made in accordance with the manufacturers’ instructions

2. Only push-on or mechanical joint pipe shall be cut.

3. Cut ductile iron pipe using an abrasive wheel saw.

4. Remove all burrs and smooth the end before jointing.

5. The Contractor shall cut the pipe and bevel the end, as necessary, to provide the correct length of pipe necessary for installing the fittings, valves, accessories and closure pieces in the correct location.

H. Lining Repair: Repair cement linings and recoat spigot ends of cut pipe with cement lining and bituminous coating as herein before specified in of this Section and as specified below:

1. Remove all burrs and areas of loose lining materials by sanding or scraping to bare metal.

2. Remove oil and lubricants used during field cutting.

3. Lining shall be stripped back a minimum of 1-inch from the spigot end into well adhered lined areas.

4. Roughen 1 to 2-inches of good lining with a rough grade (40 grit) emery paper, rasp or small chisel, to allow an overlap between new and existing lining.

5. Apply lining repair material in the number of coats required to match the thickness requirements as herein before specified in this Section and in accordance with the manufacturer's recommendations.

I. Polyethylene Encasement: Installation shall be in accordance with AWWA C105 and the manufacturer's instructions. All ends shall be securely closed with tape and all damaged areas shall be completely repaired to the satisfaction of the Construction Manager.

J. Valve and Fitting Installation

1. All valves shall be set accurately and carefully to the lines and grades given on the Drawings, or as directed, and shall be joined to the pipe utilizing such approved joints as herein before specified for ductile iron water mains.

2. Prior to installation, valves shall be inspected for direction of opening, number of turns to open, freedom of operation, tightness of pressure containing bolting and test plugs, cleanliness of valve ports and especially seating surfaces, handling damage and cracks.

   a. Defective valves shall be corrected or held for inspection by the Construction Manager. Valves shall be closed before being installed.

3. Valves, fittings, plugs and caps shall be set and joined to the pipe in the manner specified in this Section for cleaning, laying and joining pipe, except that 12-inch and larger valves shall be provided with special support, such as treated timbers, crushed stone, concrete pads or a sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve.

   a. Valves shall be installed in the closed position.

4. A valve box shall be provided on each underground valve.

a. They shall be carefully set, centered exactly over the operating nut and truly plumbed.

b. The valve box shall not be in direct contact with the bonnet of the valve and shall be supported in such a manner as not to transmit shock, stress, or load directly to the valve.

c. The bottom flange of the lower belled portion of the box shall be placed below the valve operating nut.

d. This flange shall be set on brick, so arranged that the weight of the valve box and superimposed loads will bear on the base and not on the valve or pipe.

e. Extension stems shall be installed where depth of bury places the operating nut in excess of 24-inches beneath finished grade so as to set the top of the operating nut 24-inches below finished grade.

f. The valve box cover shall be flush with the surface of the finished area or such other level as directed by the Construction Manager.

5. In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.

6. A valve marker shall be provided for each underground valve.

a. Unless otherwise detailed on the Drawings or directed by the Construction Manager valve markers shall be installed 6-inches inside the right-of-way or easement, and buried to a depth of 30-inches.

b. In addition to a concrete valve marker where street curbs are installed, a saw cut ½" deep "V" notch on top of curb adjacent to the water valve location is required.

7. A precast concrete vault shall be installed for 24-inch valves and larger.

K. Hydrant Installation

1. Prior to installation, inspect all hydrants for direction of opening, nozzle threading, operating nut and cap nut dimensions, tightness of pressure containing bolting, cleanliness of inlet elbow, handling damage and cracks. Defective hydrants shall be corrected or held for inspection by the Construction Manager.

2. All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the roadway, with pumper nozzle facing the roadway, except that hydrants having two hose nozzles 90 degrees apart shall be set with each nozzle facing the roadway at an angle of 45 degrees.

3. Hydrants shall be set to the established grade, with the centerline of the lowest nozzle at least 12-inches above the ground or as directed by the Construction Manager

4. Each hydrant shall be connected to the main with a 6-inch branch controlled by an independent 6-inch valve.

5. When a hydrant is set in soil that is pervious, drainage shall be provided at the base of the hydrant by placing coarse gravel or crushed stone mixed with coarse sand from the bottom of the trench to at least 6-inches above the drain port opening in the hydrant to a distance of 12-inches around the elbow.

6. When a hydrant is set in clay or other impervious soil, a drainage pit 2 x 2 x 2 feet shall be excavated below each hydrant and filled with coarse gravel or crushed stone mixed with coarse sand under and around the elbow of the hydrant and to a level of 6-inches above the drain port.

7. Hydrants shall be located as shown on the Drawings or as directed by the Construction Manager

   a. In the case of hydrants that are intended to fail at the ground-line joint upon vehicle impact, specific care must be taken to provide adequate soil resistance to avoid transmitting shock moment to the lower barrel and inlet connection.

   b. In loose or poor load bearing soil, this may be accomplished by pouring a concrete collar approximately 6-inches thick to a diameter of 24-inches at or near the ground line around the hydrant barrel.

8. All hydrants shall have fluorescent markings at the curb. Markings shall not be the same color as markings denoting water meters.

9. FIRE HYDRANTS SHALL NOT BE OPERATED WITH ANY TOOL EXCEPT A SPECIFICALLY DESIGNED FIRE HYDRANT WRENCH.

   a. It is the Contractor's responsibility to ensure that all new facilities are maintained in new condition until final completion of the project and acceptance by the County.

   b. Fire hydrants with damaged operating nuts shall not be accepted.

10. New fire hydrants, not yet in service, shall be bagged or tagged with appropriate "out of service" materials. All hydrant openings shall be capped, except when hydrant is being worked on.

L. Air Valve Vaults

1. Construct the vault or manhole as detailed on the Drawings.

2. The frame and cover or floor door shall be cast into the top slab or cone. The floor door drain shall be piped to vault exterior.

3. Vaults and manholes shall be constructed such that their walls are plumb.

M. Electronic markers shall be provided for all water mains.

1. Electronic markers shall be installed every 100 linear feet and as needed to establish a change in direction.

2. Contractor shall program markers at the time of installation according to the information template specified by the County.

3. Markers shall be programmed prior to installation, shall be locked to prevent further programming, and shall be buried 2.5 feet below finished grade, but no more than 4 feet below finished grade.

4. The County shall verify programming and location of all electronic markers, and if placement and/or programmed information is not satisfactory, Contractor shall be responsible for replacing and re-installing the marker.

3.06 CONNECTIONS TO WATER MAINS

A. Connections to existing pipe lines shall generally be made by the use of tapping sleeves and valves, except as specifically indicated on the Drawings to be otherwise, or as may be directed by the Owner.

1. In certain instances it may be specified or desirable to tap a dry line. In this circumstance a tapping sleeve and valve is required and the tap accomplished utilizing a standard tapping machine.

2. Under no circumstances will the Contractor be permitted to burn a hole in the main using oxyacetylene tools.

B. Wet Cut-Ins

1. The Contractor shall provide all labor and equipment necessary to make a cut-in to an existing water main for the purpose of making a connection, installing a valve, fire hydrant assembly, or other fittings and appurtenances.

2. A “wet cut-in” is defined to be the physical cutting into any existing water main which will result in the interruption of service to an existing customer, or which will necessitate the removal of water contained within the existing main from the excavation which is caused by the cutting into the pipe.

3. Wet cut-ins shall not be allowed to be performed on Fridays.

C. All connections shall be scheduled with the Construction Manager and Owner at least 48-hours in advance so as to permit supervision by the Owner.

D. Make connections to existing pipe lines with tapping sleeves and valves, unless specifically shown otherwise on the Drawings.

E. Location: Before laying pipe, locate the points of connection to existing water mains and uncover as necessary for the Construction Manager to confirm the nature of the connection to be made.

F. Interruption of Services: Make connections to existing water mains only when system operations permit. Operate existing valves only with the specific authorization and direct supervision of the Owner.

G. Tapping Sleeves

1. Holes in the new pipe shall be machine cut, either in the field or at the factory. No torch cutting of holes shall be permitted.

2. Prior to attaching the sleeve, the pipe shall be thoroughly cleaned, utilizing a brush and rag, as required.

3. Before performing field machine cut, the water tightness of the sleeve assembly shall be pressure tested, in the presence of the County Project Inspector.

   a. The interior of the assembly shall be filled with water.

   b. An air compressor shall be attached, which will induce a test pressure of 250 psi.

   c. No leakage shall be permitted for a period of five minutes.

4. The Contractor shall properly support the tapping sleeve and valve using bricks, blocks, wedges, or other substantial supporting materials, which will prevent the tapping valve or tapping machine to transfer any downward rotational force to the tapping sleeve.

   a. This support shall be provided before mounting the tapping machine.

5. **After attaching the sleeve to an existing main, but prior to making the tap, the interior of the assembly shall be disinfected. All surfaces to be exposed to potable water shall be swabbed or sprayed with a one percent hypochlorite solution.**

H. Connections Using Solid Sleeves: Where connections are shown on the Drawings using solid sleeves, the Contractor shall furnish materials and labor necessary to make the connection to the existing pipe line.

I. Connections Using Couplings: Where connections are shown on the Drawings using couplings, the Contractor shall furnish materials and labor necessary to make the connection to the existing pipe line, including all necessary cutting, plugging and backfill.

J. Valve Operation:

1. Existing valves may be operated by County personnel or with the specific authorization and/or direct supervision of the County.

2. The only exception is an emergency situation affecting public health or safety. Any Contractor found violating this provision may be subject to prosecution under the Code of Fulton County for tampering with County property.

3. When the Contractor requires existing valves to be operated in order to perform the work, the Contractor shall request such services from the Department of Public Works at least eight working days in advance.

K. System Shutdowns and Interruption of Services

1. Shutdowns shall be coordinated directly through the County.

   a. The Contractor shall notify the Construction Manager in writing at least eight working days in advance when scheduling the work.

b. When more than eight working days notice is deemed necessary by the County, the length of such notice shall be as shown on the Drawings.

c. Scheduling of shutdowns shall be approved at the discretion of the County.

d. The County reserves the right to cancel the shutdown if conditions warrant (i.e. heavy rain, main break, etc.).

2. Contractor will provide “Water Line Maintenance” signs as directed by the County. Signs will be as specified in Figure 1 at the end of this Section.

3. The County does not at any time guarantee the Contractor a 100 percent complete shutdown or dry shut. Dewatering shall be the responsibility of the Contractor.

4. Shutdowns will be permitted Monday through Thursday, exclusive of County holidays. The Contractor shall perform connections to existing mains requiring shutdowns at night.

a. Unless otherwise specified by the County, the hours of the shutdown shall be limited from 12:00 midnight to 6:00 A.M.

b. In business districts and other areas of high water usage, circumstances may dictate limiting the hours of shutdown from 2:00 A.M. to 6:00 A.M.

c. The excavation for the work shall be completed no later than 3:30 P.M. on the day prior to the shutdown to allow for inspection by the County.

5. The materials to be installed and the tools to be used shall be assembled and ready for inspection no later than 3:30 P.M. on the day prior to the shutdown.

a. The inside of all water system pipe and fittings to be installed shall be cleaned and swabbed with a chlorine solution of 50 mg/L, and ends of lines shall be capped until the time of installation.

b. All visible dirt and foreign materials shall be removed from the interior of the pipe and fittings. Immediately prior to installation of the assembly, the pipe and fittings shall again be swabbed with 50 mg/L chlorine solution.

c. The Contractor shall review in detail his plan of operation with the Construction Manager at the time the excavated pipe work is inspected for readiness.

6. Excavation around the existing pipe shall be sufficient to allow the work to be performed without requiring additional excavation during the connection.

a. Excavation shall be of sufficient depth to accommodate a minimum of 8-inches uniform depth of #57 stone which shall be placed by the Contractor over the entire bottom of the excavation.

b. In addition, there shall be a minimum of 12-inches clearance between the bottom of the pipe and the top of the #57 stone.

7. The Contractor shall clean and mark the locations on the existing pipe where the pipe cuts are to be made by 3:30 P.M. on the day prior to the shutdown.

   a. The Contractor shall measure the outside diameter of the pipe to be cut-in to be sure the proposed pipe and fittings are compatible with the existing pipe to be cut.

   b. All measurements shall be double-checked in the presence of the Construction Manager just prior to cutting the existing pipe.

8. The Contractor shall have sufficient crews and equipment on hand to perform the work for each connection.

   a. All equipment to be used during the work, including, but not limited to, pump, backup pump, backhoe, at least two pipe saws, fuel, tools, generators, light towers, tanker truck, etc., shall be test run and determined to be in proper running order prior to cutting of the existing pipe.

   b. If the Contractor fails to provide adequate equipment in proper running order, the Construction Manager has the option to cancel the work, and the Contractor shall request rescheduling when the deficiencies have been corrected.

9. The Contractor shall have available at the site of the work two full circle stainless steel repair clamps and two ductile iron mechanical joint plugs or caps as necessary for each size of pipe to be cut. If plugs or caps are used, appropriate thrust restraint shall be provided by the Contractor.

10. After an existing main has been taken out of service for the work, the Contractor shall make continuous progress toward restoring the water main to full service.

    a. The Contractor shall maintain sufficient crews, equipment, and supplies and shall not leave the work site until the water main work has been completed and restored to complete operation.

11. Any pump discharge shall be directed in such a manner as to ensure drainage away from the excavation to prevent flooding of streets or private property.

12. Hydrant service signs shall be placed by the Contractor on existing hydrants temporarily taken out of service as directed by the Construction Manager. Such signs shall remain in place until removal is approved by the Construction Manager.

L. The Contractor shall be responsible for any additional expense incurred by the Owner from his failure to comply with the aforementioned requirements.

   a. The Contractor shall anticipate the additional expense in performing the work at night and under partial shutdown conditions. No claims for additional compensation shall be made by the Contractor for performing

these operations outside normal working hours and complete shutdown conditions.

3.07 THRUST RESTRAINT

A. Provide restraint at all points where hydraulic thrust may develop. All restrained ductile iron pipe and fittings (tees, plugs, bends, etc.) shall include two forms of restraint – a manufactured restrained joint with either concrete blocking or tie rods as specified in Section 40 05 19.

B. Where specified or as directed, plugs, caps, tees, and bends deflecting 11¼ degrees or more shall be restrained. Restrained joint pipe and fittings shall be restrained, at a minimum, to the restraint lengths specified on the Drawings with one (1) of the following methods:

1. Method 'A': Restrained joint pipe and fittings

2. Method 'B': One (1) of the following dual (2) independent restraints:

   a. Retainer glands plus Thrust Blocking

   b. Retainer glands plus Rodding.

C. Retainer Glands:

1. Retainer glands are only allowed on MJ valves or where allowed by Construction Manager.
2. Retainer glands shall be installed in accordance with the manufacturer's recommendations, particularly, the required torque of the set screws.
3. The Contractor shall furnish a torque wrench to verify the torque on all set screws which do not have inherent torque indicators.
4. All MJ valves shall be restrained with two forms of restraint - retainer glands and thrust collar with tie rods sized to withstand 300 psi testing pressure.

D. Hydrants: Hydrants shall be attached to the water main by the following method:

1. The isolation valve shall be attached to the main by connecting the valve to the hydrant tee.
2. The isolation valve shall be attached to the hydrant by providing an anchor coupling between the valve and hydrant, if the hydrant and valve are less than two feet apart. Otherwise, provide ductile iron pipe with retainer glands on the hydrant and valve.

E. Thrust Collars:

1. Collars shall be constructed as shown on the Drawings.
2. Concrete and reinforcing steel shall meet the requirements as specified in this Section.

3. The split gland mega lug or welded on collar shall be designed to meet the minimum allowable load shown on the Drawings. The welded-on collar shall be attached to the pipe by the pipe manufacturer.

F. Concrete Blocking

1. Provide concrete blocking for all bends, tees, valves, and other points where thrust may develop, except where other exclusive means of thrust restraint are specifically shown on the Drawings.
2. Concrete shall be as specified herein before in this Section.
3. Form and pour concrete blocking at fittings as shown on the Drawings and as directed by the Construction Manager.
    a. Pour blocking against undisturbed earth. Increase dimensions when required by over excavation.
    b. The Contractor shall allow the concrete to set up for a minimum of 4-hours before backfilling.

G. Harnessing

1. Provide harness rods only where specifically shown on the Drawings or directed by the Construction Manager.
2. Harness rods shall be manufactured in accordance with ASTM A 36 and shall have an allowable tensile stress of no less than 22,000 psi. Harness rods shall be hot dip galvanized or field coated with bitumastic before backfilling.
3. Where possible, harness rods shall be installed through the mechanical joint bolt holes. Where it is not possible, provide 90 degree bend eye bolts or duc-lugs.
4. Eye bolts shall be of the same diameter as specified in AWWA C111 for that pipe size.
    a. The eye shall be welded closed.
    b. Where eye bolts are used in conjunction with harness rods, an appropriate size washer shall be utilized with a nut on each end of the harness rod.
    c. Eye bolts shall be of the same material and coating as the harness rods.

3.08 SPECIAL COATINGS

A. Surface Preparation

1. Remove loose scale, rust, dirt, excessive moisture, or frost from the surface in accordance with SSPC SP-2 (Hand Tool Cleaning).

B. Application

1. All surfaces shall be hand rubbed or brushed with a priming paste recommended by the CSM. Sharp projections such as threads, irregular contours, or badly pitted areas shall receive a liberal amount of priming paste to ensure maximum protection of metal throughout.

2. On irregular shaped surfaces, i.e., nuts, bolts, flanges, valves, etc., the Contractor shall use either of the following systems recommended by the CSM.

   a. Apply recommended mastic by hand in sufficient quantity to build an even contour over entire surface. The Contractor shall pay particular attention to ensure that folds and air pockets within the mastic layer are thoroughly pressed out prior to subsequent application of tape. OR

   b. An extra layer of tape shall be cut and carefully molded around sharp projections, nuts, bolts, etc., before final application of tape, in order to meet specified system thickness.

3. Tape shall be spirally wrapped with a 55 percent overlap and sufficient tension and pressure to provide continuous adhesion without stretching the tape. Edges of tape must be continuously smoothed and sealed by hand during wrapping. On vertical application, contractor shall begin at bottom and proceed upward creating a weatherboard overlap.

4. System Thickness

   a. Smooth contours shall have a minimum thickness of 50 mils while nuts, bolts, and sharp projections shall be 100 mils.

5. Tape

   a. Number and types of tape wraps shall be in accordance with the CSM's written instructions.

3.09 INSPECTION AND TESTING

A. All valves shall be tested at the point of manufacture in accordance with the specific AWWA standard for that size and type of valve.

1. After the valves have been set in place the Contractor shall hydrostatically field-test each valve as part of the hydrostatic test of the main.

2. Any valve that fails to be proved bubble-tight shall either be repaired to make it so, or be removed from the line and replaced.

3. Valves repaired or replaced shall be re-tested for leakage prior to acceptance by the Owner.

B. Pipes, fittings, and appurtenances shall be laid in such a manner as to leave joints water tight. After the pipe is laid, each section, as may be determined or defined by the Construction Manager, shall be properly and adequately flushed, all air removed, and then tested in accordance with AWWA C600.

1. A section of main will be considered ready for testing after completion of all thrust restraint and backfilling.
2. Each segment of water main between main valves shall be tested individually.

C. Test Preparation.

1. All testing of water mains, fittings, and appurtenances shall be conducted in the presence of the Construction Manager, and under his/her direction. To facilitate the testing, the Contractor shall furnish:
   a. Gauges and meters calibrated within 90 days of the test
   b. A corporation cock in the main for pressure pump connection
   c. A suitable pump, piping, appliances, labor, and other items necessary to conduct the pressure test
   d. A valve wrench and labor to accompany the Construction Manager to verify that all valves, including fire hydrant branch valves, are fully open during the pressure test.
   e. Temporary support or reinforcement as necessary for testing purposes.
   f. All the necessary apparatus and labor.
   g. The Owner will make water available for flushing and testing of water mains at the Contractor's expense. The Contractor shall provide whatever means necessary to transport or convey the water from a designated source to the main.
   h. NOTE: THE USE OF FIRE HYDRANTS AS A CONNECTION FOR EITHER HYDROSTATIC TESTING OR INJECTION OF CHLORINE SOLUTIONS FOR DISINFECTION IS EXPRESSLY PROHIBITED.
2. The Contractor shall notify the Construction Manager at least 24 hours in advance of the test date and perform tests in the presence of the Construction Manager.
3. For water mains less than 24 inches in diameter, flush sections thoroughly at flow velocities, greater than 2.5 feet per second, adequate to remove debris from pipe and valve seats.
4. For water mains 24 inches in diameter and larger, the main shall be carefully swept clean, and mopped if directed by the Construction Manager.
5. All stub-outs shall be flushed and included in the pressure test.
   a. Each stub-out shall be properly plugged, braced, and tested with the stub-out valve open.
   b. Following a successful pressure test, all stub-out valves shall be returned to the closed position.
6. Partially operate valves and hydrants to allow the water to flush the seats.

7. Provide temporary blocking, bulkheads, flanges and plugs as necessary, to ensure all new pipe, valves, and appurtenances will be pressure tested.
    a. Pressure test shall not commence until after thrust restraint has been installed, the line has been backfilled, and at least seven days has passed since the last concrete thrust blocking was poured.
8. Fill pipeline slowly with water at a velocity of approximately one foot per second and the specified test pressure shall be applied by means of pump connected to the pipe in a satisfactory manner.
9. Before applying test pressure, air shall be completely expelled from the pipeline and all appurtenances.
    a. Insert corporation cocks at highpoints to expel air as main is filled with water as necessary to supplement automatic air valves.
    b. Install additional 3/4" service taps at the highest elevations, including any intermediate points, of the section of the pipe to be tested, or at locations directed by the Construction Manager.
    c. Corporation stops shall be constructed as detailed on the Drawings with a meter box.
    d. Any such taps installed must be removed by the Contractor prior to final acceptance of the main.
10. Provide a suitable pump with an accurate gauge to pump the line to the specified pressure. The pump shall operate by pumping water from a separate reservoir into the main to be tested, until the specified test pressure is attained.
11. The differential pressure across a valve or hydrant shall equal the maximum possible, but not to exceed, the rated working pressure. Where necessary, provide temporary backpressure to meet the differential pressure restrictions.
12. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure.
13. Pressure shall be applied at intervals not to exceed 2000 feet.

D. Test Pressure:

1. Test the pipeline at 250 psi measured at the lowest point for at least two hours.
2. Maintain the test pressure within 5 psi of the specified test pressure for the test duration.
3. Should the pressure drop more than 5 psi at any time during the test period, the pressure shall be restored to the specified test pressure.
4. Provide an accurate pressure gauge with graduation not greater than 5 psi.
5. Any exposed pipe, fittings, valves, and joints shall be examined carefully during the test.

E. Any damaged or defective pipe, fittings, or valves following the hydrostatic pressure test or leakage test shall be repaired in a manner approved by the Construction Manager or replaced with sound material, and the test shall be repeated until it is satisfactory to the Construction Manager.

F. Allow the system to stabilize at the test pressure before conducting the leakage test.

G. Leakage

1. A leakage test shall be conducted concurrently with the hydrostatic pressure test.
   a. The leakage test shall be performed with a calibrated water meter, calibrated pressure gauge, measure container, pump and water.
   b. The Contractor shall provide certification of calibration of testing devices indicating devices were calibrated within 90 days of actual tests.
   c. All equipment shall be approved by the Construction Manager prior to performance.
2. Leakage shall be defined as the sum of the quantity of water that must be pumped into the test section to maintain pressure within 5 psi of the specified test pressure for the test duration plus water required to return line to test pressure at the end of the test. Leakage shall be the total cumulative amount measured on a water meter.
3. The County assumes no responsibility for leakage occurring through existing valves.
4. Test Results: No test section shall be accepted if the leakage exceeds the limits determined by the following formula:

$$L = \frac{SD\,(P)^{1/2}}{133{,}200}$$

Where: L = allowable leakage, in gallons per hour

S = length of pipe tested, in feet
D = nominal diameter of the pipe, in inches
P = average test pressure during the leakage test, in pounds per square inch (gauge)

As determined under Section 4 of AWWA C600.

5. If the water main section being tested contains lengths of various pipe diameters, the allowable leakage shall be the sum of the computed leakage for each diameter.

H. If any test of pipe laid discloses defects due to hydrostatic pressure test or leakage greater than that specified, the Contractor shall, at his own expense, locate and

make repairs in a manner approved by the Construction Manager and perform tests again until results are within allowable limits.

I. All visible leaks shall be repaired regardless of leakage test results.

J. Completion: After a pipeline section has been accepted, relieve test pressure. Record type, size and location of all outlets on record drawings.

3.10 DISINFECTING PIPELINE

A. After successfully pressure testing each pipeline section and before being placed in service all new water main pipe lines and accessories shall be disinfected by chlorination in accordance with AWWA C651 for the continuous-feed method and these Specifications. All chlorinating equipment, materials, labor, and supplies shall be furnished by the Contractor.

B. Specialty Contractor:

1. Disinfection shall be performed by an approved specialty contractor.
2. Before disinfection is performed, the Contractor shall submit a written procedure for approval before being permitted to proceed with the disinfection.
3, This plan shall also include the steps to be taken for the neutralization of the chlorinated water.

C. Prior to chlorination, all mud, dirt, debris, or other foreign matter shall be removed from the pipeline by a thorough flushing through fire hydrants or other approved means.

1. Each valved section of newly laid pipe shall be flushed independently.
2. This shall be performed prior to the pressure test to ensure removal of any trapped air within the pipe.

D. Chlorination

1. The preferable point of application of the chlorinating agent should be at the beginning of the pipeline extension, or any of its valved section. Application shall be through a corporation stop tapped into the newly laid pipe by means of a tapping saddle.
2. Back pressure, causing a reversal of flow in the pipe being treated, shall be prevented.
3. During the process of chlorinating the newly laid pipe, all valves or other appurtenances shall be operated to ensure the chlorinating agent is equally distributed throughout the pipeline.
4. Disinfection of water mains shall be performed in strict accordance with AWWA C651, latest edition, and the Georgia Environmental Protection Division’s Minimum Standards for Public Water Systems, latest edition.

5. Apply chlorine solution to achieve a concentration of at least 25 milligrams per liter free chlorine in new line.
   a. Retain chlorinated water for 24 hours. Water shall be supplied from a temporary source protected by appropriate backflow prevention devices.
   b. Backflow preventer must be approved by the County prior to connection.
   c. Chlorine shall be injected no more than ten feet from the beginning of the new main.
6. The highly chlorinated water shall be retained in the pipe long enough to destroy all non spore-forming bacteria.
7. After the chlorine treated water has been retained for the required time, the water shall be field tested for residual chlorine in the extremities.
8. Chlorine concentration shall be recorded at every outlet along the line at the beginning and end of the 24 hour period.
9. After 24 hours, all samples of water shall contain at least 10 milligrams per liter free chlorine.
10. Re-chlorinate if required results are not obtained on all samples.

E. Disposal of Chlorinated Water:

1. Following chlorination, all disinfection water shall be thoroughly flushed from the newly laid pipe at its extremities. This process shall continue until water sampled throughout the newly laid pipe tests both bacteriologically and chemically to be the same water quality as the water being served to the public through the existing pipelines.
2. Due to the proximity of creeks, streams, ponds, or other bodies of water, the Contractor may be directed by the Construction Manager to de-chlorinate any water flushed from the main to prevent damage to aquatic organisms, plants, fish, etc. Method and system of de-chlorination must be pre-approved by the Construction Manager.
3. Reduce chlorine residual of disinfection water to less than one milligram per liter if discharged directly to a body of water or to less than two milligrams per liter if discharged onto the ground prior to disposal.
4. Dechlorination shall be accomplished by treating water with sulfur dioxide or other reducing chemicals to neutralize chlorine residual.

F. Bacteriological Testing:

1. After flushing, the Construction Manager shall notify the County's Water Laboratory that the main is ready for bacteriological samples to be taken and processed.
2. After final flushing and before the water main is placed in service, the water samples from the line shall be taken and tested for bacteriological quality

in accordance with the rules of the Georgia Department of Natural Resources, Environmental Protection Division.

a. Two consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new main.

b. At least one set of samples shall be collected from every 1200 feet of new water main, plus one set from the end of the line (dead end or cul-de-sac) and at least one set from each branch.

c. Both sets of samples must receive passing tests in order for the line to receive a “Passed” certification.

d. Samples taking and testing shall be performed by the County's Water Laboratory Representatives.

e. FIRE HYDRANTS SHALL NOT BE USED AS SAMPLING POINTS. A SAMPLING TAP MUST BE INSTALLED AT ALL TEST POINTS.

f. NOTE: WHEN THE COUNTY WATER LABORATORY REPRESENTATIVE ATTEMPTS TO OBTAIN AN ACCEPTABLE SAMPLE, IF HE/SHE OBSERVES AIR, DISCOLORED WATER, TRASH, DEBRIS, TOO HIGH CHLORINE RESIDUAL, OR NO CHLORINE RESIDUAL IN THE WATER, NO SAMPLE WILL BE TAKEN UNTIL THE MAIN IS RE-FLUSHED.

3. Should the bacteriological test fail due to bacterial growth, the Contractor shall be directed to re-chlorinate the entire pipeline until required results are obtained at no additional cost to the Owner.

G. Unless the Construction Manager directs otherwise, cuts made into existing lines for the insertion of valves or fittings, for repairs or for any other purpose, shall be disinfected by thoroughly wetting the interior of the pipes, valve, fittings, etc. with a sprayed-on 1 percent hypochlorite solution.

3.11 PROTECTION AND RESTORATION OF WORK AREA

A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.

1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.

2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly.

3. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed.

4. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage.

5. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

6. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is complete in order to provide a neat and pleasing appearance.

7. The Department of Transportation's engineer shall be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.

B. Man-Made Improvements:

1. Protect, or remove and replace with the Construction Manager's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the Work.

C. Cultivated Growth:

1. Do not disturb cultivated trees or shrubbery unless approved by the Construction Manager.

2. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.

D. Cutting of Trees:

1. Do not cut trees for the performance of the Work except as absolutely necessary.

2. Protect trees that remain in the vicinity of the work from damage from equipment.

3. Do not store spoil from excavation against the trunks.

4. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system.

5. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman.

6. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor.

7. No stumps, wood piles, or trash piles will be permitted on the work site.

E. Disposal of Rubbish:

1. Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate city, state and federal regulatory agencies.

F. Swamps and Other Wetlands

1. The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures which alter the original topographic features within the easement.
2. All temporary construction or alterations to the original topography shall incorporate measures to prevent erosion into the surrounding swamp or wetland.
3. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area.
4. All materials of construction and other non-native materials shall be disposed by the Contractor.
5. The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between portions of a swamp, wetland or stream which may be temporarily divided by construction.
6. The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.

3.12 ABANDONING EXISTING WATER MAINS

A. General:

1. Abandon in place all existing water main segments indicated on the Drawings to be abandoned.
2. Perform abandonment after the new water main has been placed in service and all water main services have been changed over to the new main.
3. Salvage for the County, existing fire hydrants, valve boxes, valve markers, and other materials indicated on the Drawings or located on water mains abandoned.

B. Capping and Plugging

1. Where existing water mains are proposed for abandonment and where portions of the water distribution system must be shut down, the Contractor shall only be permitted to perform cut and plug operations on Monday through Thursday between the hours of 12:00 midnight and 6:00 A.M.
2. Furthermore, the County does not guarantee a complete shutdown of the distribution system should a shutdown be necessary.
3. The Contractor shall anticipate cut and plug operations having to be carried out with the system under partial pressure and provide additional equipment as necessary for such an operation at no additional cost to the County.
4. Disconnect by sawing or cutting and removing a segment of existing pipe where cutting and capping or plugging is shown on the Drawings or directed by the Construction Manager.
5. Provide a watertight pipe cap or plug and concrete blocking for restraint to seal off existing mains indicated to remain in service.

6. Seal ends of existing mains to be abandoned with a pipe cap or plug or with a masonry plug and minimum 6-inch cover of concrete on all sides around the end of the pipe.

7. The Contractor shall be responsible for uncovering and verifying the size and material of the existing main to be capped or plugged.

C. Salvaging Materials:

1. Salvage existing fire hydrants, valve boxes, valve markers and other materials as indicated on the Drawings and deliver salvaged items in good condition to the County's storage yard.

2. Coordinate delivery and placement of salvaged materials in advance with the County.

D. Blow-Off Piping:

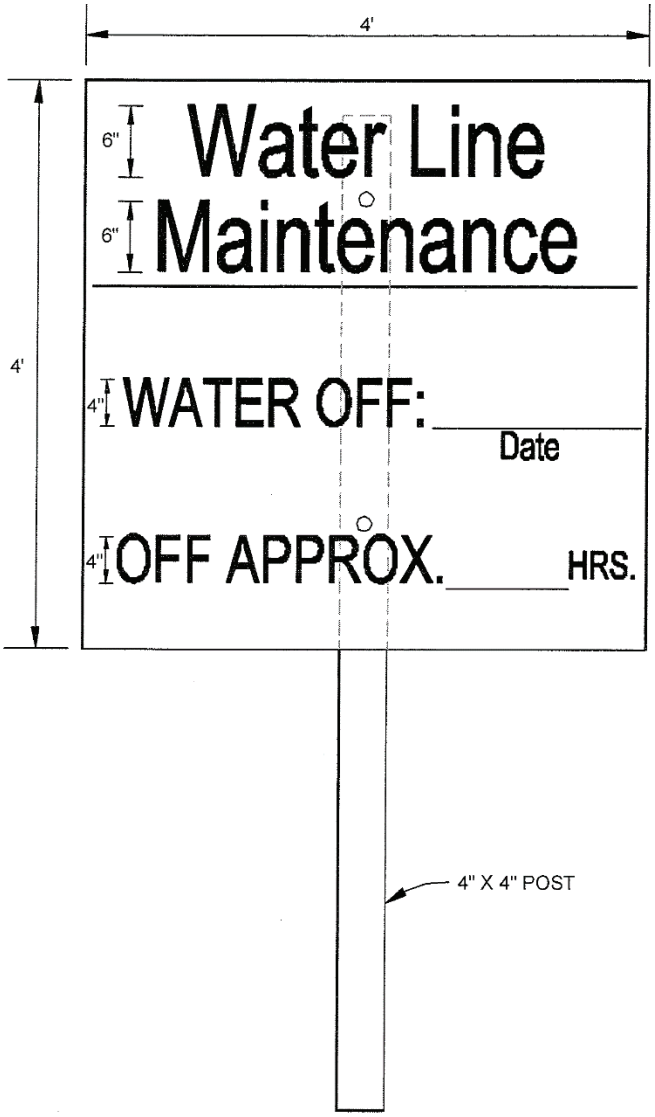
1. Remove existing blow-off piping, located on segments of water mains to be abandoned, to a minimum of two feet below finished grade.

2. Seal the end of remaining piping as specified above in paragraph B.

3. Blow-off piping removed becomes the property of the Contractor.

E. Pavement Removal and Replacement: Perform any necessary pavement removal and replacement in accordance with the details on the Drawings and Section 32 12 16 of these Specifications.

FIGURE 1



WATER LINE
MAINTENANCE
SIGN

END OF SECTION

SECTION 40 05 06

WATER SERVICE CONNECTIONS

PART 1 – GENERAL

1.01 SCOPE

A. The work covered by this Section includes furnishing all materials and equipment, providing all required labor and installing water service connections and all appurtenant work according to these Specifications and/or to the Water Connection Detail as shown schematically on the Drawings.

B. Water meters are not to be furnished nor installed. However, the water meter connection must be compatible with the water meters currently used by the Owner.

1.02 LOCATIONS

A. Locations shall be directed by the Construction Manager along the route of the water mains.

1.03 SERVICE COMPATIBILITY

A. It is the intent of these Specifications that the water service connections shall duplicate those presently being provided by the County in order to be compatible with their service maintenance procedures.

1.04 QUALITY CONTROL

A. All materials installed under this Section shall have the approval of the NSF for water services.

PART 2 – MATERIALS

2.01 MATERIALS AND CONSTRUCTION

A. Service Line

1. No galvanized or PVC pipe or fittings shall be used on water services.
2. Copper Tubing: Tubing shall be ASTM B 88, Type K. Fittings shall be brass with flare connection inlets and outlets, ANSI B16.26. Where required, adapters shall be brass ANSI B16.18. Unions shall be cast bronze. Joints shall be flare type. All fittings shall be of bronze construction with flare type connection.

B. Meter Box for Single Family Residential (where sewer service is not present)

1. Modified Polyethylene Meter Box shall have nominal dimensions of 19-1/2" X 12-3/8" X 18"

and shall have a 10,000 lb. Load Rating with a single mouse hole in each end.

2. Cover for Meter Box shall be Modified Polyethylene with "WATER METER" in minimum 1" high letters.

3. Lids shall have oblong knock out and 1/2-inch recess for meter antennae with a ferrous magnet in the lid and a plastic locking mechanism. The covers shall have a non-skid surface.

4. Meter box and lid shall be DFW Meter Box Model 1219-18-1MKF Deep. Lid only shall be Model 1219-1-MKF Deep.

5. Minimum inside dimensions shall be 19-1/2 inches x 12-3/8 inches and at least 18 inches deep.

6. Lids shall be Fulton County standard and fit snugly on the box. Lids shall be banded together with a steel strapping and painted with black asphaltic paint before shipping.

7. Lid for Stretch Yoke Box shall be DFW Model 6514-1-MKF Deep with Oblong Knock Out and 1/2-inch Recess for Meter Antennae with a Ferrous Magnet in the lid and a plastic locking mechanism.

C. Meter Box for Irrigation Meter

1. Where irrigation meters are necessary (where sewer service is present), meter boxes shall be cast iron painted black with a locking lid quad valve box.

2. Boxes shall have nominal dimensions of 14-3/4 inches x 17 inches at bottom, 12 inches x 14 inches opening, and 12 inches tall.

3. Meter box assemblies shall include one U-branch, four ball valves, two unions, two touch plugs with cotter pins, and two expansion connections.

4. The entire assembly shall be configured to allow a 7-1/2 inch meter and an ASSE 1024 dual check valve with a combined distance of 12-3/4 inches between inlet and outlet unions for the installation of the meter and ASSE 1024 dual check valve backflow preventer.

5. The County will install the meter after property owner applies for it.

6. Meter boxes shall be equal to The Ford Meter Box Company, Inc. DGHC 228-243-TT-NL Assembly Long Double Gulfbox, Angle Inlet for 5/8-inch by 3/4-inch meter drawing C14434-001.

D. Valves and Accessories

1. Curb Stops

a. Ball valves shall be full port bronze, heavy duty type.

b. Valve ends shall be threaded.

c. Valves shall have a minimum 200 psi working pressure for water.

d. Valves shall have stainless steel nut and handle. Valves shall be made in the U.S.A.

e. Curb stops shall be equal to Ford BA21-444W with padlock wings.

The stops shall open left.

2. Corporation Cocks

a. Corporation cocks shall be ground key type, shall be made of bronze conforming to ASTM B61 or B62 and shall be suitable for the working pressure of the system.

b. Ends shall be suitable for flare type joint. Coupling nut for connection to flared copper tubing shall conform to ANSI B16.26.

b. Corporation cocks shall be equal to Ford FB600-4. The cocks shall open left.

E. 1-1/2-inch water services are saddle tapped to the water main using the following brass material certified to ANSI/NSF Standard 61:

1. Brass Saddles/W (IPT) – Ford or equal:

Pipe Size	Part No.
6”	202B-750-IP6
8”	202B-962-IP6
10”	202B-1212IP6
12”	202B-1438-IP6
16”	202B-1840-IP6
20”	202B-2220-IP6
24"	202B-2650-IP6

2. 1 ½” Ballcorp Corporation Stop: Ford #FB1100-6-G-K or equal

3. 1 ½” Rolled Type K soft copper tubing

4. 1 ½” Meter Setter- A.Y. McDonald #20R600WWFF 666X402 or equal

5. Water meter box & lid are of a composite material, box 24x36x24, and lid with one 1 ¼” hole on top.

F. 2-inch water services are saddle tapped to the water main using the following brass material certified to ANSI/NSF Standard 61:

1. Brass Saddles/W (IPT) – Ford or equal:

Pipe Size	Part No.
6”	202B-750-IP7
8”	202B-962-IP7
10”	202B-1438-IP7
12”	202B-1438-IP7
16”	202B-1840-IP7
20”	202B-2220-IP7
24"	202B-2650-IP7

2. 2” Ballcorp Corporation Stop: Ford #FB1100-7-G-K or equal

3. 2” Rolled Type K soft copper tubing

4. 2" Meter Setter: A.Y. McDonald #20R700WWFF 777X15.62 or equal

5. Water meter box & lid are of a composite material, box 24x36x24, and lid with two 1 ¼" holes on top.

G. Detection Tape:

1. Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket.

2. Tapes shall be color coded in accordance with APWA color codes with the following legends: Water Systems, Safety Precaution Blue, "Caution Water Line Buried Below". Colors may be solid or striped.

3. Tape shall be permanently printed with no surface printing allowed.

4. Tape width shall be a minimum of 2-inches when buried less than 10-inches below the surface.

5. Tape width shall be a minimum of 3-inches when buried greater than 10-inches and less than 20-inches.

6. Detection tape shall be equal to Lineguard Type III Detectable or Allen Systems Detectatape.

2.02 DOUBLE DETECTOR BACKFLOW PREVENTER ASSEMBLY

A. Provide a double detector check (DDC) backflow preventer (BFP) assembly in a size to match that of the required fire line service piping. The DDC-BFP assembly shall be provided with a OS&Y gate valve near the inlet and outlet sides of the device.

B. The DDC device shall be provided with three brass ball valve test cocks fitted with brass or plastic threaded plugs. A fourth test cock shall be provided on the upstream side of the inlet shut-off valve.

C. The DDC device and shut-off valve bodies shall be cast iron, coated inside and outside with a NSF-approved, fused epoxy coating and assembled with bolts that are resistant to electrolysis. All DDC device interior/exterior components shall be of materials equal in corrosion resistance to bronze and/or stainless steel to resist electrolysis.

D. Check valves shall have replaceable seats, and be accessible by top-entry only for maintenance and repair.

E. The detector bypass line on the DDC-BFP assembly shall be of 3/4-inch copper pipe and have a bronze detector meter and a 3/4-inch DCV-BFP complete with unions and shut-off valves.

F. The DDC-BFP assembly shall be classified or listed by the Underwriters Laboratories, Factory Mutual Insurance, and bear the ASSE seal (ASSE Standard 1049).

1. The DDC-BFP assembly shall have approval of and conform to all current requirements of the University of Southern California, Foundation for Cross-

Connection Control (USC-FCCC).

2. The DDC-BFP assembly shall be individually factory tested, shipped and installed as a unit.

G. The DDC-BFP assembly shall not be buried in earth but installed below ground in a concrete vault, and as close as practical to the property line of the premises.

H. Under no condition will any connection be allowed on the system other than for fire fighting or fire protection purposes.

I. All DDC-BFP assemblies shall be tested at the time of installation and at least annually thereafter. A copy of all test and maintenance reports must be submitted to the Fulton County Water Department, Dogwood Station.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Water Service Connections

1. Immediately following completion of the water main system, water service connections and meter boxes shall be installed for the properties adjacent to the water transmission mains both to the same side of the roadway (Short Side Service) and to the opposite side of the roadway (Long Side Service) as directed by the Construction Manager.

2. The Contractor shall be prepared to make emergency repairs to the water system, if necessary, due to damage by others working in the area.

   a. In conjunction with this requirement, the Contractor shall furnish and have available at all times, a tapping machine, for the purpose of making temporary water service taps or emergency repairs to damaged water services.

   b. The Contractor shall furnish the County a phone number of an individual with the authority to initiate emergency repair work. This number must be provided prior to starting work on the Project.

3. All services connected to water main shall be through individual 1-inch direct taps regardless of service and meter size with the exception of 1 ½” and 2” inch services and above.

4. The water main shall be tapped with a tapping machine specifically designed for that purpose.

   a. The tap shall be a direct tap into the water main through a 1-inch brass corporation cock. All taps shall be supervised by the County.

   b. All taps shall be made on the water main at a position so as not to be the top side of the pipe nor the bottom of the pipe.

   c. Distance between taps must be a minimum of 12 inches apart and not in line with each other.

5. Installation shall conform to the details for water service connections appearing schematically on the Drawings. Contractor shall provide any and all appurtenant work required to provide the intended water service connections.

B. Service Lines

1. Copper tubing between tap and water meter shall be one continuous length of pipe with no intermediate joints or connections. The service line shall be placed without sharp turns or bends from the water main to the meter box.

2. When meters are located on the opposite side of the street from the water main, new copper service lines shall be extended through a common 6-inch bore, Schedule 40 PVC conduit to the service side.

    a. Replacement of existing services may be by free bore without a casing.

3. Provide detection tape over all service lines.

4. Service lines shall have a minimum 48-inch clear cover between main and meter, shallowing to allow a bury of 12-inches at the meter location.

C. Meter Boxes

1. The meter box shall be located one foot from back of right of way.

    a. The meter box lid shall be set at finished grade.

    b. The meter box shall be placed on two courses of brick on a bed of gravel or crushed stone. Brick shall not be placed on top of water service lines.

    c. The bed of gravel or crushed stone shall be 3-inches thick and extend 6-inches in all directions beyond the edge of the meter box.

    d. The box shall be carefully and uniformly backfilled to prevent distortion that would cause leaks.

    e. Meter boxes shall be located in pairs within two feet of the common property lines between the lots.

2. All water meters shall have fluorescent markings at curb.

    a. Markings shall not be the same color as markings denoting hydrants.

    b. In addition to fluorescent markings, a saw cut ½" deep "W" notch on top of curb at water service location is required.

D. Relocation of Service Lines

1. Relocate the existing meter to the new right-ofway limits as shown on the drawings or as ordered by the Construction Manager and reconnect to the house service. Existing meters already located at the new -right-ofway- limits will not need relocating.

2. Before disconnecting the existing meter, the existing corporation cock in the main

shall be closed. All existing meters and meter boxes shall be removed if not already located at the right-ofway, reinstalled and reconnected as indicated- on the Drawings.

3. Existing service lines shall be field located by the Contractor. The Contractor shall be responsible for locating existing water meters, relocating the meters and meter boxes as necessary, and determining the existing size service line to reconnect the meters to the new water mains-.

4. All service lines installed under existing pavement, including streets, driveways and sidewalks, shall be installed by boring.

E. Transfer of Service:

1. Immediately before connecting to the relocated or existing meter, all service lines shall be flushed to remove any foreign matter.

2. Any special fittings required to reconnect the existing meter to the new copper service line, or the existing private service line, shall be provided by the Contractor.

3. To minimize out of service time, the Contractor shall determine the connections to be made and have all the required pipe and fittings on hand before shutting off the existing service.

4. After completing the connection, the new corporation stop shall be opened and all visible leaks shall be repaired.

F. Maintenance and Repairs: The tap, service line and meter box shall remain under the Contractor's maintenance responsibility for the same warranty period as the water main. The Contractor shall promptly repair any damage to the water system during the warranty period.

END OF SECTION

SECTION 40 05 06.16

PIPING CONNECTIONS

PART 1 – GENERAL

1.01 DESCRIPTION

A. This section specifies the following methods of connecting metallic piping: flanges, threading, mechanical couplings, equipment connection fittings, and dielectric unions.

1.02 REFERENCES

A. This section contains references to the following documents.

1. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.
2. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
3. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids).
4. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
5. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI B1.1	Unified Inch Screw Threads (UN and UNR Thread Form)
ANSI B1.20.1	Pipe Threads, General Purpose (Inch)
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings
ANSI B16.5	Pipe Flanges and Flanged Fittings
ANSI B18.2.1	Square and Hex Bolts and Screws Inch Series
ANSI B18.2.2	Square and Hex Nuts (Inch Series)
ANSI B31.1	Power Piping
ANSI B31.3	Chemical Plant and Petroleum Refinery Piping

Reference	Title
ASME Section IX	Boiler and Pressure Vessel Code; Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators Qualifications
ASTM B98	Copper-Silicon Alloy Rod, Bar and Shapes
ASTM F37	Standard Test Methods for Sealability of Gasket Materials
ASTM F104	Standard Classification System for Nonmetallic Gasket Materials
ASTM F152	Standard Test Methods for Tension Testing of Nonmetallic Gasket Materials
ASTM F593	Stainless Steel Bolts, Hex Cap Screws, and Studs
AWWA C111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C206	Field Welding of Steel Water Pipe
AWWA C207	Steel Pipe Flanges for Waterworks Service-Size 4 in. through 144 in.
AWWA C219	Bolted, Sleeve-Type Couplings for Plain-End Pipe
AWWA C550	Protective Epoxy Coatings for Valves and Hydrants
AWWA C606	Grooved and Shouldered Joints
AWWA M11	Steel Pipe-A Guide for Design and Installation
NSF 61	Drinking Water System Components - Health Effects

1.03 SUBMITTALS

A. In addition to the material listed in the detailed specification, the following submittals shall be provided in accordance with Section 01 33 00:

1. For Equipment Connection Fittings used in pumping applications submit thrust rod stretch calculations and dimensional layout data.

PART 2 – PRODUCTS .

2.01 MECHANICAL COUPLINGS

A. Sleeve-Type Couplings:

1. Unless otherwise specified, sleeve-type mechanical pipe couplings shall be Smith-Blair Type 411, Dresser Style 38, or equal, with the stop removed from the middle ring.

2. Reducing couplings shall be Smith-Blair Type 415, Dresser Style 62, or equal.

3. Sleeve-type flanged coupling adapters shall be Smith-Blair Type 913, Dresser Style 128, or equal.

4. Insulating couplings shall be Smith-Blair Type 416, Dresser Style 39, or equal.

5. Bolts for submerged service shall be made of Type 316 stainless steel in conformance with ASTM F593, markingF593F.

6. Nuts for submerged service shall be made of copper-silicon alloy bronze conforming to ASTM B98, alloy C65100, designation H04, or alloy C65500, designation H04.

7. Bolts and nuts for buried services shall be made of noncorrosive high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21, regardless of any other protective coating. Where washers are required, they shall be of the same material as the associated bolts.

8. Gaskets shall be as specified in paragraph 2.03 and AWWA C111.

B. Plain End Couplings:

1. Plain end pipe couplings for pipe sizes 6 inches and smaller shall be Gustin-Bacon 200, Victaulic Style 99, or equal for Schedule 80 pipe and Gustin-Bacon 205, Victaulic Style 90, or equal for lighter weight pipe.

2. Plain end couplings for pipe sizes 8 inches and larger shall be Gustin-Bacon 200, Victaulic Style 99, or equal.

3. Unless otherwise specified, bolts and nuts shall comply with AWWA C606.

4. Gaskets shall be as specified in paragraph 2.03 and AWWA C606.

C. Dismantling Joints:

1. Dismantling joints may be used as takedown couplings in accordance with paragraph 3.03.

2. Dismantling joints shall fully restrained double flange fittings consisting of a flange coupling adapter and flanged spool piece that allows for longitudinal adjustment.

3. Thrust restraint shall be provided by means of all threaded rod spanning between flanges and secured to the flanges with a minimum of two flange bolts.

4. Dismantling joints shall be Romac DJ-400, Smith Blair 975, or Crane-Viking Johnson Dismantling Joint.

D. Equipment Connection Fittings

1. Design of equipment connection fittings shall conform to AWWA C219.

   a. Sleeves shall be carbon steel or as specified for the specific piping system.

   b. Pressure rating of flange adapters shall equal or exceed the pressure rating of mating flanges.

c. All metal portions of equipment connection fittings, with the exception of 316 stainless steel components, shall be coated and lined with fusion bonded epoxy conforming to AWWA C550 and NSF 61.

d. Equipment connection fittings shall be Romac ECF400 Series or equal.

E. Pipe thread dimensions and size limits shall conform to ANSI Bl.20.1.

2.02 DIELECTRIC UNIONS

A. Dielectric unions shall be EPCO, Capitol Manufacturing, or equal.

PART 3 – EXECUTION

3.01 PIPE CUTTING, THREADING AND JOINTING

A. Pipe cutting, threading and jointing shall conform to the requirements of ANSI B31.1.

3.02 TAKEDOWN COUPLINGS

A. Takedown couplings shall be screw unions, flanged or grooved end mechanical coupling type joints and shall be provided as specified.

B. Flanged or grooved end joints shall be employed on pipelines 2-1/2 inches in diameter and larger. Where piping passes through walls, takedown couplings shall be provided within 3 feet of the wall, unless specified otherwise.

C. A union or flanged connection shall be provided within 2 feet of each threaded end valve.

3.03 FLEXIBILITY

A. Unless otherwise specified, piping passing from concrete to earth shall be provided with two pipe couplings or flexible joints on the buried pipe as follows:

1. Within 2 feet of the structure for 2-inch through 6-inch diameter pipe.
2. Within 3 feet of the structure for 8-inch through 24-inch diameter pipe.
3. Within one and one-half pipe diameters of the structure for larger pipe.

B. Where required for resistance to pressure, mechanical couplings shall be restrained in accordance with Chapter 13 of AWWA M11, including Tables 13-4, 13-5 and 13-5A, and Figure 13-20.

3.04 DIELECTRIC CONNECTIONS

A. Where a copper pipe is connected to steel or cast iron pipe, an insulating section of rubber or plastic pipe shall be provided.

B. The insulating section shall have a minimum length of 12 pipe diameters.

C. Dielectric unions as specified in paragraph 2.05 may be used instead of the specified insulating sections.

3.05 EQUIPMENT CONNECTION FITTINGS

A. Shall be required:

1. To permit easy disassembly and reassembly
2. To provide misalignment adjustment between equipment connection flanges and the connection to field piping.
3. To provide full pressure thrust restraint between the field piping connection and equipment connection flanges.
4. To Impede the transmission of damaging forces.

B. Equipment connection fittings shall each conform to the requirements of the specified piping system of sufficient length to span the gap between the connection at the equipment and the connection at the field piping with gasketed flange adapters at each end.

END OF SECTION

SECTION 40 05 19

DUCTILE IRON PIPE

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. This section specifies ductile iron pipe, ductile fittings and gaskets.

B. Definition:

1. Where cast iron pipe is specified, the term and symbol shall mean ductile iron pipe.

1.02 REFERENCES

A. This section contains references to the following documents.

1. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.
2. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
3. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids).
4. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
5. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI B1.1	Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms)
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250, and 800
ANSI B16.5	Pipe Flanges and Flanged Fittings
ASTM A 193	High Tensile Alloy and Stainless Steel Bolts

Reference	Title
ASTM A 194	Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
ASTM A242	Standard Specification for High-Strength Low-Alloy Structural Steel
ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A563	Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric)
ASTM A716	Ductile-Iron Culvert Pipe
ASTM B633	Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C150	Portland Cement
AWWA C104 (ANSI A21.4)	Cement-Mortar Lining for Ductile- Iron and Gray-Iron Pipe and Fittings for Water
AWWA C105 (ANSI A21.5)	American National Standard for Polyethylene Encasement For Ductile-Iron Pipe Systems
AWWA C110 (ANSI A21.10)	Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In., for Water and Other Liquids
AWWA C111 (ANSI A21.11)	Rubber-Gasket Joints for Ductile- Iron and Gray-Iron Pressure Pipe and Fittings
AWWA C115 (ANSI A21.15)	Flanged Ductile-Iron and Gray-Iron Pipe With Threaded Flanges
AWWA C116 (ANSI A21.16-09)	Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
AWWA C150 (ANSI A21.50)	Thickness Design of Ductile-Iron Pipe
AWWA C151 (ANSI A21.51)	Ductile-Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
AWWA C153 (ANSI A21.53)	Ductile-Iron Compact Fittings, 3 In. Through 12 In. for Water and Other Liquids
AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C606	Grooved and Shouldered Type Joints

1.03 SUBMITTALS

A. The following information shall be provided in accordance with Section 01 33 23:

1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.

a. Check marks shall denote full compliance with a paragraph as a whole.

b. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation.

c. The Engineer shall be the final authority for determining acceptability of requested deviations.

d. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications.

2. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

B. The following information shall be submitted by pipe and fitting suppliers

1. Name of the pipe manufacturer and a list of the piping and quantities to be provided by manufacturer.

2. Name(s) of fitting manufacturer(s) and lists of fittings and quantities to be provided by manufacturer.

3. Pipe and fitting product data indicating conformance with this Specification, applicable standards, and warranty provisions, including written documentation regarding any intended variance from this specification and applicable standards.

4. At the time of shipment, the supplier shall provide certified documentation of pipe and fitting conformance with this Specification and applicable pipe and fitting standards specified herein.

PART 2 – PRODUCTS

2.01 GENERAL

A. Pipe design, materials and manufacture shall comply with the following documents:

Item	Document
Thickness design	AWWA C150
Manufacturing requirements	
• Water or other liquid	AWWA C151
Gravity service pipe	ASTM A716
Joints	
• Rubber gasket	AWWA C111

Item	Document
• Threaded flange	AWWA C115
Fittings	
• Water or other liquid	AWWA C110/AWWA C153
Cement mortar lining	AWWA C104

B. All ductile iron pipe shall be marked in accordance with AWWA C151 and ductile iron fittings shall be marked in accordance with AWWA C110.

C. Acceptable Manufacturers

1. American Cast Iron Company
2. U.S. Pipe
3. Or approved equal

2.02 PIPE

B. All pipe shall be Class 51 (thickness class) for 16-inch and smaller, and Class 51 for 18-inch and larger, unless otherwise specified or shown on the Drawings.

A. Flanged pipe minimum wall thickness shall be equal to Special Class 53. Flanges shall be furnished by the pipe manufacturer.

B. All pipes shall have a minimum pressure rating as indicated in the following table, unless otherwise specified or shown on the Drawings:

Diameter	Minimum Pressure Class
4” through 20”	350
24” and greater	300

C. Unless otherwise specified, pipe shall have nominal laying lengths of 18 or 20 feet.

D. All pipe shall be manufactured in the United States of America.

E. Certificates of conformance with the foregoing specifications shall be furnished with each lot of pipe supplied.

2.03 GASKETS

A. Unless otherwise specified, gasket stock shall be a synthetic rubber compound in which the elastomer is nitrile or neoprene.

1. The compound shall contain not less than 50 percent by volume nitrile or neoprene and shall be free from factice, reclaimed rubber and other deleterious substances.

B. Gaskets for flanges shall be the full face type and 1/8 inch thick.

C. Gaskets shall, in addition, comply with AWWA C111 for push-on and mechanical joints and with AWWA C606 for grooved end joints.

D. Sufficient lubricant shall be furnished with each order of pipe to provide a thin coating on both the gasket and the spigot-end of the pipe.

1. Lubricant shall be NSF 61 approved and shall have no deleterious effect on the rubber gasket.

2. Lubricant shall be of such consistency that it can be easily applied to the pipe in either hot or cold weather, and shall satisfactorily adhere to either wet or dry pipe.

3. ONLY LUBRICANT FURNISHED WITH THE PIPE BY THE PIPE MANUFACTURER SHALL BE USED.

2.04 FITTINGS

A. Unless otherwise specified, fittings shall conform to AWWA C110 with a minimum rated working pressure of 250 psi.

B. Ends shall be flanged, restrained mechanical joint, restrained push-on, or grooved to suit the conditions specified.

C. The AWWA C153 compact ductile iron fittings in sizes 3 through 12 inches are an acceptable substitute for standard fittings unless otherwise specified.

D. In general, use flanged fittings with long radius elbows except where space limitations prohibit use of same.

E. Design of special flanged fittings, including wall castings, shall conform to dimensions and details as directed, indicated, or noted on the approved drawings.

F. Fittings shall be cement lined in accordance with AWWA C104 and shall be furnished with a bituminous outside coating.

G. In lieu of cement lining and bituminous coating, fittings may be provided with a fusion bonded coating and lining meeting the requirements of AWWA C116.

H. Galvanized pipe fittings and PVC pipe fittings shall not be used as any part of the Fulton County Water Transmission and Distribution System, nor shall it be used to join any appurtenances to the System.

2.05 JOINTS

A. Unrestrained Joints:

1. Push-On Joints:

a. Unrestrained joints, where specified, shall be the rubber ring compression, push-on type joint suitable for buried services.

b. Acceptable unrestrained joints shall be:

1) Fastite Joint as manufactured by American Cast Iron Pipe Company

2) Tyton Joint as manufactured by U.S. Pipe

3) Or approved equal.

c. This joint is not permitted on fittings or specials, unless otherwise specified.

d. Unless otherwise specified, joints shall have an allowable maximum deflection up to 5 degrees at specified pressures.

e. Joint assembly and field cut joints shall be made in strict conformance with AWWA C600 and manufacturer's recommendations.

2. Mechanical Joints:

a. Where specified, mechanical joints for above or below ground services shall meet the requirements of ANSI/AWWA A21.10/C110 and ANSI/AWWA A21.11/C111.

b. Mechanical joint glands shall be ductile iron.

c. Gaskets and bolts and nuts shall comply with paragraphs 2.03 and 2.05D, respectively.

B. Restrained Joints:

1. General:

a. Unless otherwise specified, restrained joints shall be flanged or grooved end for exposed service and restrained push-on or restrained mechanical for buried services.

b. Restrained joint pipe (RJP) on supports shall have bolted joints and shall be specifically designed for clear spans of at least 36 feet.

2. Push-On Joints:

a. Restrained push-on joints shall be as specified in paragraph 2.05A, modified for restraint.

b. Acceptable restrained push on Joints

1) Flex-Ring or Lok-Ring Joint as manufactured by American Cast Iron Pipe Company,

2) TR Flex or HP Lok Joint as manufactured by US Pipe

3) Clow “SUPER-LOCK”

4) Griffin “SNAP-LOK”

5) Or approved equal.

c. Restraining gasket joints shall be assembled with American Fast-Grip gaskets or US Pipe FIELD LOK gaskets and may be used for pipe 12-Inches in diameter or less.

d. Restrained joints shall be capable of being deflected after full assembly.

e. Joint assembly shall be in strict conformance with AWWA C600 and manufacturer's recommendations.

f. No field welding for manufactured restrained joint pipe assembly will be permitted.

g. No field cuts of restrained pipe are permitted without prior approval of the Construction Manager.

h. Where field cutting of restrained joint pipe is required, the joint shall be assembled with American Field Flex-Rings or US Pipe TR FLEX GRIPPER Rings.

3. Flange Joints:

a. Unless otherwise specified, flanges shall be flat faced, ductile iron and shall be threaded-on flanges conforming to ANSI/AWWA A21.15/C115 or cast-on flanges conforming to ANSI/AWWA A21.10/C110.

b. Flanges shall be adequate for 250 psi working pressure.

c. Bolt circle and bolt holes shall match those of ANSI B16.1, Class 125 flanges and ANSI B16.5, Class 150 flanges.

d. Where specified, flanges shall be threaded-on or cast-on flanges conforming to ANSI B16.1, Class 125.

e. Gaskets shall be as specified in Paragraph 2.03.

1. Thrust collars shall be welded on ductile iron body type or split retainer gland type, as shown on the Drawings or directed by the Construction Manager, designed to withstand thrust due to 250 psi internal pressure on a dead end.

4. Anchorage:

a. All valves, caps, tees, bends deflecting 11 ¼ degrees or more and other fittings shall have two forms of restraint as one of the following:

1) Manufactured restrained joint plus concrete blocking (3,000 psi concrete thrust block sized to withstand line pressures of 300 psi and soil bearing pressures of 2,000 psf)

2) Manufactured restrained joint plus rodding to concrete thrust collar (3,000 psi concrete collar and tie rods sized to withstand line pressures of 300 psi and soil bearing pressures of 2,000 psf)

5. Mechanical Joints:

a. Where specified, restrained mechanical joints shall be the positive restraint type.

b. Retainer glands on a mechanical joint may be used as a restrained joint only where retainer glands are specifically shown on the drawings, where specifically specified or where specifically identified and allowed by the Construction Manager.

1) Retainer glands shall be Megalug Series 1100, as manufactured by EBAA Iron, or Uni-Flange Series 1400, as manufactured by Ford Meter Box Company.

c. Locked mechanical hydrant tees, bends and adapters are an acceptable substitute for anchoring fire hydrants and valves to the pipe main.

C. Ball and Socket Flexible Joint Pipe:

1. Ball and socket flexible joint pipe shall be the boltless type and shall allow a maximum joint deflection of 15 degrees.

2. Each joint shall be provided with a retainer lock to prevent rotation after assembly.

3. Joints shall be the Flex-Lok Joint as manufactured by American Cast Iron Pipe Company, USIFLEX as manufactured by U.S. Pipe, or equal.

D. Bolts and Nuts:

1. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit. All bolts and nuts shall be made in the U.S.A.

2. Bolts and nuts for mechanical joints shall be Tee Head Bolts and nuts of high strength low alloy steel in accordance with ASTM A 242 to the dimensions shown in AWWA C111/ANSI A21.11.

2. Flanged joints shall be bolted with through stud or tap bolts of required size as directed. Bolt length and diameter shall conform to ANSI/AWWA C115 for Class 125 flanges shown in ANSI/ASME B16.1.

3. Bolts for exposed service shall be zinc plated, cold pressed, steel machine bolts conforming to ASTM A 307, Grade B. Nuts for exposed service shall be zinc plated, heavy hex conforming to ASTM A 563. Zinc plating shall conform to ASTM B 633, Type II.

4. Bolts for submerged service shall be stainless steel machine bolts conforming to ASTM A 193, Grade B8M. Nuts shall be heavy hex, stainless steel conforming to ASTM A 194, Grade 8M.

5. Corrosion-resistant bolts and nuts for use with ductile iron joints shall be Type 316 stainless steel.

C. Thrust collars shall be welded on ductile iron body type or split retainer gland type, as shown on the Drawings or directed by the Construction Project Manager, designed to withstand thrust due to 250 psi internal pressure on a dead end.

E. Tapping Saddles: Tapping saddles are not allowed.

D. Pipe outlets shall be welded on ductile iron pipe and shall be provided in lieu of tees or saddles on mains with a diameter greater than or equal to 24-inches.

1. Outlets shall be plain end, push-on, mechanical or flanged joint, and shall meet the joint requirements stated in this Specification.
2. All welding, fabrication and outlet hole drilling shall be performed by the manufacturer of the parent pipe.
3. Outlets shall be free of burrs. Sizes shall be as indicated on the Drawings.
4. The outlets and parent pipe shall be minimum Class 53 ductile iron pipe for parent pipe 54-inches and smaller.
5. For pipe larger than 54-inches, parent pipe shall be Pressure Class 350.
6. Each welded outlet shall be rated for 250 psi working pressure and hydrostatically tested at 500 psi.
7. The maximum outlet diameters shall not exceed those listed in the table below:

Parent Pipe Diameter, Inches	Maximum Outlet Diameter, Inches
24	16
30	20
36	24
42	30
48	30
54	30
60	30
64	30

2.06 PIPE COATING

A. The exterior of ductile iron pipe and fittings shall be coated with a layer of arc-sprayed zinc per ISO 8179.

1. The mass of the zinc applied shall be 200 g/m^2 of pipe surface area.
2. A finishing layer of bituminous topcoat as specified in AWWA C151 shall be applied to pipe and fitting over the zinc.
3. The coating system shall conform in every respect to ISO 8179-1 “Ductile iron pipes – External zinc-based coating - Part 1: Metallic zinc with finishing layer. Second edition 2004- 06-01.”

B. Where corrosive soils or soils with electrical currents are encountered that may, or in the judgment of the Owner, cause a deleterious effect on the piping system, the piping system shall be wrapped with polyethylene in accordance with the manufacturers recommendations to a minimum distance of 20 lineal feet beyond such conditions.

1. All elements of the piping system shall be wrapped entirely in polyethylene tubbing and secured with polyethylene tape to completely prevent the entrance of foreign matter.

2. Such encasement shall be carried out in accordance with AWWA/ANSI C105/A21.5.

2.07 PIPE LINING

A. Cement Mortar Lining:

1. Pipe:

a. Cement mortar lining shall be to Standard thickness in accordance with ANSI/AWWA C104/A21.4 .

2. Fittings:

a. Cement mortar lining shall be to Double thickness in accordance with ANSI/AWWA C104/A21.4

2.08 PRODUCT DATA

A. The following information shall be provided in accordance with Section 01 33 23:

1. Shop drawings.

2. Alignment drawings.

3. Certifications specified in the following documents:

a. ASTM A716, paragraph 4.2

b. AWWA C110, paragraph 10-5.3

c. AWWA C111, paragraph 11-7.1

d. AWWA C115, paragraph 15-4.2

e. AWWA C151, paragraph 51-5.2

f. AWWA C153, paragraph 53-6.3

g. AWWA C606, paragraph 4.1.1.1

PART 3 – EXECUTION

3.01 INSTALLATION

A. General:

1. Piping runs specified on the Drawings shall be followed as closely as possible. Proposed deviations shall be submitted in accordance with Section 01 33 00.
2. Pipe shall be installed in accordance with AWWA C600.
3. Coatings and linings shall be inspected for damage during installation, and damage shall be repaired according to the coating manufacturer's recommendations.

B. Insulating Sections:

1. Where a metallic nonferrous pipe or appurtenance is connected to ferrous pipe or appurtenance, an insulating section shall be provided as specified in Section 40 05 06.16.

C. Anchorage:

1. Anchorage shall be provided as specified. Calculations and drawings for proposed alternative anchorage shall be submitted in accordance with Section 01 33 00.

3.02 ACCEPTANCE TESTING

A. Hydrostatic pressure and leakage tests shall be conducted in accordance with Section 4 of AWWA C600 except that test pressures and allowable leakage shall be as listed in Section 40 05 01.

B. Contractor shall conduct the tests in the presence of Construction Manager.

3.03 GUARANTEE

A. Material Warranty:

1. A written guarantee of 20 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the pipe and fittings material.
2. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.

B. Workmanship Warranty:

1. The Contractor shall guarantee the Work is free from defects in material and workmanship for a period of 10 years from the final acceptance

including, but not be limited to, all water mains, appurtenances, trenches, roadways, landscaping, and other areas disturbed by the construction of the project.

2. The warranty shall cover the costs to repair or replace items including, but not be limited to, water mains, service mains appurtenances, trenches, roadways, landscaping, other areas disturbed by the construction of the project and freight to project site, should these items have any defects in material or workmanship.
3. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the installer of warranty responsibility for the full warranty term.

C. Deficiencies related to material and workmanship shall be repaired by Contractor to the satisfaction of the Construction Manager.

D. No bell clamps or wrap around corsets are allowed as a means of repair on new pipelines.

E. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

F. If required, Contractor and pipe manufacturer representatives may participate in inspections to determine such deficiencies.

G. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract.

H. The Contractor shall be responsible for repairs to any trench settlements caused by leaking pipe, fittings, etc. He shall promptly furnish and place fill to original grade.

I. Should any leaks or trench settlement occur under the new pavement, the Contractor will be held responsible for the cost of all repairs, including pavement replacement.

J. Within the guarantee period, where no loss of customer service or property damage is involved, the Contractor shall begin work on requested repairs or corrective measures with 24 hours following notification by Owner.

K. If property damage or loss of customer service is involved, the Contractor shall begin work with four (4) hours of notification by Owner.

L. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

3.04 INSPECTION

A. Furnish to Owner copies of the Manufacturer's Sworn Certificate of Inspection and Testing of all ductile iron pipe and ductile iron fittings provided on the Work.

B. All ductile iron pipe and cast iron fittings will be subject to inspection and approval by Owner after delivery of material to the site. Do not use broken, cracked, misshaped, imperfectly coated, unsatisfactory, or otherwise damaged pipe or fittings.

C. Such inspection by Owner does not relieve the Contractor of full responsibility for the material installed.

END OF SECTION

SECTION 40 05 64

BUTTERFLY VALVES

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. This Section specifies resilient seated butterfly valves 16 inches in diameter and larger for services in the water systems. Unless specified otherwise, the valves shall be manually operated.

B. Type:

1. Butterfly valves shall be resilient seated, short body design, and shall be designed, manufactured, and tested in accordance with all requirements of AWWA C504 and as modified below.
2. All valves furnished under this specification shall be suitable for installation in vaults or direct burial as specified. Unless otherwise specified, all valves shall conform to ANSI/AWWA 504.

C. Design and Performance Requirements:

1. Valves shall be designed for a rated working pressure of 250 psi
2. Valves furnished under this specification shall be suitable for use in water services.
3. Valves furnished under this specification shall be Class 250.
4. Valve shall be able to withstand a 500 psi pressure test without being damaged.

1.02 REFERENCES

A. This section contains references to the following documents.

1. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.
2. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
3. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids).
4. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement

documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

5. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800
ANSI B16.5	Pipe Flanges and Flanged Fittings
ANSI B46.1	Surface Texture
ASTM A36	Structural Steel
ASTM A48	Gray Iron Castings
ASTM A108	Steel Bars, Carbon, Cold-Finished, Standard Quality
ASTM A126	Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A216/A216M	Steel Castings, Carbon, Suitable for Fusion Welding, for High Temperature Service
ASTM A276	Stainless and Heat-Resisting Steel Bars and Shapes
ASTM A436	Austenitic Gray Iron Castings
ASTM A536	Ductile Iron Castings
AWWA C504	Rubber-Seated Butterfly Valves
ANSI/NSF 61	Drinking Water System Components Health Effects

1.03 SUBMITTALS

A. Action Submittals:

1. Procedures: Section 01 33 00.
2. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
   a. Check marks (✓) shall denote full compliance with a paragraph as a whole.
   b. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation.
   c. The Construction Manager shall be the final authority for determining acceptability of requested deviations.

d. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications.

e. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

3. Affidavit of compliance, as required by AWWA C504.

4. Catalog information, sectional views showing internal details, dimensions, weights, and bills of material detailing construction materials for the each size and Type valve. This information shall be in sufficient detail to demonstrate compliance with this Section and any related specification.

5. Installation drawings depicting the arrangement of each valve.

B. Informational Submittals:

1. Procedures: Section 01 33 00

2. Certified test records.

a. Certification shall be by an officer of the manufacturing corporation.

3. Installation details and instructions.

4. Manufacturer's Installation Certification Form 43 05 11-A specified in Section 01 99 90.

1.04 FACTORY TESTS

A. Butterfly valves shall be subjected to hydrostatic and leakage tests in accordance with ANSI/AWWA C504.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Candidate manufacturers are listed below. The manufacturer's standard product may require modification to conform to specified requirements:

1. DeZurik
2. American
3. M&H
4. Mueller
5. Pratt

B. All valves shall be manufactured in the U.S.A.

2.02 MATERIALS

A. Valves shall be 250 pound valves constructed of the following materials unless otherwise specified:

Component	Material
Shaft and Shaft Hardware	Stainless steel, ASTM A564, Type 630, machined and polished
Disc	Ductile iron, ASTM A536, Gr 65-45-12
Seat Mating Surface	See Paragraph 2.03 C
Seat Sealing Surface	See Paragraph 2.03 C
Body	Ductile iron, ASTM A536, Gr 65-45-12

B. All materials shall be NSF-61 compliant.

2.03 MANUFACTURE

A. Body:

1. The body shall have openings equal to the size of the connecting piping and shall be arranged for installation with the shaft in the horizontal.
2. Finish on all body waterway surfaces shall be 3.2 or better in accordance with ANSI B42.1.
3. The valve shall be suitable for buried or exposed installation as specified.
4. A mounting pad shall be provided on the extended shaft end of the body for mounting the worm gear operator.
5. Valve for buried services shall be mechanical joint type, except where other joint ends are shown.
6. Valves for exposed services shall have flanged joints meeting the requirements of ANSI B16.1, Class 250, but drilled and faced to Class 125 dimensions.

B. Disc:

1. The disc shall be streamlined to provide minimum loss characteristics in the open position.
2. The disc shall be finished smooth on all surfaces to 3.2 or better in accordance with ANSI B46.1.
3. Disc seats shall conform to the requirements of paragraph 2.02C .
4. Discs shall be retained on the shaft by pins or keys.
5. All shaft joints shall be pinned in two directions.

C. Seats:

1. The resilient valve seat shall be located on the valve disc and shall be fully field adjustable and field replaceable.
2. Resilient seating materials shall be mounted with 316 L SS hardware on the disc with bolted, continuous 316L SS retainer plates.
3. Valves with resilient seats mounted on the body will not be acceptable.
4. The Contractor shall furnish documentation, signed under penalty of perjury by an officer of the valve manufacturer's corporation, that the material selected for the seating material meets the requirements of paragraphs 3.5.3.3.2 and 3.5.3.3.3 of ANSI/AWWA C504 under actual test.
5. The seat design shall be such that the seat material can be replaced without removing the valve from the pipeline and can be adjusted from within the pipe.
6. The design shall be such that the resilient material is retained and cannot extrude under the specified differential pressure.
7. All bolts, cap screws, keeper plates, lock washers and retainers shall be of stainless steel or Monel.
8. Body seats shall be 316L stainless steel with machined face, mechanically fastened to the valve body.
9. The mating surface shall have a minimum thickness of 3/8-inch.

D. Bearings:

1. Bearings shall be bronze, conforming to ANSI/AWWA C504 and shall be replaceable.

E. Shaft Seals:

1. Shaft seals shall be replaceable without removing the valve from the pipeline.
2. The seals shall be retained in the seal cavity by devices that are independent from the actuator mechanism.
3. Seals shall be replaceable without disturbing the actuator mechanism.
4. Packing shall be TFE impregnated fiber.
5. All shaft seal hardware shall be 316 stainless steel.

2.04 MANUAL OPERATORS

A. General:

1. Manual operators shall be designed in accordance with AWWA C504 and shall have a disc position indicator designating the opened and closed position of the valve.

B. Manual Operators

1. Manual operators shall be of the traveling nut, rack and pinion or worm gear type.
2. Valves shall be equipped with traveling nut, self-locking type operators designed, manufactured and tested in accordance with AWWA C504.
3. Operators shall be capable of holding the disc in any position between full open and full closed without any movement or fluttering of the disc.
4. Operators shall be equipped with fully adjustable mechanical stop-limiting devices to prevent over travel of the disc in the open and closed positions and shall be self-locking and designed to hold the valve in any intermediate position between full open and full closed.
5. Operators that utilize the sides of the actuator housing to limit disc travel are not acceptable.
6. Valve operator components shall withstand an input torque of 450 ft-lbs at the extreme operator positions without damage.
7. Valves for buried services or where otherwise shown on the Drawings shall include an AWWA operating nut and shall be gasketed and grease packed for submerged operation at water pressures to 10 psig.
8. Valves for buried services shall have a 2-inch square wrench nut type operator and shall be equipped with a valve box and stem extension, as required and shall open left.
9. Operators for exposed service shall include a handwheel and be gasketed for weatherproof service.

2.05 PAINTINGS AND OTHER COATINGS

A. All valves, where not constructed of brass or bronze, or of finished steel, shall be coated at the point of manufacture in accordance with the AWWA Standard Specifications for Painting Ductile or Cast Iron Water Pipes and Fittings.

B. Resilient seated valves shall only be provided with a bonded epoxy coating.

C. Machined surfaces shall be given a suitable coating of grease or other protective material.

2.06 PRODUCT DATA

A. Affidavits of compliance with AWWA C504 for Type A valves shall be provided in accordance with Section 01 33 00.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Valves for buried services shall be installed with the valve shafts horizontal.

B. Valves and operators shall have seals on all shafts and gaskets on valve actuator covers to prevent the entry of water. Actuator mounting brackets shall be totally enclosed and shall have gasket seals.

C. Valves shall be installed as specified and in accordance with manufacturer's written recommendations.

D. The installation and initial operation shall be certified on Form 43 05 11-A specified in Section 01 99 90.

3.02 TESTING

A. Test in accordance with Class B, AWWA C504 Section 5.2 testing requirements modified as follows:

1. The leakage test shall be performed at a pressure of 250 psi
2. The hydrostatic test shall be performed at a pressure of 500 psi
3. Proof of design tests shall be performed and certification of such proof of design test shall be provided to the Construction Manager.

B. Upon completion of installation, the valves shall be pressure tested to demonstrate a leak-free closure.

3.03 MANUFACTURER'S SERVICES

A. Butterfly valve supplier shall provide one (1) day of field/start-up services by the manufacturer's factory personnel.

END OF SECTION

SECTION 40 05 70

BACKFLOW PREVENTERS

PART 1 – GENERAL

1.01 SCOPE

A. This section includes materials, installation, and testing of reduced-pressure backflow prevention devices and check valve and double check valve assemblies.

1.02 REFERENCE SECTIONS

A. The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only.

B. Reference shall be made to the latest edition of said standards unless otherwise called for.

1. AWWA Publication Cross-Connection and Backflow Prevention
2. AWWA C510 - Double Check Valve Backflow-Prevention Assembly
3. AWWA C511 - Reduced-Pressure Principle Backflow-Prevention Assembly
4. AWWA M14 - Recommended Practice for Backflow Prevention and Cross-Connection Control

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Agencies of Jurisdiction rules and regulations regarding “Cross Connection Control and Backflow Prevention”.

B. Fulton County Standard Drawings.

C. Fulton County Standard Specifications.

1.04 SERVICE APPLICATION

A. Reduced-pressure backflow prevention assemblies shall be provided on all commercial and industrial water services. Depending on degree of hazard, a double check valve assembly may be required in place of a reduced-pressure backflow assembly.

B. Reduced-pressure backflow prevention assemblies shall be provided on irrigation services where served by potable water.

C. Reduced-pressure backflow prevention assemblies shall be provided on potable water services where recycled water, well water or any other water supply is served to the same property.

D. Double check valve assemblies shall be provided at all points of connections to County sources at construction sites.

E. Reduced-pressure detector assemblies shall be provided on all fire services. Backflow prevention on fire services shall be as required by the County.

F. The County shall be the final authority as to the location, installation, and type of backflow prevention device required.

1.05 GENERAL DESIGN CONSIDERATIONS

A. The design and construction of backflow prevention assemblies shall meet the requirements called for in this specification except that any modifications specifically shown on the Approved Plans shall take precedence over these general standards.

B. The nominal size of the backflow prevention device shall be equal to or greater than the size of the purchased meter. For example, a 25mm (1") meter shall have a 25mm (1") or larger backflow device.

C. The assembly shall include same size valves located on either side of the backflow prevention assemblies. Four test cocks shall be appropriately located on the assembly for testing and certification.

D. The nominal size of reduced-pressure principle detector assemblies shall be as shown on the Approved Plans or as directed by the Fire Department of jurisdiction.

E. Enclosures and concrete slabs shall be provided only as shown on the Approved Plans or as required by the County.

1.06 DELIVERY, STORAGE AND HANDLING

A. Backflow prevention assemblies shall be delivered and stored in accordance with AWWA C210, AWWA C213, and AWWA C550.

B. The port openings shall be covered with plastic, cardboard, or wood while in transit and during storage in the field.

C. These covers shall remain in place until the backflow assembly is ready to be installed.

D. Backflow assemblies shall not be stored in contact with bare ground.

E. Backflow assemblies shall not be stacked.

1.07 RECYCLED WATER IDENTIFICATION

A. Backflow prevention assemblies and enclosures, if required, for recycled water shall be identified with purple-colored coating, identification labels, or signs.

1.08 WARNING/IDENTIFICATION TAPE

A. Warning/Identification tape shall be installed for backflow prevention assemblies.

PART 2 – MATERIALS

2.01 BACKFLOW PREVENTION ASSEMBLIES

A. Backflow prevention assemblies shall be among those listed on the list below for the size of the water service line.

B. Double Check Assemblies

1. Watts LF007 Double Check Assembly for 5/8 inch to 2 inch.
2. Watts 774 Double Check Assembly for 2-1/2 inch to 12 inch.

C. Reduced Pressure Zone Assemblies

1. Watts LF009 RPZ Assembly for 5/8 inch to 2 inch.
2. Ames 4000SS RPZ Assembly for 2-1/2 inch to 12 inch.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Installation shall comply with the latest edition of the Uniform Plumbing Code, applicable local agency and County requirements.

B. Backflow prevention assemblies shall be installed in accordance with the Standard Drawings in separate vaults or boxes.

C. Water service and fire service shut-off valves will be secured closed during installation until an approved backflow prevention device is installed and tested in compliance with this specification.

D. When static pressure exceeds 150psi, when recommended by the backflow device manufacturer, or when required by the County, a pressure-reducing valve shall be installed as shown on the Standard Drawings.

END OF SECTION

TECHNICAL SPECIFICATIONS

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 – GENERAL

1.01. SUMMARY

A. Section includes:

1. Project information.
2. Work covered by Contract Documents
3. Work by Owner
4. Future Work
5. Purchase contracts.
6. Owner-furnished products.
7. Contractor-furnished, Owner-installed products
8. Access to site
9. Coordination with occupants
10. Work restrictions
11. Coordination with third parties
12. Specification and drawing conventions
13. Alteration of quantities

1.02. PROJECT INFORMATION

A. Project Identification: <Insert Bid Title>

1. Project Location: <Insert Location Information>

B. Owner: Fulton County

1. Owner's Representative: <Insert Contact and Info for PM>

C. Engineer: <Insert Engineer Contact Info>

1.03. WORK COVERED BY CONTRACT DOCUMENTS

A. The work of the Project is defined by the Contact Documents and consists of the following:

1. The work will consist of providing all labor, equipment and materials necessary for the construction, installation, and emergency repair of sewer mains, waste water service lines, and other required improvements to the wastewater collection system within Fulton County.

2. ll work shall be in conformance with the Contract Documents, Drawings, and Fulton County Standards and Specifications, and the relevant government agencies Standards and Specifications.

1.04. WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1. <Insert description or “None.”>

B. Preceding Work: Owner will perform the following construction operations at Project site. Those operations are scheduled to be substantially complete before work under this Contract begins.

1. <Insert description or “None.”>

C. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

1. <Insert description or “None.”>

D. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.

1. <Insert description or “None.”>

1.05. FUTURE WORK

A. The Contract Documents include requirements that will allow Owner to carry out future work following completion of this Project; provide for the following future work:

1. <Insert description or “None.”>

1.06. PURCHASE CONTRACTS

A. General: Owner has negotiated purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum, unless otherwise noted.

B. Purchase Contracts Information:

1. <Insert description or “None.”>

1.07. OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

B. Owner-Furnished Products:

1. <Insert description or “None.”>

1.08. CONTRACTOR-FURNISHED, OWNER-INSTALLED PRODUCTS

A. Contractor shall furnish products indicated. The Work includes unloading, handling, storing, and protecting Contractor-furnished products as directed and turning over to Owner at Project closeout.

B. Contractor-Furnished, Owner-Installed Products:

1. <Insert description or “None.”>

1.09. ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.10. COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy:

1. The existing facilities to which these improvements are being made will continue operation during the period of construction.

2. Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

3. Provide not less than 48 hours' notice to Owner of activities that will affect Owner's operations.

1.11. WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in existing buildings to normal business working hours of <Insert time> a.m. to <Insert time> p.m., Monday through Friday, except as otherwise indicated.

1. Weekend Hours: <Insert restrictions on times permitted for weekend work>

2. Hours for Utility Shutdowns: <Insert Owner's restrictions>

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Fulton County not less than two days in advance of proposed utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

E. Controlled Substances: Use of alcohol, tobacco products and other controlled substances on the Project site is not permitted.

1.12. COORDINATION WITH THIRD PARTIES

A. The Contractor shall coordinate the work with third parties (such as power, natural gas, or telephone companies) in areas where such parties may have rights to underground property or facilities.

B. The Contractor shall request from involved third parties maps or other descriptive information as to the nature and location of such underground facilities or property. The Contractor shall make all necessary investigations to determine the existence and location of underground utilities.

C. The Contractor will be held responsible for any damage to and for maintenance and protection of existing utilities and structures whether or not if the utility has been located by the owner. The Contractor shall contact the utility owners and the individual property owners for the location of the utilities within the area of Work.

D. The Contractor shall coordinate the work with owners of private and public property where access is required for the performance of the work. Legal access will be acquired and provided by the Owner.

1.13. SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.14. ALTERATION OF QUANTITIES

A. The Owner reserves the right to alter the quantities of work to be performed or to extend or shorten the improvements at any time when and as found necessary, and the Contractor shall perform the work as altered, increased or decreased.

1. Payment for such increased or decreased quantity will be made in accordance with the Instructions to Bidders.

2. No allowance will be made for any change in anticipated profits nor shall such changes be considered as waiving or invalidating any conditions or provisions of the Contract and Bond.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 11 10

GEOTECHNICAL INFORMATION

PART 1 – GENERAL

1.01. SCOPE

A. The following geotechnical report document is available for review in the appendix of these contract documents:

Report of Subsurface Exploration and Geotechnical Engineering Evaluation
<Insert Project Title>

Prepared by:
<Insert Geotechnical Consultant>

Interpretations, evaluations, and conclusions as to the nature of the geotechnical materials, the difficulties of making and maintaining the required excavations, and the difficulties of doing other work affected by geotechnical conditions shall be the sole responsibility of the Contractor. At no additional cost to the Owner, the Contractor may conduct, with Owner's approval, other investigations and tests it deems appropriate.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 11 55

CONSTRUCTION STAKING

PART 1 – GENERAL

1.01 SCOPE

A. Construction staking shall include all of the surveying work required to layout the Work and control the location of the finished Project. The Contractor shall have the full responsibility for constructing the Project to the correct horizontal and vertical alignment, as shown on the Drawings, as specified, or as ordered by the Construction Manager. The Contractor shall assume all costs associated with rectifying work constructed in the wrong location.

B. From the information shown on the Drawings and the information to be provided as indicated under Project Conditions below, the Contractor shall:

1. Be responsible for setting reference points and/or offsets, establishment of baselines, and all other layout, staking, and all other surveying required for the construction of the Project.
2. Safeguard all reference points, stakes, grade marks, horizontal and vertical control points, and shall bear the cost of re-establishing same if disturbed.
3. Stake out the permanent and temporary easements or the limits of construction to ensure that the Work is not deviating from the indicated limits.
4. Be responsible for all damage done to reference points, baselines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, baselines, center lines and temporary bench marks as a result of the operations.

C. Baselines shall be defined as the line to which the location of the Work is referenced including, but not limited to, edge of pavement, road centerline, property line, right of way or survey line.

D. Record Drawing surveys shall be performed in accordance with Section 01 78 39 of these Specifications.

1.02 PROJECT CONDITIONS

A. The Drawings provide the location and/or coordinates of principal components of the Project. The alignment of some components of the Project may be indicated in the Specifications. The Construction Manager may order changes to the location of some of the components of the Project or provide clarification to questions regarding the correct alignment.

B. The survey points, control points, and baseline to be provided to the Contractor shall be limited to only that information which can be found on the Project site by the Contractor.

C. A topographic survey is included on the Drawings.

1.03 QUALITY ASSURANCE

A. The Contractor shall furnish documentation, prepared by a surveyor currently registered in the State of Georgia, confirming that staking is being done to the horizontal and vertical alignment shown in the Contract Documents. This requires that the Contractor hire, at the Contractor's own expense, a currently registered surveyor, acceptable to the Owner, to provide ongoing construction staking or confirmation of such.

B. Any deviations from the Drawings shall be confirmed by the Construction Manager prior to construction of that portion of the Project.

C. Quantities for payments measured under this Contract shall be certified by the registered surveyor.

D. Construction Verification Surveying Cash Allowance

1. This cash allowance is solely for the use of the Construction Manager for verification of the Contractor's reference points, centerlines and work performed and is not to be used by the Contractor to provide cut sheets.

2. The presence of this cash allowance in no way relieves the Contractor of the responsibility of installing reference points, centerlines, temporary bench marks, verifying that the work has been performed accurately, and all other work covered by this Section.

1.04 SANITARY SEWERS

A. Staking Precision: The precision of construction staking required shall be that which the correct location of the sanitary sewer, manholes and other appurtenances can be established for construction and verified by the Construction Manager.

B. Reference Points

1. Reference points shall be placed, at or no more than three feet, from the outside of the construction easement or right of way. The location of the reference points shall be recorded in a log with a copy provided to the Construction Manager for use, prior to verifying reference point locations.

2. Distances shall be accurately measured to 0.01 foot.

3. The Contractor shall give the Construction Manager reasonable notice that reference points are set. The reference point locations must be verified by the Construction Manager prior to commencing clearing and grubbing operations.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 11 80

ENVIRONMENTAL CONDITIONS

PART 1 – GENERAL

1.01 ENVIRONMENTAL CONDITIONS

A. This section describes the environmental conditions which have been observed at the site of the Work and which may reasonably be anticipated throughout the life of the project.

1.02 CLIMATE CONDITIONS

A. The site of the Work is at an elevation of approximately 860 feet to 1,200 feet above mean sea level.

B. Climate conditions are described as follows:

Description	Range of Conditions
Winter	Cool and damp
Summer	Hot and humid
Relative humidity, percent	
• Indoors	20 to 90
• Average outdoors	20 to 100
Air temperature, degrees F	
• Outdoors	15 to 105
• Indoors	30 to 105
Barometric pressure, inches, mercury	29.1 to 31.0

1.03 ADDITIONAL CONDITIONS

A. Additional conditions which may be applicable are specified in other sections.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 14 13

INSPECTION OF WORK

PART 1 – GENERAL

1.01 SCOPE

A. The work covered by this Section includes the Construction Manager's and Contractor's responsibilities and obligations regarding inspection of the work performed.

1.02 CONSTRUCTION MANAGER'S INSPECTION

A. The Construction Manager shall have the right of access to and inspection of the Work at all times. Materials, equipment and products shall be subject to the Construction Manager's review as specified herein.

B. The Construction Manager is responsible for general surveillance of the work on behalf of the Owner. The Construction Manager is not responsible for construction means, methods, sequences, or procedures or for safety precautions and programs in connection with the Work. The Construction Manager is not responsible for supervision of the Work and shall not give instruction to the Contractor's personnel as to methods of execution of the Work. The Construction Manager is not responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents.

1.03 CONTRACTOR'S DUTIES

A. The Contractor is responsible for all materials, equipment, methods, and procedures in execution of the Work.

B. The Contractor shall correct to the satisfaction of the Construction Manager any work or material found to be defective or of deficient quality. Such corrections shall be made by the Contractor at no additional expense to the Owner.

1.04 RIGHT OF ENTRY

A. Representatives of Fulton County, the Environmental Protection Division of the Georgia Department of Natural Resources, and the U.S. Department of Agriculture, Soil Conservation Services and others as may be identified by the Owner shall have access to the Work wherever it is in preparation or progress.

B. The Contractor shall provide proper facilities for such access and inspection.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 14 16

OCCUPANCY

PART 1 – GENERAL

1.01 PARTIAL OCCUPANCY BY OWNER

A. Whenever, in the opinion of the Construction Manager, any section or portion of the Work or any structure is in suitable condition, it may be put into use upon the written order of the Construction Manager and such usage will not be held in any way as an acceptance of said Work or structure, or any part thereof, or as a waiver of any of the provisions of these Specifications and the Contract.

B. Pending final completion and acceptance of the Work, all necessary repairs and replacements, due to defective materials or workmanship or operations of the Contractor, for any section of the Work so put into use shall be performed by the Contractor at Contractor's own expense.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 22 00

MEARUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 SCOPE

A. The Bid lists each item of the Project for which payment will be made. **No payment will be made for any items other than those listed in the Bid**. The Project Manager will clarify all contradictions.

B. Required items of work and incidentals necessary for the satisfactory completion of the work which are not specifically listed in the Bid and which are not specified in this Section to be measured or to be included in one of the items listed in the Bid shall be considered as incidental to the work. All costs thereof, including Contractor's overhead costs and profit shall be considered as included in the unit prices bid for the various Bid items. The Contractor shall prepare the Bid accordingly.

C. Work includes furnishing all labor, equipment, tools and materials, which are not furnished by the Owner and performing all operations required to complete the work satisfactorily, in place, as specified and as indicated on the Drawings.

1.02 DESCRIPTIONS

A. Measurement of an item of work will be by the unit indicated in the Bid. Work performed for items not included in the Bid shall be paid in accordance with Section 8, 00700-87.

B. Final payment shall be based on the actual work or service performed, calculated, and field measured, using the unit prices set forth in the Contract Document.

C. Payment for an item of work includes all necessary and incidental related work required to complete the Work, whether specified or not.

D. Unless otherwise stated in individual sections of the Specifications or in the Bid, or as approved in writing by the Construction Manager prior to beginning the Work, no separate payment will be made for any item of work, materials, parts, equipment, supplies or related items required to perform and complete the Work.

1. The costs for all such items required shall be included in the price bid for item of which it is a part.

2. In the event that the Owner requests work that is agreed by both the Owner and the Contractor as not included in the Bid, that item of work will be paid for in accordance with Section 8, 00700-87.

E. Payment will be made by extending unit prices multiplied by quantities provided and then summing the extended prices to reflect actual work.

1. Such price and payment shall constitute full compensation to the Contractor for furnishing all plant, labor, equipment, tools and materials not furnished by the Owner and for performing all operations required to provide to the Owner the entire Project, complete in place, as specified and as indicated on the Drawings.

F. “Products” shall mean materials or equipment permanently incorporated into the work.

G. “Provide” shall mean furnish and install.

1.03 NON PAYMENTS

A. No separate payment shall be made for the restoration of developed property and the cost shall be included in the overall prices for the execution of the Work unless specifically noted otherwise.

B. No separate payment shall be made for pipe, pipe appurtenances, excavation, disposal of rubbish and debris, pipe bedding, backfill, dewatering of trench, repair of damaged properties unless otherwise stated. All testing required for the execution of the Work shall be done as part of the price for the item involved.

C. No separate payment shall be made for any traffic control, work area protection, recording, safety measures, set-up of equipment and set-up of staging area except as indicated below. Payment for these items shall be part of the unit price bid for each particular item of work.

D. No separate payment shall be made for providing detail surveys needed for construction. The Contractor shall be responsible in providing further survey necessary to complete the Work. The Contractor shall carefully preserve the established points. In case of willful or careless destruction, the Contractor shall be responsible for the costs of reestablishing the bench marks, reference points and stakes.

E. No separate payment shall be made for delay or extra cost encountered by the Contractor due to protection, avoidance or relocation of existing utilities, mains, or services shown or not shown on the Project Construction Drawings.

F. No separate payment shall be made for abandoning and/or removal of any existing materials from the project area or work site. The cost of such work and materials shall be included in the Bid Unit Price for each particular item.

G. No separate payments shall be made for existing pavement removal and replacement associated with the construction of the Project unless listed separately in the Bid. The cost of such work and materials shall be included in the Bid Unit Price for each particular item.

H. No separate payments shall be made for saw cutting existing pavement, any cutting activities necessary to install the proposed work, and including beveling of pipes.

I. No separate payments shall be made for temporary and/or permanent Erosion and Sedimentation Controls unless listed separately in the Bid, or except as noted on the Project Drawings or as directed and approved by the Owner.

J. No separate or additional payments shall be made for the Project area where the Contractor need to reseed for the following causes:

1. Inadequate watering and maintenance.
2. Loss of seeds caused by site erosion, e.g. wind and rain.
3. Inadequate germination of seeds.
4. Inadequate coverage and/or density.
5. Providing permanent species at the appropriate season, after temporary grassing has been performed.

K No separate or additional payments shall be made for providing temporary species of grass, where the seasonal limitations does not allow for the proper germination of a permanent species of grass. The cost for sowing or planting temporary species shall be included in the Unit Price Bid for the item it pertains.

L. No separate or additional payments shall be made for following reasons:

1. Materials that were not installed,
2. The replacement of defective materials.
3. Any section of the Project activity which does not pass the applicable tests.
4. If the area has not been clean up to the satisfaction of the Construction Manager.

M. No separate or additional payments shall be made for maintaining traffic flow, on and/or near or through the Project's area detour, roadways, streets, driveways, and work segment impacted by the construction activities unless listed separately in the Bid.

N. No separate or additional payments shall be made for existing rock or pipe line soil excavation, for the Project's construction. The cost shall be included in the particular work item Bid Unit Price.

O. No separate or additional payment shall be made for removing and replacing the damaged pre-construction area condition adjacent to the Project's site, damaged curb and gutter, driveway areas and pavements, caused by Contractor working on the Project.

P. No payments shall be made for restoration and the regrading of easements. The cost shall be included in the particular work item Bid Unit Price.

Q. No separate or additional payments shall be made for temporary measures required or necessary to make the road passable and drivable, including backing to the top of the trench temporarily with crusher run or granular material or placing a temporary asphalt topping surface.

R. No separate or additional payments for trench excavation, backfill and trench stabilization, shall be made for any special or unique method, means, techniques or equipment necessary for the Contractor's compliance with Specifications, regulatory requirements, permits, and laws or regulations, applicable to the Project.

S. No separate payments shall be made for trench excavation and backfill. All costs shall be included in the Bid Unit Price for the item to which pertains.

T. No separate payments shall be made for providing any sheeting, bracing, and shoring. All costs shall be included in the Bid Unit price for item to which it pertains.

1.04 CONTRACTOR MOBILIZATION

A. All costs associated with mobilization of all required resources, a one-time cost, shall be included in the unit prices bid for CONTRACTOR MOBILIZATION, based on the project sizes listed in the Bid.

1.05 SEWERS AND ACCESSORIES

A. Existing Utilities and Obstructions

1. Horizontal Conflict: Payments for conflicts with existing utilities shall be made only where additional manholes, and/or additional lengths of pipe are approved by the Construction Manager.

a. Said payment shall be made at the unit prices in the Bid.

b. No other payment will be made for any delay or extra cost encountered by the Contractor due to protection, avoidance or relocation of existing utilities, mains or services or changing the horizontal alignment of the sewer.

2. Vertical Conflict: Where authorized by the Construction Manager, payment for additional depth of cut required to avoid vertical conflicts shall be made at the unit prices bid for sewer line. No payment will be made for relocation of existing utilities except as authorized by the Construction Manager.

B. Location and Grade: No separate payment shall be made for survey work performed by or for the Contractor in the establishment of reference points, bench marks, cut sheets, limits of right of way or easement, including their restoration, as well as centerline or baseline points.

1. The Construction Verification Surveying cash allowance is solely for the use of the Construction Manager, for the verification of Contractor's reference points, centerlines, and work performed.

2. This cash allowance, in no way relieves the Contractor of the responsibility of, including but not limited to, installing the required Project reference points, centerlines, temporary and permanent bench marks, or verifying that their work has been performed accurately.

C. Construction Along Highways, Streets and Roadways: No separate payment shall be made for traffic control or maintaining highways, streets, roadways and driveways, except as authorized by the Construction Manager.

1. The Bid Unit Price shall include the cost of erecting and maintaining barriers, Signs, lights, traffic control measures and channelization devices, flagmen, and whatever is necessary to provide a safe work zone, and to protect the public safety, in accordance with the Traffic control Plan, and the current Manual on Uniform Traffic Control Devices for Streets and Highways.

D. Gravity Sewers – Ductile Iron, C900 PVC and HDPE

1. Payment for gravity sewer shall be made at the unit price bid for GRAVITY SEWER, for the quantity and type provided at the appropriate depth. Payment will be made at the one unit price for the actual depth of the sewer line.

2. Measurement for payment at the unit price for gravity sewer shall be made along the centerline of the pipe, through fittings, from inside face of structure wall penetrated to inside face of structure wall penetrated. Depth of cut shall be measured from pipe invert to ground level at pipe centerline. Cut sheets prepared by the Contractor and approved by the Construction Manager shall be the basis for payment.

3. The unit price bid for GRAVITY SEWER shall include all costs for installation of the sewer as required including, but not limited to, materials, labor, excavation, dewatering, shoring, bedding, haunching, backfill, compaction, clean-up, testing, bypass pumping, traffic control, and all other related items not listed as separate items in the Bid.

4. Payment for pipe INSTALLED IN STEEL CASING will be made in addition to payment for gravity sewer installed at the appropriate depth.

   a. The unit price bid for pipe INSTALLED IN STEEL CASING shall include all additional costs associated with providing the appropriate size steel casing pipe, spacers, grout, brick, as required for the complete installation of pipe in casing via open-cut installation.

   b. All costs associated with installation of the sewer line, including excavation, dewatering, etc. shall be included in the unit price bid for GRAVITY SEWER.

5. No payment shall be made for sections of pipe which are not installed.

6. No additional payment shall be made for replacement of defective materials.

7. No additional payment will be made for maintaining or stopping flow while placing the new sewer in service.

8. No payment shall be made for sections of pipe which have not passed required tests, or if the area has not been cleaned up to the satisfaction of the Construction Manager.

9. No separate payment will be made for cutting and beveling pipe.

E. Clean up and Testing: No separate payment will be made for clean-up and pressure testing.

1. All costs associated with clean up and testing of the gravity sewer shall be included in the unit price bid for GRAVITY SEWER.

2. No payment shall be made for tests that fail to verify required results.

F. Pipe Bursting

1. Measurement for payment at the unit price for PIPE BURSTING shall be made along the centerline of the pipe from inside face of structure wall penetrated to inside face of structure wall penetrated.

2. No separate payment shall be made for launch pits or receiving pit.

G. HDPE, Fusible PVC and Spiral Wound Sliplining

1. Measurement for payment at the unit price for HDPE, Fusible PVC and Spiral Wound Sliplining shall be made along the centerline of the pipe from inside face of structure wall penetrated to inside face of structure wall penetrated.

H. Cured-In-Place Lining

1. Measurement for payment at the unit price for CURED-IN-PLACE LINING shall be made along the centerline of the pipe from inside face of structure wall penetrated to inside face of structure wall penetrated. No payment shall be made for "down-tube" or dry felt used in conjunction with an inversion.

I. Sewer Cleaning

1. No payment shall be made for normal cleaning of sewers and manhole associated with rehabilitation of these items.

2. The costs of such cleaning shall be included in the Unit Price Bid of each item involved.

J. Manhole Rehabilitation

1. Measurement for payment at the unit price for MANHOLE REHABILITATION shall be made from the invert to the base of the manhole frame for each method of rehabilitation bid at the price for the depth range listed.

1.06 SEWER SERVICE CONNECTIONS

A. The unit price bid for SEWER SERVICE CONNECTIONS shall include all costs associated with installing a service connection as listed in the Bid including, but not limited to, all materials, labor, tools, excavation, backfill, compaction, manhole coring, grouting, manhole boot, fittings including wye or tee, and all incidental items required for a complete installation. No additional payment will be made for plugging the fitting or for cutting an existing sewer pipe to locate the fitting.

B. Measurement for payment for service connections will be made along the centerline of the pipe, through fittings, from centerline of manhole or pipe to the inside face of the clean-out box.

C. The unit price bid for CLEAN-OUT ASSEMBLY shall include, but is not limited to, all materials, labor, tools, fittings, vertical pipe, cleanout, cast iron box and cover, and all incidental items as required to provide a complete clean-out assembly.

D. Payment for re-establishing sewer service connections shall be made under the unit prices bid for SERVICE LINE RECONNECTIONS.

1.07 PRECAST CONCRETE MANHOLES AND ACCESSORIES

A. The unit price bid for 4-FOOT DIAMETER PRECAST MANHOLES, at the depths listed in the Bid, shall include all costs associated with construction of a complete manhole on a new sewer line, including excavation, shoring, dewatering, backfilling, compaction, crushed stone bedding, concrete slab, precast base, riser sections, cone or flat top, coring, rubber boots, grouting, sleeves, concrete, invert, mastic sealant, brickwork, mortar, connection of pipes to the manhole, vacuum testing, and all incidental items required to complete the installation.

B. The unit price bid for 4-FOOT DIAMETER DOGHOUSE MANHOLES, at the depths listed in the Bid, shall include all costs associated with construction of a complete manhole on an existing sewer line, including excavation, shoring, dewatering, backfilling, compaction, crushed stone bedding, concrete slab, base, riser sections, cone or flat top, coring, rubber boots, grouting, concrete, invert, diversion of flow, cutting existing pipe, connecting pipes to manhole, mastic sealant, brickwork, mortar, vacuum testing, and all incidental items required to complete the installation.

C. Measurement for payment at the unit price for MANHOLES shall be made from the invert to the top of the top section. Payment for manholes shall be made at the unit price bid for MANHOLES, for the type provided at the appropriate depth. Payment will be made at the one unit price for the actual depth of the manhole.

D. Manhole Accessories

1. The unit price bid for MANHOLE RING AND COVER shall include the cost of providing the appropriate type ring and cover on a new manhole or new riser section including materials, labor, grouting, brick and mortar, minor grade adjustments (up to three inches either way vertically) and all incidental items required to complete the installation.

E. Manhole Modifications

1. The unit price bid for ADJUST EXISTING MANHOLE COVER TO GRADE shall include all costs associated with adjusting an existing manhole cover by up to three inches using steel or concrete adjusting rings or brick and mortar, as ordered by the Construction Manager, including pavement repair if applicable. Measurement for payment will be made based on the actual quantity of manhole covers adjusted.

2. The unit price bid for ADJUST EXISTING PRECAST MANHOLE shall include all costs associated with raising or lowering an existing manhole including, but not limited to, excavation, shoring, dewatering, backfilling, compaction, removal and replacement of existing cone or flat top, removal or addition of riser sections, disposal of removed materials, grouting, brickwork, mortar, mastic and all incidental items required to complete the installation. In the event that a new cone or flat top section is required, it will be paid for at the unit price bid for 4-FOOT DIAMETER PRECAST MANHOLE.

3. The unit price bid for ADJUST EXISTING BRICK MANHOLE shall include all costs associated with raising or lowering an existing manhole including, but not limited to, excavation, shoring, dewatering, backfilling, compaction, removal or addition of brick, disposal of removed materials, grouting, mortar, and all incidental items required to complete the installation.

4. Payment for pavement patching associated with ADJUST EXISTING MANHOLE shall be paid for at the unit price bid for FULTON COUNTY STANDARD UTILITY CUT.

5. Measurement for payment for ADJUST EXISTING MANHOLE will be made from the original manhole cover elevation to the proposed elevation of the new manhole cover. Vertical distance will be measured to the nearest tenth of a foot.

6. Measurement for payment for REESTABLISH MANHOLE INVERT shall include all costs associated with reestablishing inverts within an existing manhole including, but not limited to dewatering, concrete placement, removal of unusable materials and debris, disposal of removed materials, grouting, mortar, and all incidental items required to complete the installation. Payment for bypassing associated with REESTABLISH MANHOLE INVERT shall be paid for under the ALLOWANCE for Bypass Pumping.

F. Manhole Connections: The unit price bid for MANHOLE CONNECTIONS shall include all costs associated with connecting a new sewer line to an existing manhole, including drop connection fittings, tees, or core and boot as appropriate for the type of connection, flow diversion, penetration of manhole wall, sealing connection, forming new invert, and all incidental items required to complete the connection. Costs for excavation, shoring, dewatering, backfilling, compaction, and bedding shall be included in the unit price bid for GRAVITY SEWER.

G. Measurement for payment for drop connection vertical pipe shall be made from the invert of the upstream sewer to the invert of the manhole. Payment for the

measured vertical feet of pipe will be made for the unit price bid for GRAVITY SEWER. Inside drop connection vertical piping will be paid for at the 0.0 to 6.0 foot depth price for gravity sewer. Outside drop connection vertical piping will be paid for based on the actual depth of the of the drop connection.

1.08 BORE AND JACK CASINGS

A. The unit price bid for BORE AND JACK CASING shall include all costs associated with furnishing and installation of the casing pipe and carrier pipe, including but not limited to excavation, shoring, dewatering, backfilling, compaction, steel casing pipe, ductile iron sewer pipe, spacers, grout, brick, and other accessories, for installing the pipe complete in place.

1. The unit price bid shall assume that all jack and bore casing installations exceed 60 feet in length.

B. Payment for casing shall be made only at the completion of all work specified for the casing installation. No partial payment shall be made for the construction of the casing without carrier pipe.

C. Measurement for payment shall be made along the centerline of the pipe line to the limits of bore and jack as ordered by the Construction Manager.

D. Casing pipe may be included in Partial Payment Requests as stored materials, if, in the opinion of the Construction Manager, the casing pipe is stored and properly protected at the Project site. Casing pipe which has been properly installed, but has not yet been paid for as installed casing, may also be included as stored materials.

E. Payment for pipe in casing shall be made only at the completion of all work specified for the pipe installation. Payment for pipe in the casing shall be made only at the one unit price bid for BORE AND JACK CASING.

F. In the event that rock is encountered during the installation of the pipe casing which, in the opinion of the Construction Manager, cannot be removed through the casing then the Construction Manager may authorize the Contractor to complete the crossing by another method via a change order.

G. No additional payment shall be made for rock excavation through the casing.

1.09 FREE BORE / DIRECTIONAL DRILL

A. Payment for installation of sewer pipe via either free bore or directional drill installation methods shall be made at the unit price bid for FREE BORE / DIRECTIONAL DRILL for the appropriate size and type of pipe installed to the limits ordered by the Construction Manager. The unit price bid shall include all costs for construction of the pipe via free bore or directional drilling methods in lieu of open cut, including but not limited to excavation, shoring, dewatering, backfilling,

compaction, carrier pipe, and other accessories, for installing the pipe complete in place.

B. The unit price bid for FREE BORE / DIRECTIONAL DRILL shall include all costs for free bore failures and the subsequent bore and jack installation if required as well as for bore and jack casing if the Contractor elects to provide the casing in lieu of free bore.

C. Measurement for payment shall be made along the centerline of the pipe installed, to the limits for free bore or directional drill ordered by the Construction Manager.

1.10 STORM DRAIN PIPE INSTALLATION

A. The unit price bid for STORM DRAIN PIPE shall include all costs associated with the installation or replacement of the appropriate size and type of storm drain piping associated with construction of a gravity sewer, where directed by the Construction Manager. Costs for excavation, shoring, dewatering, backfilling, compaction, and bedding shall be included in the unit price bid for STORM DRAIN PIPE.

B. Measurement for payment will be made along the centerline of the storm drain pipe installed.

C. No separate payment will be made for support of existing pipe when installing new sewer line over or under existing storm water piping. All costs for support shall be included in the unit price bid for GRAVITY SEWER.

D. Costs for removing and replacing existing storm water pipe for ease of construction when installing new sewer line shall be included in the unit price bid for GRAVITY SEWER. Payment for storm drain pipe will only be made where removal or replacement is approved or ordered by the Construction Manager prior to removal.

1.11 EROSION AND SEDIMENTATION CONTROL

A. General

1. No separate payment shall be made for erosion and sedimentation controls unless listed separately in the Bid and except as noted below. All other erosion and sedimentation control costs shall be included in the unit price bid for the item to which it pertains.

2. No payment will be made for any portion of the Project for which temporary erosion and sedimentation controls are not properly maintained.

3. Quantities for payment of erosion and sedimentation controls devices, if bid separately, shall be based upon actual quantity constructed by the Contractor.

B. Construction Exits:

1. All costs for construction exits, including installation, maintenance, repair, and removal, shall be included in the unit price bid for CONSTRUCTION EXITS.
2. The unit price bid shall include geotextile underliner, stone, and all incidental costs associated with maintaining a construction exit to Fulton County standards.
3. If the action of the construction vehicles traveling over the gravel pad does not sufficiently remove mud and debris, the vehicle tires shall be washed prior to allowing vehicles to enter public right-of-way. No additional payment will be made for the cost of washing tires.
4. No payment will be made for construction exits that are improperly constructed or use materials that are not approved.

C. Reinforced Silt Fence: All costs for Type S silt fence, where ordered by the Construction Manager, including installation, maintenance, repair, replacement, and removal, shall be included in the unit price bid for REINFORCED SILT FENCE.

D. Hay Bale Check Dams: All costs for hay bale check dams, including hay bales, necessary earthwork, staking, periodic maintenance and repair, and removal of sediment and hay bales following establishment of permanent erosion control measures shall be included in the unit price bid for HAY BALE CHECK DAMS.

E. Stone Check Dams: All costs for stone check dams, including stone, geotextile underliner, necessary earthwork, periodic maintenance and repair, and removal of sediment and stone following establishment of permanent erosion control measures shall be included in the unit price bid for STONE CHECK DAM. Measurement for payment will be made to the limits allowed in accordance with the Standard Details and Specifications.

F. Curb Inlet Filter and Protection: All costs for temporary fabric, blocks, wires, and the furnishing of all labor, material, equipment and tools for installation, maintenance, repair and removal, shall be included in the Unit Price Bid for CURB INLET FILTER. Payment shall be based on the actual field quantity installed.

G. Inlet Sediment Traps: All costs for temporary inlet sediment traps (silt box), including installation, maintenance, repair and removal, shall be included in the unit price bid for INLET SEDIMENT TRAPS.

H. Pigs-in-a-Blanket: All costs for pigs in a blanket, including installation, maintenance, repair and removal shall be included in the unit price bid for PIGS-IN-A-BLANKET.

I. Rip Rap with Filter Fabric Underlay: All costs for rip rap, including filter fabric, installation, maintenance, repair and removal, as required by the Standard Details and Specifications, or as directed by the Construction Manager, shall be included in the unit price bid for RIP RAP WITH FILTER FABRIC UNDERLAY.

J. Rip Rap: All costs for rip rap, excluding RIP RAP WITH FILTER FABRIC UNDERLAY, installation, maintenance, repair and removal, as required by the Standard Details and Specifications, or as directed by the Construction Manager, shall be included in the unit price bid for RIP RAP.

K. Box Gabion – 3'x3'x6' Baskets: All costs for box gabions, including stone, wire mesh, stakes, anchors, filter fabric, assembly of box gabion, placement, excavation, backfill, compaction, and all incidental costs shall be included in the unit price bid for BOX GABION.

L. Tree Protection Fence: All costs for tree protection fence, also known as orange mesh safety fence, including installation, maintenance, repair and removal, shall be included in the unit price bid for TREE PROTECTION FENCE.

1.12 VEGETATION RESTORATION

A. Temporary Seeding: Temporary seeding and mulching shall be applied to all disturbed area to be left exposed for a period greater than 14 days, or as ordered by the Construction Manager.

1. The unit price bid for TEMPORARY SEEDING shall include all costs associated with spreading fast growing seed, mulching, watering, maintenance and repair until permanent grassing is established.

B. Permanent Seeding: All costs for permanent seeding, including fine grading, raking, soil preparation (removal of rocks and other objectionable materials), sewing the appropriate type of grass seed, fertilizing, mulching, watering, temporary protective measures, maintenance and repair until permanent grassing is established, shall be included in the unit price bid for PERMANENT SEEDING.

1. Permanent seed will be applied only after final grading and dress-up of disturbed area have been completed to the satisfaction of the Construction Manager.

C. Sod Grassing: Where ordered by the Construction Manager, sod shall be provided at the unit price bid for SOD GRASSING for any type.

1. All costs for proper installation, including preparation of surface, installation, rolling, compacting, watering, maintenance, repair, and any temporary measures required to protect the sod until establishment, shall be included in the unit price bid for SOD GRASSING.

D. Hydroseeding: All costs for hydroseeding, including preparation of surface, maintenance, repair, and any temporary measures required to protect the area until establishment, shall be included in the unit price bid for HYDROSEEDING.

E. In no case shall any one area be paid more than once for temporary grassing or for permanent grassing.

F. If an area is temporarily grassed and as directed by the Construction Manager to leave the area that way permanently, no additional payment will be made for permanent grassing.

G. Measurement for payment will be made by square yard, along the sewer centerline, to the widths allowed by the Standard Details and Specifications.

1.13 TEMPORARY STREAM CROSSING

A. Temporary Stream Crossing: All costs for constructing temporary stream crossings, whether for contractor access to the work or for work crossing streams, shall be included in the unit price bid for TEMPORARY STREAM CROSSING.

B. All labor and materials including temporary culverts, temporary bridge(s), stone, filter fabric underlay, check dams, bypassing, necessary earthwork, periodic maintenance and repair, and removal of sediment and all materials placed by the Contractor, following the end of the usefulness of the temporary crossing, shall be included in the unit prices bid for TEMPORARY STREAM CROSSING.

C. Stream Crossings shall be constructed as shown in the Standard Details and Specifications, limited to 10 feet upstream and 10 feet downstream from top of trench excavation and from five feet beyond top of bank, across stream or ditch bank and bottom, to five feet beyond top of bank.

D. Any other areas at streams or ditches disturbed by the Contractor, which may require rip rap, shall be rip rapped at no additional cost to the Owner.

1.14 TRENCH EXCAVATION AND STABILIZATION

A. No separate or additional payment will be made for any special or unique method, means, techniques or equipment necessary for the Contractor's compliance with the Specifications, regulatory requirements, permits, laws or regulations which govern this Project.

B. Trench Excavation: No separate payment will be made for trench excavation. All costs shall be included in the unit price bid for the item to which it pertains at the appropriate depth.

C. Sheeting, Bracing and Shoring: No separate payment will be made for providing any sheeting, bracing and shoring. All costs shall be included in the unit price bid for the item to which it pertains at the appropriate depth.

D. Dewatering Excavations: All costs of equipment, labor and materials required for dewatering shall be included in the price bid for the item to which it pertains.

E. Trench Foundation And Stabilization

1. No payment for trench stabilization shall be authorized until after the trench has been dewatered.

a. If the pipe is installed in an inadequately prepared trench bottom, the Construction Manager shall notify the Contractor in writing of the deficiency and will not authorize payment for that portion of that length of pipe which was improperly installed.

2. Payment for trench stabilization shall be made on the basis of the amount authorized and the unit price bid for TRENCH STABILIZATION.

a. Payment shall include all costs for the removal and disposal of the unsuitable material and replacement with the materials listed in the Bid including filter fabric.

b. No additional payment will be made for material required for specified bedding.

F. Bedding and Haunching

1. The unit price bid for pipe for GRAVITY SEWER shall include excavation of the trench to the depth below the pipe necessary to provide specified bedding and to lay the sewer to grade. Measurements for payment will be made only to the pipe invert.

2. No separate payment will be made for material used to provide specified bedding. The cost of all bedding materials shall be included in the unit price bid for the item to which it relates, except for trench stabilization.

3. No additional payment will be made for improved bedding required to compensate for over excavation of the trench.

G. Trench Rock Excavation

1. Rock excavation shall be paid for in addition to payment for normal pipe excavation accounted for in the unit price bid for gravity sewer.

a. Payment will be made for the measured quantity of rock excavated, at the sum of the unit prices for Trench Rock Base Cost and Trench Rock Premium Cost if applicable.

2. The unit price for Trench Rock Base Cost is for the normally anticipated cost of rock excavation, the cost of additional bedding and backfill material as specified and all costs incidental thereto.

3. The unit price bid for Trench Rock Premium Cost shall be for all additional costs for rock excavation which, in the opinion of the Contractor, are in excess of the Base Cost:

a. Including but not limited to extra blasting protection, closer grouping of blasting holes, more detonator caps, more caution, etc.

b. The Contractor shall not bid less than zero (bid a deduct) for the Trench Rock Premium Cost. Any Bids containing a deduct will be declared non-responsive and rejected by the Owner.

4. The maximum allowable volume of rock excavation for payment shall be based on a trench width equal to the outside diameter of the pipe barrel plus 18 inches, but not less than 36 inches, and depth of rock on the pipe

centerline, from the top of the rock to the bottom of the rock or the specified bottom of the trench, whichever has the higher elevation.

5. The Construction Manager must be given reasonable notice to measure all rock. Payment will not be made for excavated rock that was not measured and approved by the Construction Manager prior to removal.

6. No allowance shall be made for excavating to extra widths for construction of manholes or other appurtenances, for excavating to sloping sides, or for excavations made necessary by the physical limitations of the Contractor's equipment. Cost of such additional rock excavation shall be included in the unit price bid for the item to which it pertains.

7. Payment for blasting monitoring shall be made from the BLASTING MONITORING cash allowance.

   a. A fee must be agreed upon by the Construction Manager prior to the Contractor employing an independent, qualified specialty subcontractor to monitor the blasting.

   b. If the Contractor employs the specialty subcontractor prior to the Construction Manager's approval of the fee, all such costs are subject to non-reimbursement.

H. Initial Backfill

1. No separate payment shall be made for initial backfill.

2. No separate payment shall be made for drying out the initial backfill material in order to meet the compaction requirements.

3. No separate payment shall be made for the adding of moisture to the initial backfill materials in order to meet the compaction requirements.

4. No separate payment shall be made for providing select material if the insitu material cannot meet the compaction requirements.

I. Concrete Encasement: Payment for concrete encasement shall be at the unit price in the Bid for GENERAL CONCRETE PLACEMENT.

J. Final Backfilling

1. No additional payment will be made for additional material when excavated materials are used.

2. No separate payment shall be made for drying out the final backfill material in order to meet the compaction requirements.

3. No separate payment shall be made for the adding of moisture to the final backfill materials in order to meet the compaction requirements.

4. No additional payment will be made for providing select material if the insitu material cannot meet the compaction requirements.

K. Backfill Density testing for compacted Trench material placed, shall be included in the Unit Price Bid item BACKFILL DENSITY TEST.

1. The Unit Price shall include, but not limited to, labor, equipment, lab cost, cost incidentals and/or related items, and the relevant specification.

2. Field measurement cost shall be based on a density test per 500 linear feet interval, along installed pipe length, and the Contractor and sub-contractor are responsible to provide documentation and/or daily record of the actual number of field tests, as approved by The Construction Manager.

L. Additional Material: No separate payment will be made for additional earth or fill materials imported to the Project site.

1.15 EASEMENT CLEARING AND GRUBBING

A. The unit price bid for EASEMENT CLEARING AND GRUBBING shall include all costs associated with clearing a 20-foot wide easement of the specified type, as approved by the Construction Manager prior to clearing, including but not limited to removal and disposal of trees, stumps, roots, undergrowth, debris, or other objectionable matter.

B. LIGHT CLEARING shall be defined by an easement that is dense with shrubs, brush, and trees up to one foot in diameter.

C. MEDIUM CLEARING shall be defined by an easement that is dense with shrubs, brush, and trees averaging one to two feet in diameter.

D. HEAVY CLEARING shall be defined by an easement that is dense with shrubs, brush, and trees averaging over two feet in diameter, including specimen trees.

E. The cost of moving and reestablishing landscape features, including labor and materials, shall be included in the unit price bid for the item to which it pertains.

F. No payment will be made for clearing and grubbing in grassed areas and in areas with non-established vegetation. The costs associated with such clearing shall be included in the unit price bid for the item to which it pertains.

1.16 REMOVE, REPAIR AND REPLACE DRIVEWAY, CURB AND GUTTER, AND SIDEWALK

A. General:

1. Payment for removing and replacing driveway shall be made based on the actual field measured quantity replaced for the type pavement, at the Unit Price Bid, for REMOVE AND REPLACE PAVEMENT.

2. The Unit Price Bid shall include all costs associated with the following:

a. Cutting, removing and disposing of existing materials

b. Replacing and compacting materials for base, subbase,

c. All related items as required for a complete driveway repair, including:

1) Providing select backfill if necessary,

2) All traffic control and temporary measures for maintaining traffic, and access, in accordance with the Project Drawings Standard Details and Specifications and/or per the applicable jurisdiction Standard Details and Specifications.

3. Payment shall be made only for that length for which the pipeline is constructed underneath or within four feet of the edge of the pavement to a width as shown in the Standard Details and Specifications.

4. Payment for driveway soils testing shall be made from the SOILS, CONCRETE, ASPHALT, AND MATERIALS TESTING cash allowance.

5. No payment shall be made for tests that fail to verify required results.

6. No additional payment will be made for removing and replacing damaged adjacent pavement.

7. No additional payment will be made for saw cutting of driveways or curbs.

B. Payment for removing and replacing Gravel Driveways will be made based on the actual measured quantity replaced at the unit price Bid for GRAVEL DRIVEWAY.

1. The unit price bid shall include all costs associated with removing, replacing, and compacting a minimum of four-inches of GAB or #57 stone, and all related items as required for a complete driveway repair, including:

a. All traffic control and temporary measures for maintaining traffic and access in accordance with the Project Drawing Standard Detail and Specifications and/or per the applicable jurisdiction Specifications.

2. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width as limited by the Standard Details and Specifications.

C. Payment for removing and replacing Commercial Concrete Driveways

1. Shall be made based on the field measured quantity replaced at the unit price Bid for CONCRETE DRIVEWAY - COMMERCIAL.

2. The Unit Price Bid shall include all costs associated with the following:

a. Cutting, removing, and disposing of existing materials.

b. Replacing and compacting materials for base, subbase.

c. Placing a minimum of six inches concrete with reinforcing steel.

d. All related items as required, including:

1) Providing select backfill if necessary.

2). All traffic control and temporary measures for maintaining traffic, and access, in accordance with the Project Drawings Standard Details and Specifications and/or per the applicable jurisdiction Standard Details and Specifications.

3. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width to the nearest construction joint on either side of the new pipeline.

D. Payment for removing, repairing and replacing Concrete Driveway

1. Shall be made based on the actual field measured quantity replaced, at the Unit Price Bid, for CONCRETE DRIVEWAY - RESIDENTIAL.
2. The Unit Price Bid shall include all costs associated with the following:
   a. Cutting, removing, and disposing of existing materials,
   b. Replacing and compacting materials for base, subbase, and
   c. All related items as required for a complete driveway repair, including:
      1) Providing select backfill if necessary,
      2) All traffic control and temporary measures for maintaining traffic, and access, in accordance with the Project Drawings Standard Details and Specifications and/or per the applicable jurisdiction Standard Details and Specifications.
3. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width to the nearest construction joint on either side of the new pipe line.

E. Payment for removing and replacing Asphalt Driveways

1. Shall be made based on the actual measured quantity replaced at the unit price Bid for ASPHALT DRIVEWAY- RESIDENTIAL.
2. The unit price bid shall include all costs associated with the following:
   a. Cutting, removing existing pavement, disposing of removed materials,
   b. Replacing and compacting materials for base, subbase, and
   c. Compacting and placing a minimum of four inches of GAB and 1-1/2 inches of 9.5 mm Superpave asphalt.
   d. All related items as required for a complete driveway repair, including:
      1) Providing select backfill if necessary
      2) All traffic control and temporary measures for maintaining access in accordance with the Project Drawing Standard Detail and Specifications and/or per the applicable jurisdiction Specifications.
3. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width as limited by the Standard Details and Specifications.

F. Payment for removing and replacing Concrete Sidewalk shall be made based on the field measured quantity replaced, at the Unit Price Bid for SIDEWALK.

1. The Unit Price Bid shall include all costs associated with cutting, removing existing sidewalk, removing, replacing, displacing existing materials, and compacting placement material, and all other items as required for completing the sidewalk repair, including all traffic control measures, and temporary measures for maintaining sidewalk capability, in accordance with the Project Drawings Sidewalk Standard Details and Specifications, and/or per the applicable jurisdiction specification.

2. No payment for sidewalk shall be made where the centerline of the new pipe is more than 5-feet from the closest edge of the sidewalk.

3 The Unit Price Bid for removing, disposal and replacing existing Sidewalk, shall include, but not limited to base, bricks, concrete, forms, curing, finishing, labor, materials, tools, and appliances, and all related items necessary to complete the work, and/or per the applicable jurisdiction Standard Detail and Specification.

G. Payment for removal and replacement of curb and gutter shall be made based on the actual field measured quantity replaced, and the Standard Details and Specifications, at the unit prices bid for CONCRETE CURB AND GUTTER or for GRANITE CURB as appropriate.

1. The Unit Price Bid shall include all costs associated with cutting, removing, replacing, and displacing existing materials, and all related items as required, including all traffic control measures.

2. No payment for curb and gutter shall be made where the centerline of the new pipe is more than 5-feet from the closest edge of the curb and gut

1.17 ASPHALT PAVEMENT REMOVAL AND REPLACEMENT

A. Payment for removing and replacing pavement shall be based on the field verifiable measured quantity replaced, at the Unit Price Bid for ASPHALT PAVEMENT REPLACEMENT.

1. The Unit Price Bid shall include all costs associated with the following:

a. Trench cutting, existing asphalt pavement saw cut, labor. materials, tools and equipment.

b. Removing, and disposing of existing materials.

c. Replacing and compacting materials for base, subbase.

d. All related items as required, including:

1) Providing select backfill if necessary, as required by and approved by Construction Manager.

2) All traffic control and temporary measures for maintaining traffic, and access, in accordance with the Project Drawings Standard Details and Specifications and/or per the applicable jurisdiction Standard Details and Specifications.

B. Payment for removal and replacement of asphalt pavement (Type A Cut Repair), where the Fulton County Standard Utility Cut (Type C Cut Repair) is not required, shall be made at the unit price bid for ASPHALT PAVEMENT REMOVAL AND REPLACEMENT.

1. The unit price bid shall include all costs associated with a Type A Cut Repair, including:

   a. Cutting, removing existing pavement, disposing of removed materials.

   b. Compacting and placing a minimum of six inches of crusher run and 1-1/2 inches of 9.5 mm Superpave asphalt.

   c. All related items as required for a complete repair, including road plates and all traffic control and temporary measures as specified above.

2. Payment will be made for the length for which the pipeline is constructed underneath the roadway and for the width as limited by the Standard Details and Specifications, or as approved by the Construction Manager.

C. Payment for Fulton County Standard Utility Cut (Type C Cut Repair) shall be made at the unit price bid for COMPLETE FULTON COUNTY STANDARD UTILITY CUT.

1. The unit price bid shall include all costs associated with a Type C Cut Repair, including:

   a. Cutting, removing existing pavement.

   b. Disposing of removed materials.

   c. Eight inch concrete cap, bituminous tack coat, and 1-1/2 inches of 9.5 mm Superpave asphalt.

   d. All related items as required for a complete repair, including road plates and all traffic control and temporary measures as specified above.

2. Payment will be made for the length for which the pipeline is constructed underneath the roadway and for the width as limited by the Standard Details and Specifications, or as approved by the Construction Manager.

D. No separate or additional payment shall be made for temporary measures required to make the road or driveway surface passable, including backfilling the top of the trench temporarily with crusher run or granular material or placing a temporary asphalt topping.

E. Payment for milling shall be made at the unit price bid for ROAD SURFACE MILLING.

1. The Unit Price shall include all costs associated with the milling activity, such as:

   a. Lowering of existing water valves or manholes.

b. Milling the existing pavement to the required thickness.

c. Disposing all waste materials.

d. All related items, including:

1) All traffic control and temporary measures as specified above.

2) As required by the Municipality Standard Detail and Specification, and/or the Construction Manager.

2. Payment shall be made for the actual field measured road surface area length and width milled, as approved by the Construction Manager.

F. Payment for overlay shall be made at the unit price bid for ROAD SURFACE OVERLAY.

1. The unit price bid shall include all costs associated with overlaying a road surface with a bituminous tack coat and a minimum of one and 1-1/2 inches of 9.5 mm Superpave asphalt, and all related items as required including all traffic control and temporary measures as specified above.

2. Measurement shall be made based on actual area overlaid, as approved by the Construction Manager.

G. Payment for road resurfacing shall be made at the Unit Price Bid for ROAD RESURFACING.

1. The limits eligible for payment shall be based on actual field measured area width and length, relevant Municipality Standard and Specification, Project Drawings, as approved by Construction Manager.

2. The Unit Price Bid shall include all costs associated with road resurfacing:

a. Labor, materials, tools, equipment.

b. Bituminous tack coat.

c. Replacing existing stripping and traffic devices.

c. Raising existing water valves, or manholes.

d. Potholes repair.

e Replacing items affected by the resurfacing activity, and restoring the road to its pre-construction condition.

f. All related items as required including all traffic control and temporary measures as specified above.

1.18 PAVEMENT MARKING AND STRIPING

A. The unit price bid for PAVEMENT MARKING AND STRIPING shall include all costs associated with applying standard DOT striping and paint as listed in the Bid and as ordered by the Construction Manager. All required materials, labor, tools, equipment, and traffic control shall be included in the unit price bid.

1.19 TRAFFIC CONTROL

A. All costs for providing traffic control in compliance with the Manual on Uniform Traffic Control Devices (MUTCD) and Georgia Department of Transportation (GDOT) specifications shall be included in the unit price bid for the item to which it pertains. No additional payment will be made for complying with MUTCD or GDOT requirements.

B. Payment for TRAFFIC CONTROL as indicated in the Bid will be made only for additional traffic control devices beyond the requirements of the MUTCD and / or GDOT as ordered by the Construction Manager.

C. The unit price bid for STANDARD DOT BARRIER shall include all costs for providing, installing and removing a standard DOT barrier, as directed by the Construction Manager.

1. No excavation in or near roadways will be left open overnight. Therefore, all concrete barriers will be required to be removed from the roadway and moved to a location where vehicular and pedestrian traffic are not obstructed. The cost of moving the barriers as such shall be included in the unit price bid.

2. Measurement for payment shall be made based on the actual linear footage of barrier installed, per day, approved by the Construction Manager and serving the purpose for which it was intended. Payment will not be made for excess barriers stored by the Contractor in any location.

D. The unit price bid for MUTCD STANDARD SAFETY BARREL shall include all costs for providing, installing and removing a standard MUTCD safety barrel, as directed by the Construction Manager. Only safety barrels directed by the Construction Manager, in addition to those required by the MUTCD and GDOT, shall be paid for separately.

E. The unit price bid for POLICE CRUISER shall include all costs for providing a police cruiser for additional traffic control. Payment will be made for hours spent on site, which may be a portion of a standard work day. Payment will be made only for hours documented and approved by the Construction Manager.

F. The unit price bid for CERTIFIED FLAGMAN shall include all costs for providing a flagman for additional traffic control, as directed by the Construction Manager, in addition to the requirements of MUTCD and GDOT.

1. The flagman shall be certified and dedicated to maintaining and directing traffic flow.

a. An individual who works part time as a flagman and part time as a laborer or acts in dual capacity will not be approved for payment under this item.

b. Proof of certification may be required by the Construction Manager prior to acceptance for payment.

2. Payment will be made for hours spent on site performing dedicated flagman duties, which may be a portion of a standard work day.

3. Payment will be made only for hours documented and approved by the Construction Manager.

G. The unit price bid for LIGHT PLANT shall include all costs for providing a light plant, including generator and lighting system, for night work, as directed by the Construction Manager.

H. The unit price bid for ELECTRONIC MESSAGE BOARD shall include all costs for providing an electronic message board, as directed by the Construction Manager.

1.20 REMOVE AND REPLACE EXISTING FENCE

A. The unit price bid for REMOVE AND REPLACE EXISTING FENCE shall include all costs associated with removing and replacing an existing fence of the type and material listed in the Bid, including disposing of waste materials, restoration of site to original condition, and all other associated work for a complete installation.

1.21 CAST IN PLACE CONCRETE

A. Structural Concrete: The unit price bid for STRUCTURAL CONCRETE shall include all costs associated with placing concrete as directed by the Construction Manager including excavation, dewatering, formwork, placing of concrete, and all associated labor, tools, and materials. This item will not be utilized for concrete piers for stream crossings

B. Reinforcing Steel: The unit price bid for REINFORCING STEEL shall include all costs associated with providing reinforcing steel for structural concrete, including providing steel as directed by the Construction Manager and all labor, tools, and materials required.

C. The unit price bid for REINFORCED CONCRETE PLACEMENT shall include all costs of placing reinforced concrete as directed by the Construction Manager. Reinforced concrete placement shall only be used for concrete requiring the installation of rebar reinforcement in addition to items listed elsewhere in the Bid.

D. The unit price Bid for CONCRETE PIERS shall include all costs associated with installation of concrete piers under sewer line including excavation, backfill, compaction, dewatering, drilling grout holes, grouting dowels in place, concrete, reinforcement, and all other work required for pier installation. Measurement for vertical height of the piers shall include the thickness of the footing.

E. The cost of services of the consulting soil and foundation Construction Manager will be paid by the Contractor from the SOILS, CONCRETE, ASPHALT, AND MATERIALS TESTING cash allowance.

F. The unit price bid for GENERAL CONCRETE PLACEMENT shall include all costs of placing general concrete as directed by the Construction Manager. General

concrete placement shall only be used for concrete in addition to items listed elsewhere in the Bid.

G The unit price bid for CONCRETE – FLOWABLE FILL shall include all costs of filling abandoned pipes with concrete as directed by the Construction Manager. Flowable fill shall only be used for concrete in addition to items listed elsewhere in the Bid.

1.22 PROGRAMMABLE ELECTRONIC MARKING DEVICES

A. The unit price bid for PROGRAMMABLE ELECTRONIC MARKING DEVICES shall include the cost of providing the marking devices including:

1. Programmer/locator as specified.
2. Programming the devices and placing them along the water line.
3. The cost of excavation shall be included in the unit price bid for GRAVITYSEWER or UTILITY LOCATION.
4. Measurement for payment will be based on the quantity installed as directed by the Construction Manager.

1.23 CCTV

A. The unit price bid for CCTV shall include all costs associated with utilizing CCTV equipment to record work on assets, measuring depth, diameter and type of pipes and all conditions of the run of the pipe from manhole to manhole. Measurement shall be made based on distance recorded on video of the CCTV, as approved by the Construction Manager.

B. For all CCTV work, PACP data requirements are as follows:

1. PACP database must be NASSCO compliant.
2. Data must be delivered in PACP or GaniteXP format.
3. PACP format is only acceptable for the following versions: Nothing earlier then 2.0.2 nothing later 6.0.3.
4. Asset ID in the database needs to be implemented as provided by Fulton County. If the CCTV contractor discovers additional assets that are not currently mapped by Fulton County, then the discovered asset(s) should be identified with a TMP prefix joined with the next known downstream Asset ID. If there is no downstream and upstream IDs contractor need to use sequence number identified with a TMP.
5. If a new Data (manhole, pipe) is found, map update (sketch) needs to be provided.
6. Data and videos should be provided on a flash drive with the label of the project.
7. Videos will only be accepted in MPG format.

8. Video needs to be delivered per section of the pipe from manhole to manhole.

1.24 UTILITY LOCATION – EXCAVATION AND BACKFILL

A. Soft Dig Hydro Excavation:

1. The unit price bid for SOFT DIG HYDRO EXCAVATION shall include all costs associated with the following:

a. Locating the assigned utility.

b. Excavating to directly above the pipe.

c. Measuring the depth, diameter and type of the pipe.

d Backfilling and compacting the hole up to two feet from existing grade with soil.

e Encoding a 3M ID marker device and installing the marker above the pipe at a depth of two feet.

f. Backfilling with soil and dressing the disturbed area with like surrounding materials.

2. Measurement for payment shall be based on the actual field number of locations, only when directed and approved by the Construction Manager prior to any soft dig excavation.

3. Cost of the 3M ID marker shall be paid separately per each.

B. Where utility location is performed in roadways or sidewalks, other materials may be required for backfill.

1. Select materials will be paid for at the unit prices bid for TRENCH STABILIZATION.
2. Measurement for payment will be made on the actual quantity of material used for backfill of the hole where the marker ball is installed.

C. Exploratory Excavation:

1. The unit price bid for EXPLORATORY EXCAVATION shall include all costs associated with excavation of an area by machine and by hand where necessary with the intent of locating an existing utility, including all equipment, tools, and labor.

2. The costs associated with removal and replacement of roadway, driveway, sidewalk, or curb and gutter shall be included under the appropriate pay item.

3. Measurement for payment will be based on the actual hours required to locate the utility, only when ordered by the Construction Manager prior to any excavation.

4. This item shall not be used for standard locating of utilities as required to perform the work.

D. No payment will be made for excavation that does not locate the assigned utility, or where the marker ball is not installed directly above the pipe.

E. No separate or additional payment will be made for any special or unique method, means, techniques or equipment necessary for the Contractor's compliance with these Specifications, regulatory requirements, permits, laws or regulations which govern this Project.

1.25 CASH ALLOWANCES

A. General

1. The Contractor shall include in the Bid Total all allowances stated in the Contract Documents.

a. These allowances shall cover the net cost of the services provided by a firm selected by the Owner.

b. The Contractor's handling costs, labor, overhead, profit and other expenses contemplated for the original allowance shall be included in the items to which they pertain and not in allowances.

2. No payment will be made for nonproductive time on the part of testing personnel due to the Contractor's failure to properly coordinate testing activities with the work schedule or the Contractor's problems with maintaining equipment in good working condition.

3. The Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests.

4. No payment shall be provided for services that fail to verify required results.

B. Should the net cost be more or less than the specified amount of the allowance, the Contract will be adjusted accordingly by Change Order. The amount of change order will not recognize any changes in handling costs at the site, labor, overhead, profit and other expenses caused by the adjustment to the allowance.

C. Documentation

1. Submit copies of the invoices with each periodic payment request from the firm providing the services.

2. Submit results of services provided which verify required results.

D. Schedule of Cash Allowances

1. Soils, Concrete, Asphalt, and Materials Testing: Allow the amount provided in the Bid for the services of a Geotechnical Engineering firm and testing laboratory to verify soils conditions including trench excavation and backfill, asphalt coring and density tests, testing of concrete cylinders for poured in place concrete, pipe materials, and similar issues as directed by the Construction Manager.

a. Services will be reimbursed at direct cost with no markup.

b. Contractor must provide invoices for Owner approval.

c. This allowance amount specified in the Bid, is for additional testing services not included in the Unit Price Bid for the item to which it relates, and for services not specifically required in the applicable authorized Specifications but is requested or directed and for approval by the Construction Manager, prior to the start of work activity.

2. Unforeseen Conditions: Allow the amount specified in the Bid to resolve unforeseen project situations and/or site conditions during construction, to be pre–approved and approved by Construction Manager, prior to the start of work activity.

a. Utility Conflicts: Allow the amount specified in the Bid to resolve any unforeseen utility conflicts, which may accrue during the Project's construction, including its relocation and/or replacement, as directed and approved by the Construction Manager.

1) Known on site located utility which was not shown or accurately field marked by Fulton County water locators, but is necessary to be relocated to accommodate the installation of the proposed pipeline.

2). Unknown on site located utility which was not marked by Fulton County water locators, but requires significant relocation work, prior to the start of the proposed pipeline installation.

3. Large Tree Removal:

a. Allow the amount specified in the Bid for the services of a tree removal specialist to remove individual trees as directed by the Construction Manager.

b. Services will be reimbursed in accordance with 1.25.D.9 below.

c. Contractor must provide invoices for Owner approval.

d. No payment will be made for trees removed as part of clearing and grubbing.

4. Bypass Pumping:

a. Bypass pumping is included within the Item of Work. Allow the amount specified in the Bid for the services of a bypass pumping specialty contractor to provide bypass pumping services as directed and approved by the Construction Manager.

b. Services will be reimbursed in accordance with 1.25.D.9 below.

c. Contractor must provide invoices for Owner approval.

d. Costs for bypass pumping will be reimbursed only with prior approval of the Construction Manager.

e. If bypass pumps are provided without prior Construction Manager approval, payment may not be made for services at the discretion of the Construction Manager.

5. Preblast Survey/Inspection and Blasting Monitoring:

   a. Allow the amount provided in the Bid for the services of an independent, qualified specialty subcontractor to monitor the blasting, as directed and approved by the Construction Manager.

   b. The services will be reimbursed at direct cost with no mark–up.

   c. The Contractor must provide an estimated invoice for services or activities to be performed, for pre-approval by the Construction Manager, prior to the start of work.

   d. Contractor must provide invoices for Owner approval.

6. Construction Verification Surveying:

   a. Allow the amount provided in the Bid for Project construction field staking surveying of the proposed pipeline horizontal centerline alignment, depth of cover checks throughout installation of pipeline, and as-built verification and accuracy of pipe line, if deemed necessary by the Construction Manager.

   b. The Construction Manager shall pre-approve and approve the independent surveying firm selection by the Contractor.

   c. The Contractor must provide an estimate invoice from the approved selected survey firm to perform the work activity, prior to the start of work.

   d. This allowance shall only be utilized by the Owner or Construction Manager, for field verification of the Contractor's reference points, proposed pipeline centerline, and project activities performed by the Contractor.

   e. This cash allowance does not in any way relieves the Contractor of their responsibilities, for installing the necessary project reference points, field staking the proposed pipeline horizontal centerline, field checking, or verifying the installed pipeline required minimum depth of cover, installing temporary and permanent bench marks, and field verifying the accuracy of the Contractor's work activities performed, including as-built drawings.

7. Exploratory Excavation: Allow the amount provided in Bid for subsurface investigation to field locate and identify existing water lines size, depth, pipe type, within the Project's pipeline installation limit, where there is no as-built or record drawings.

   a. The Construction Manager shall pre–approve and approve all exploratory excavation locations, the number of locations, and exploratory excavation request by Contractor, including estimated cost, prior to the start of work.

8. Additional Landscaping, not shown on the Project Drawings: Allow for the amount specified in the Bid for additional existing or current landscaping replacement, not shown on the Project Drawings, or specified, but is affected by the Project construction.

a. The Contractor must provide an estimate invoice for activities to be performed, for pre-approval and approval, by the Construction Manager, prior to the start of work activity.

b. Contractor must provide invoices for approval of payment by Owner.

9. In Subparagraphs 3 and 4 above, the items included in “Cost and “Overhead” shall be based on the following schedule:

a. Unless otherwise provided in the Contract Documents, “Cost” shall be limited to the following: cost of materials incorporated into the Work, including sales tax and cost of delivery; cost of direct labor (labor cost may include a pro rata share of foreman’s account of the change) including social security, old age and unemployment insurance, and fringe benefits required by agreement or custom; workers’ or workmen’s compensation insurance; rental value of equipment and machinery; costs for preparing Shop Drawings.

b. Unless otherwise provided in the Contract Documents, “Overhead” shall include the following: bond and insurance premiums including increase and decreases from change in the Work, supervision, superintendence, construction parking, wages of timekeepers, watchmen and clerks, small tools, consumable supplies, expendables, incidentals, general office expense, the cost of additional reproduction for the Contractor’s subcontractors beyond that agreed upon in the Contract Documents, construction parking, any additional costs of craft supervision by the Contractor’s or subcontractors’ superintendents, and overhead charges which would be customary and expended regardless of the change in the Work due to other overlapping activities which are included as part of the original Contract, and all other expenses not included in “Cost” above.

1.26 EMERGENCY SERVICES

A. The following labor and equipment are included in the Bid for when the County needs manpower or additional equipment to assist in making emergency repairs other than those specified above as unit price items.

1. Hourly rate items below shall **NOT** apply when work is performed under non-emergency conditions.

2. The Notice to Proceed for each project will indicate emergency or non-emergency project status.

a. On emergency projects, the Contractor shall have a representative on site within 2 hours of notification to assess the work to be performed and have emergency work crews on site with the proper equipment within 4 hours of the original notification.

3. Once an emergency is declared contained by the Construction Manager, the project will go forward as non-emergency utilizing line items and a notice to proceed will be issued for the remainder of the work.

B. The unit price bid for the following items shall include all costs for providing the specified personnel on an hourly basis as required by the Owner.

1. Sewer Superintendent with pickup truck
2. Sewer Crew Truck - Fully equipped with tools and repair parts including but not limited to pipe saw, wacker-packer, chain saw, and miscellaneous hand tools, including sewer foreman and three laborers.
3. Rubber Tired Front End Loader with Trailer and Operator
4. Rubber Tired Backhoe with Trailer and Operator
5. Excavator with Trailer and Operator
6. Trench Compactor with Operator
7. Mobile Air Compressor with Hoses and Air Tools (Jackhammer, Pavement Breaker, Clay Spade, etc.)
8. 10 CY dump truck with operator.

C. Payment may be made for partial work days where applicable.

D. All overhead and direct costs, including all mobilization costs, for providing the labor, equipment, tools, supplies associated shall be included.

E. Separate payments for items not included shall be agreed to prior to providing such items.

F. No payment will be made for additional services provided without proper written notification to the Owner that the services being requested are additional.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 – GENERAL

1.01. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02. SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.03. DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

B. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work.

C. No other adjustments are made to the Contract Sum.

1.04. PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

B. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

C. Notification by Owner: The Owner will, immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

D. Execute accepted alternates under the same conditions as other work of the Contract.

1.05. SCHEDULE OF ALTERNATES

A. <To be developed for each Project>

PART 2– MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USE)

END OF SECTION

SECTION 01 25 00

SUBSTITUTIONS AND OPTIONS

PART 1 – GENERAL

1.01 SCOPE

A. This Section outlines the restrictions and requirements for substitutions, product and manufacturer options, and construction method options.

1.02 DEFINITIONS

A. For the purposes of these Contract Documents, a “substitute item” shall be defined as one of the following:

1. A product or manufacturer offered as a replacement to a specified product or manufacturer.
2. A product or manufacturer offered in addition to a specified product or manufacturer.

B. For the purposes of these Contract Documents, a “substitute construction method” shall be defined as one of the following:

1. A mean, method, technique, sequence or procedure of construction offered as a replacement for a specified mean, method, technique, sequence or procedure of construction.
2. A mean, method, technique, sequence or procedure of construction offered in addition to a specified mean, method, technique, sequence or procedure of construction.

1.03 GENERAL

A. An item or construction method, which is offered where no specific product, manufacturer, mean, method, technique, sequence or procedure of construction is specified or shown on the Drawings, shall not be considered a substitute and shall be at the option of the Contractor, subject to the provisions in the Contract Documents for that item or construction method.

B. For products specified only by a referenced standard, the Contractor may select any product by any manufacturer, which meets the requirements of the Specifications, unless indicated otherwise in the Contract Documents.

C. If the manufacturer is named on the Drawings or in the Specifications as an acceptable manufacturer, products of that manufacturer meeting all requirements of the Specifications and Drawings are acceptable.

D. Whenever the Engineer's design is based on a specific product of a particular manufacturer, that manufacturer will be shown on the Drawings and/or listed first

in the list of approved manufacturers in the Specifications. Any Bidder intending to furnish products of other than the first listed manufacturer, or furnish substitute items, shall:

1. Verify that the item being furnished will fit in the space allowed, perform the same functions and have the same capabilities as the item specified.
2. Include in its Bid the cost of all accessory items which may be required by the other listed substitute product,
3. Include the cost of any architectural, structural, mechanical, piping, electrical or other modifications required, and
4. Include the cost of required additional work by the Construction Manager, if any, to accommodate the item.

E. Whenever a product is identified on the Drawings or in the Specifications by reference to manufacturers or vendors names, trade names, catalog numbers, etc., it is intended only to denote the quality standard of product desired and that they do not restrict Bidders to a specific brand, make, manufacturer or specific name. These listings and citations are used only to set forth and convey to Bidders the general style, type, character and quality of product desired. Equivalent products will be acceptable, subject to the substitution provisions of this Section.

1.04 APPROVALS

A. Approval, of a substitution as an acceptable manufacturer, of the Construction Manager is dependent on determination that the product offered is essentially equal in function, performance, quality of manufacture, ease of maintenance, reliability, service life and other criteria to that on which the design is based; and will require no major modifications to structures, electrical systems, control systems or piping systems.

1.05 SUBSTITUTIONS AND OPTIONS

A. No substitutions will be considered for the manufacturers listed in the Bid Form.

B. After Notice to Proceed

1. Substitute items will be considered only if the term “equal to” precedes the names of acceptable manufacturers in the Specification.
2. Where items are specified by referenced standard or specified as indicated in Article 1.03 above, such items shall be submitted to the Construction Manager for review.
3. The Contractor shall submit shop drawings on the substitute item for the Construction Manager's review in accordance with the Section 01 33 23.

C. Prior to Opening of Bids

1. No consideration or approvals will be made for products specified by a referenced standard, or specified as indicated in Article 1.03 above. Such consideration may occur only after the Notice to Proceed.
2. No consideration or approvals will be made for products being offered where the term “equal to” precedes the name of an approved product. Such substitution consideration may occur only after the Notice to Proceed.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 – GENERAL

1.01 SCOPE

A. Work under this Section includes all scheduling and administering of pre-construction and progress meetings as herein specified and necessary for the proper and complete performance of this Work.

B. Scheduling and Administration of Meeting:

1. Prepare agenda.
2. Make physical arrangements for the meetings.
3. Preside at meetings.
4. Record minutes and include significant proceedings and decisions.
5. Distribute copies of the minutes to participants.

1.02 PRECONSTRUCTION CONFERENCE

A. The Construction Manager shall schedule the preconstruction conference prior to the issuance of the Notice to Proceed.

B. Representatives of the following parties are to be in attendance at the meeting:

1. Owner
2. Design Engineer
3. Construction Manager
4. Project Manager
5. Contractor and superintendent
6. Major subcontractors
7. Representatives of governmental or regulatory agencies when appropriate.

C. The agenda for the preconstruction conference shall consist of the following as a minimum:

1. The Work – including, but not limited to:
    a. Adequacy of distribution of Contract Documents.
    b. Scheduling and phasing requirements.
    c. Schedule and submittal of shop drawings, product data and samples.

d. Major equipment deliveries and priorities.

e. Critical work sequencing.

f. Use of premises, including office and storage areas and Owner's requirements.

g. Special conditions and coordination.

h. Security.

i. Work hours.

2. Distribution and discussion of major subcontractors and tentative construction schedule, and project phasing requirements.

3. Communications – including, but not limited to:

   a. Designation of responsible personnel and emergency telephone numbers.

   b. Change and persons authorized to direct changes.

   c. Requests for Information (RFI), field decisions, and clarifications.

   d. Processing of field decisions and change orders.

   e. Non-Conformance Reports.

   f. Hazard communication.

   g. Project meetings.

4. Contractor’s Site Specific Safety Plan and first aid procedures.

5. Administrative and procedural requirements including, but not limited to:

   a. Contract modification.

   b. Progress payment.

   c. Pay request format, submittal cutoff date, pay date and retainage.

   d. Submittals - including Contractor’s Construction Progress Schedule.

   e. Electronic Communications.

   f. Apprentice and Journey Level Worker Utilization Reporting, if required.

6. Owner testing and inspection.

7. Contractor Quality Control.

8. Procedures for maintaining record documents.

9. Temporary Facilities and Controls including, but not limited to:

   a. Deliveries and storage.

   b. Temporary utilities and enclosures.

   c. Security procedures.

   d. Noise and vibration control.

e. Cutting, patching, and field engineering.

f. Utility shutdowns.

g. Contractor parking.

h. Housekeeping and waste management.

10. Closeout Procedures – including Project Record documents.

D. Contractor shall conduct a like meeting, covering the same body of information, with each Subcontractor's project manager and foreman supervising the Work prior to the performance of any work on site by that Subcontractor.

1. Provide Construction Manager with copies of meeting minutes prepared by the Contractor with each Subcontractor, when requested by Construction Manager.

1.03 PROJECT COORDINATION MEETINGS

A. Project Coordination Meetings may be requested at any time at the discretion of the Owner, Construction Manager or Contractor. The party requesting a meeting shall provide the other two parties with as much advance notice as possible, as well as a written agenda for such meeting.

B. Schedule regular monthly or bi-weekly meetings as directed by the Construction Manager.

C. Hold called meetings as the progress of the work dictates.

D. The meetings shall be held at the location indicated by the Construction Manager.

E. Representatives of the following parties are to be in attendance at the meetings:

1. Construction Manager
2. Design Engineer
3. Project Manager
4. Contractor and superintendent
5. Major subcontractors as pertinent to the agenda
6. Owner's representative as appropriate
7. Representatives of governmental or other regulatory agencies as appropriate.

F. Contractor shall:

1. Administer the meetings.
2. Provide schedules, logs and other construction activity data in support of the issues discussed and recorded in meeting minutes.
3. Record and distribute copies of minutes prior to the next meeting.

G. Construction Manager will:

1. Will review meeting minutes and ascertain that the Work is in accordance with the Construction Documents and the Construction Progress Schedule.

H. The minimum agenda for progress meetings shall consist of the following:

1. Review and approve minutes of previous meetings.
2. Review work progress since last meeting.
3. Review plans for progress during subsequent work period.
   a. Identify pending meetings.
   b. Discuss safety activities and Job Hazards Analysis.
4. Discuss field observations, problems, and conflicts.
   a. Identify problems impeding the Construction Progress Schedule.
5. Identify problems which impede planned progress.
6. Review Quality Control.
   a. Non-conformance reports - discuss corrective Work actions.
7. Review off-site fabrication, delivery schedules and problems.
8. Review Contractor's corrective measures and procedures to regain plan schedule.
9. Review Contractor's revision to the construction schedule as outlined in the Supplementary Conditions.
10. Review submittal schedule and RFIs; - present methods to expedite as required to maintain schedule.
11. Maintenance of quality and work standards.
12. Review proposed changes in the Work and substitution requests for:
    a. Timely processing.
    b. Effect on Construction Progress Schedule and on completion date.
    c. Effect on any other contracts of the Project.
13. Identify and track action items for all parties. The intent is to maintain a running list of action items with specific designation for parties responsible and expected completion dates.
14. Complete other current business.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 32 16

CONSTRUCTION SCHEDULES

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section includes preparing, furnishing, distributing, and periodic updating of the construction schedules as specified herein.

B. The purpose of the schedule is to demonstrate that the Contractor can complete the overall Project within the Contract Time and meet all required interim milestones.

C. The schedule also provides a basis for determining the progress status of each phase and the Project relative to specific dates and completion time.

1.02 DESCRIPTION

A. The Contractor shall provide a graphic construction schedule prepared by the critical path method of analysis. The critical path schedule shall be prepared from estimates of the required duration and sequence for each item of work and function to be performed.

B. A general guide for preparing such a schedule is contained in "The Use of CPM in Construction, A Manual for Contractors," published by the Associated General Contractors of America.

C. Tabulation and analysis of the work schedule shall be performed by computer using a commercially available critical path software program. In addition to the capability to produce tabular reports, the computer software shall plot the construction schedule after the Contractor has produced it in draft form as required by paragraph 1.03 Submittals.

D. The schedule shall depict all significant construction activities and all items of work listed in the breakdown of contract prices submitted by the Contractor in accordance with the General Conditions of the Contract Documents. The dependencies between activities shall be indicated so that it may be established what effect the progress of any one activity has on the schedule.

E. No activity on the schedule shall have a duration longer than 21 days or assigned value greater than $100,000, except activities comprising only fabrication, and delivery may extend for more than 21 days. Activities which exceed these limits shall be divided into more detailed components. The schedule duration of each activity shall be based on the work being performed during the normal 40-hour workweek with allowances made for legal holidays and normal weather conditions.

1.03 SUBMITTALS

A. Overall Project Schedule (OPS)

1. Submit the schedule within 10 days after date of the Notice to Proceed.
2. The OPS schedule shall identify various critical project milestones, in order to address the public and activities within the project's area.
3. The Construction Manager will review the schedule and return it within 10 days after receipt.
4. If required, resubmit within 10 days after receipt of a returned copy.

B. Near Term Schedule (NTS)

1. Submit the first Near Term Schedule within 10 days of the Notice to Proceed.
2. The Construction Manager will review the schedule and return it within 10 days after receipt.

C. Submit an update of the OPS and NTS with each progress payment request.

D. Submit the number of copies required by the Contractor, plus four copies to be retained by the Construction Manager.

1.04 APPROVAL

A. Approval of the Contractor's detailed construction program and revisions thereto shall in no way relieve the Contractor of any of Contractor's duties and obligations under the Contract.

B. Approval is limited to the format of the schedule and does not in any way indicate approval of, or concurrence with, the Contractor's means, methods and ability to carry out the work.

1.05 OVERALL PROJECT SCHEDULE (OPS)

A. The Contractor shall submit to the Construction Manager for approval a detailed Overall Project Schedule of the Contractor's proposed operations for the duration of the Project. The OPS shall be in the form of a Gantt/bar chart. Primavera P6 shall be used to produce this Gantt/bar chart.

B. Gantt/Bar Chart Schedule

1. Each activity with a duration of five or more days shall be identified by a separate bar. Activities with a duration of more than 21 days shall be sub-divided into separate activities.
2. The schedule shall include activities for shop drawing preparation and review, fabrication, delivery, and installation of major or critical path materials and equipment items. .

3. The schedule shall show the proposed start and completion date for each activity. A separate listing of activity start and stop dates and working day requirements shall be provided unless the information is shown in text form on the Gantt/bar chart.

4. The schedule shall identify the Notice to Proceed date, the Contract Completion date, major milestone dates, and a critical path.

5. The schedule shall be printed on a maximum 11 x 17-inch size paper. If the OPS needs to be shown on multiple sheets, a simplified, one page, summary bar chart showing the entire Project shall be provided.

6. The schedule shall have a horizontal time scale based on calendar days and shall identify the Monday of each week.

7. The schedule shall show the precedence relationship for each activity.

1.06 NEAR TERM SCHEDULE (NTS)

A. The Contractor shall develop and refine a detailed Near Term Schedule showing the day to day activities with committed completion dates which must be performed during the upcoming 30 day period. The detailed schedule shall represent the Contractor's best approach to the Work which must be accomplished to maintain progress consistent with the Overall Project Schedule.

B. The Near Term Schedule shall be in the form of Gantt/bar chart and shall include a written narrative description of all activities to be performed and describe corrective action to be taken for items that are behind schedule.

1.07 SCHEDULE REVISIONS

A. Revisions to the accepted critical path construction schedule may be made only with written approval of the Owner.

B. Changes in timing for activities which are not on the critical path may be modified with written agreement of the Contractor and Construction Manager.

C. A change affecting the contract value of any activity, the timing of any activity on the critical path, the completion time and specific dates as specified in the Contract Documents, and work sequencing may be made only in accordance with applicable provisions of the General Conditions of the Contract Documents.

1.08 UPDATING

A. Project status review and update shall be provided each month as specified in the General Conditions of the Contract Documents.

B. Show all changes occurring since previous submission of the updated schedule.

C. Indicate progress of each activity and show actual completion dates.

D. The Contractor shall be prepared to provide a narrative report at the Project Coordination Meetings. The report shall include the following:

1. A description of the overall Project status and comparison to the OPS.
2. Identify activities which are behind schedule and describe corrective action to be taken.
3. A description of changes or revisions to the Project and their effect on the OPS.
4. A description of the Near Term Schedule of the activities to be completed during the next 30 days. The report shall include a description of all activities requiring participation by the Construction Manager and/or Owner.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 32 33

CONSTRUCTION VIDEOS AND PHOTOGRAPHS

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall furnish all equipment and labor materials required to provide the Owner with digital construction videos and photographs of the Project.

B. Videos and photographs shall be provided on a flash drive.

C. Photograph and video files shall become the property of the Owner and none of the photographs herein shall be published without express permission of the Owner.

1.02 PRE-CONSTRUCTION VIDEOS AND PHOTOGRAPHS

A. The Contractor shall provide preconstruction photographs and videos prior to commencement of work on the site. The documentation shall be digital and shall indicate the date, name of project, direction in which the images were taken and the location where the images were taken.

B. A minimum of 50 photographs shall be taken prior to construction including a video of the entire route.

C. Before construction may start, digital copies of the documentation shall be delivered on a flash drive to the Construction Manager.

D. The Contractor shall document the entire area of proposed construction and site entries and access roads from multiple perspectives.

E. All conditions which might later be subject to disagreement shall be shown in sufficient detail to provide a basis for decisions.

F. The pre-construction photographs shall be submitted to the Construction Manager within 28 calendar days after the date of receipt by the Contractor of Notice to Proceed.

1.03 PROGRESS PHOTOGRAPHS AND SUBMITTALS

A. The Contractor shall provide digital construction images showing the progress of the work on a monthly basis.

B. Starting immediately after the date of the preconstruction documentation and continuing as long as the work is in progress, construction photographs shall be taken.

C. Photographs shall be taken to document completely the ongoing work, points of site entry and access roads.

D. A minimum of 20 photographs shall be taken each month including a video of the route.

E. Additional photographs shall be taken and be of such subjects as may be directed by the Construction Manager.

F. All photographs shall indicate the date, job title and brief description of the image(s), including the location and direction the image was taken.

G. A final set of aerial photographs shall be taken once all grassing has been established.

H. Photographs should be provided on a flash drive with each payment application. In addition, one hard copy of each photograph shall be submitted. Failure to include photographs may be cause for rejection of the payment request.

I. If software is used to organize, store and describe the photos, a copy of the software and all relevant updates shall be supplied to both the Owner and the Construction Manager by the Contractor, at no additional cost to Owner.

J. Progress photograph and video files shall be provided on flash drive as well as hard copies for photographs.

K. The file name of each photograph shall at a minimum contain the date the photograph was taken. All photographs shall be labeled to indicate date, time taken, and description of work shown.

1.04 COMPLETION DIGITAL PHOTOGRAPHS AND VIDEO

A. Following completion of the work, photographs and videos shall be made showing the same areas and features as in the pre-construction photographs.

B. The Contractor shall provide one (1) set of completion photographs after Substantial Completion has been achieved.

C. The photographs shall be digital, and shall indicate the date, name of project, direction in which the photograph was taken and the location where the photograph was taken.

D. A minimum of 50 photographs shall be taken at project completion including a video of the entire pipeline route.

E. Before Final Completion and acceptance of the project, digital copies of the photographs shall be delivered on a flash drive to the Construction Manager.

F. The Contractor shall photograph all of the constructed work, the entire area of construction and all site entries and access roads from multiple perspectives.

G. Post construction photographs and videos shall be provided prior to final acceptance of the Project.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SUBMITTALS

A. Submittals covered by these requirements include manufacturers' information, shop drawings, test procedures, test results, samples, requests for substitutions, and miscellaneous work-related submittals.

B. Submittals shall also include, but not be limited to, all mechanical, electrical and electronic equipment and systems, materials, reinforcing steel, fabricated items, and piping and conduit details.

C. The Contractor shall furnish all drawings, specifications, descriptive data, certificates, samples, tests, methods, schedules, and manufacturer's installation and other instructions as specifically required in the contract documents to demonstrate fully that the materials and equipment to be furnished and the methods of work comply with the provisions and intent of the contract documents.

1.02 CONTRACTOR'S RESPONSIBILITIES

A. General:

1. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal.

    a. The Contractor shall verify that all features of all products conform to the specified requirements. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment, which are being submitted for review.

    b. All extraneous materials shall be crossed out or otherwise obliterated. The Contractor shall ensure that there is no conflict with other submittals and notify the Construction Manager in each case where his submittal may affect the work of another contractor or the Owner.

    c. The Contractor shall coordinate submittals among his subcontractors and suppliers.

2. The Contractor shall coordinate submittals with the Work so that work will not be delayed. He shall coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another.

    a. No extension of time will be allowed because of failure to properly schedule submittals.

b. The Contractor shall not proceed with work related to a submittal until the submittal process is complete. This requires that submittals for review and comment be returned to the Contractor stamped "No Exceptions Taken" or "Make Corrections Noted."

3. The Contractor shall certify on each submittal document that he has reviewed the submittal, verified field conditions, and complied with the contract documents.

4. The Contractor may authorize in writing a material or equipment supplier to deal directly with the Construction Manager or the Owner with regard to a submittal. These dealings shall be limited to contract interpretations to clarify and expedite the Work.

1.03 CATEGORIES OF SUBMITTALS

A. General:

1. Submittals fall into two general categories: submittals for review and comment, and submittals which are primarily for information only. Submittals which are for information only are generally specified as Product Data in Part 2 of applicable specification sections.

B. Submittals for review and comment:

1. All submittals except where specified to be submitted as product data for information only shall be submitted by the Contractor to the Construction Manager for review and comment.

C. Submittals (product data) for information only:

1. Where specified, the Contractor shall furnish submittals (product data) to the Construction Manager for Information only. Submittal requirements for operation and maintenance manuals, which are included in this category, are specified in Section 01 78 23.

1.04 TRANSMITTAL PROCEDURE

A. General:

1. Unless otherwise specified, submittals regarding material and equipment shall be accompanied by Transmittal Form 01 33 00-A specified in Section 01 99 90.

2. Submittals for operation and maintenance manuals, information and data shall be accompanied by Transmittal Form 01 78 23-A specified in Section 01 99 90.

3. A separate form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which the submittal is required. Submittal documents common to more than one piece of equipment shall be identified with all the appropriate equipment numbers.

4. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

5. A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted.

    a. Original submittal numbers shall have the following format: XX XX XX.XX.YY, where 'X' denotes the applicable specification section and 'Y' denotes the individual submittal number for that particular specification section, beginning with 01.

    b. The initial submittal shall be identified as "Revision" 000.

    c. Subsequent resubmittals shall be identified 001, 002, etc. Packages shall be identified as follows: XXXXXXXXAA; where 'X' denotes the applicable specification.

B. Deviation from contract:

1. If the Contractor proposes to provide material, equipment, or method of work which deviates from the project manual, he shall indicate so under "deviations" on the transmittal form accompanying the submittal copies.

C. Submittal completeness:

1. Submittals which do not have all the information required to be submitted, including deviations, are not acceptable and will be returned without review.

D. Submittal schedule and log:

1. Contractor shall prepare and maintain a submittal log/schedule that includes all specified submittals for the project.

    a. Copies of the submittal log shall be provided to the Owner and Construction Manager for review within 15 days of the notice to proceed.

    b. No progress payments will be made by the Owner until the submittal log/schedule is accepted and approved by the Construction Manager.

2. The schedule shall clearly delineate submittals for review and comment and product data (submittals) for information only.

3. Submittal schedule information shall be updated monthly with the Contractor's updated project schedule.

4. The Contractor shall identify as an activity in the project schedule specified in Section 01 32 16, all major equipment submittals as well as those involving complex reviews and long lead deliveries.

1.05 REVIEW PROCEDURE

A. General:

1. Submittals are specified for those features and characteristics of materials, equipment, and methods of operation which can be selected based on the Contractor's judgment of their conformance to the specified requirements.

2. Other features and characteristics are specified in a manner which enables the Contractor to determine acceptable options without submittals.

3. The review procedure is based on the Contractor's guarantee that all features and characteristics not requiring submittals conform as specified.

   a. Review will not extend to means, methods, techniques, sequences or procedures of construction, or to verifying quantities, dimensions, weights or gages, or fabrication processes (except where specifically indicated or required by the project manual) or to safety precautions or programs incident thereto.

   b. Review of a separate item, as such, will not indicate approval of the assembly in which the item functions.

4. When the contract documents require a submittal, the Contractor shall submit the specified information as follows:

   a. Three (3) hard copies of all submitted information plus one digital pdf copy of all information shall be transmitted with submittals for review and comment.

   b. Unless otherwise specified, 3 copies of all sample data shall be transmitted with submittals (Product Data) for information only.

B. Submittals for review and comment:

1. Unless otherwise specified, within 30 calendar days after receipt of a submittal for review and comment, the Construction Manager shall review the submittal and return 1 copy of the marked-up copy. The marked-up copy/returned submittal will be retained by the Construction Manager. The returned submittal shall indicate one of the following actions:

   a. If the review indicates that the material, equipment or work method complies with the project manual, submittal copies will be marked "NO EXCEPTIONS TAKEN." In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.

   b. If the review indicates limited corrections are required, copies will be marked "MAKE CORRECTIONS NOTED." The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated in O&M data, a corrected copy shall be provided.

   c. If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked "AMEND AND RESUBMIT."

Except at his own risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

d. If the review indicates that the material, equipment, or work method does not comply with the project manual, copies of the submittal will be marked "REJECTED - SEE REMARKS." Submittals with deviations which have not been identified clearly may be rejected. Except at his own risk, the Contractor shall not undertake the work covered by such submittals until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

C. Submittals (product data) for information only:

1. Such information is not subject to submittal review procedures and shall be provided as part of the work under this contract and its acceptability determined under normal inspection procedures.

1.06 EFFECT OF REVIEW OF CONTRACTOR'S SUBMITTALS

A. General:

1. Review of contract drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of his responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the Construction Manager or the Owner, or by any officer or employee thereof, and the Contractor shall have no claim under the Contract on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed.

2. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the Owner has no objection to the Contractor, upon his own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 – GENERAL

1.01 SCOPE

A. Work under this Section includes submittal to the Construction Manager of shop drawings, product data and samples required by the various sections of these Specifications.

B. Submittal Contents: The submittal contents required are specified in each section.

C. Definitions: Submittals are categorized as follows:

1. Shop Drawings

a. Shop drawings shall include technical data, drawings, diagrams, procedure and methodology, performance curves, schedules, templates, patterns, test reports, calculations, instructions, measurements and similar information as applicable to the specific item for which the shop drawing is prepared.

b. Provide newly prepared information, on reproducible sheets, with graphic information at accurate scale (except as otherwise indicated) or appropriate number of prints hereof, with name or preparer (firm name) indicated.

c. The Contract Drawings shall not be traced or reproduced by any method for use as or in lieu of detail shop drawings.

d. Show dimensions and note dimensions that are based on field measurement.

e. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements.

f. Do not allow shop drawings to be used in connection with the Work without appropriate final “Action” markings by the Construction Manager.

g. Drawings shall be presented in a clear and thorough manner. Details shall be identified by reference to sheet and detail, specification section, schedule or room numbers shown on the Contract Drawings.

h. Minimum assembly drawings sheet size shall be 22 x 34 inches.

i. Minimum detail sheet size shall be 8 1/2 x 11 inches.

j. Minimum Scale:

1) Assembly Drawings Sheet, Scale: 1 inch = 30 feet.

2) Detail Sheet, Scale: 1/4 inch = 1 foot.

2. Product Data

   a. Product data includes standard printed information on materials, products and systems, not specially prepared for this Project, other than the designation of selections from among available choices printed therein.

   b. Collect required data into one submittal for each unit of work or system, and mark each copy to show which choices and options are applicable to the Project.

   c. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked and special coordination requirements.

3. Samples

   a. Samples include both fabricated and unfabricated physical examples of materials, products and units of work, both as complete units and as smaller portions of units of work, either for limited visual inspection or, where indicated, for more detailed testing and analysis.

   b. Provide units identical with final condition of proposed materials or products for the work.

      1) Include “range” samples, not less than three units, where unavoidable variations must be expected, and describe or identify variations between units of each set.

      2) Provide full set of optional samples where the Construction Manager's selection is required.

      3) Prepare samples to match the Construction Manager's sample where indicated.

      4) Information with each sample to show generic description, source or product name and manufacturer, limitations and compliance with standards.

      5) Samples are submitted for review and confirmation of color, pattern, texture and “kind” by the Construction Manager.

      6) Construction Manager will note “test” samples, except as otherwise indicated, for other requirements, which are the exclusive responsibility of the Contractor.

4. Miscellaneous submittals related directly to the Work (non-administrative) warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, statements of applicability, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, security/protection/safety keys and similar information, devices and materials applicable to the Work but not processed as shop drawings, product data or samples.

1.02 SPECIFIC CATEGORY REQUIREMENTS

A. General: Except as otherwise indicated in the individual work sections, comply with general requirements specified herein for each indicated category of submittal. Submittals shall contain:

1. The date of submittal and the dates of any previous submittals.
2. The Project title.
3. Numerical submittal numbers, starting with 1.0, 2.0, etc. Revisions to be numbered 1.1, 1.2, etc.
4. The Names of:
   a. Contractor
   b. Supplier
   c. Manufacturer
5. Identification of the product, with the Specification section number, permanent equipment tag numbers and applicable Drawing Number.
6. Field dimensions, clearly identified as such.
7. Relation to adjacent or critical features of the Work or materials.
8. Applicable standards, such as ASTM or Federal Specification numbers.
9. Notification to the Construction Manager in writing, at time of submissions, of any deviations on the submittals from requirements of the Contract Documents.
10. Identification of revisions on resubmittals.
11. An 8 x 3 inch blank space for Contractor and Construction Manager stamps.
12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria and coordination of the information within the submittal with requirements of the Work and of Contract Documents.
13. Submittal sheets or drawings showing more than the particular item under consideration shall have all but the pertinent description of the item for which review is requested crossed out.

1.03 ROUTING OF SUBMITTALS

A. Submittals and routine correspondence shall be routed as follows:

1. Supplier to Contractor (through representative if applicable)
2. Contractor to Construction Manager
3. Construction Manager to Contractor and Owner
4. Contractor to Supplier

PART 2 – PRODUCTS

2.01 SHOP DRAWINGS

A. Unless otherwise specifically directed by the Construction Manager, make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the Work.

B. Submit all shop drawings in the form of six hard copies and one pdf file.

C. One reproducible for all submittals larger than 11 x 17 inches and no more than three prints of other submittals will be returned to the Contractor.

2.02 MANUFACTURER'S LITERATURE

A. Where content of submitted literature from manufacturers includes data not pertinent to this submittal, clearly indicate which portion of the contents is being submitted for the Construction Manager's review.

B. Submit the number of copies which are required to be returned (not to exceed three) plus three copies which will be retained by the Construction Manager.

2.03 SAMPLES

A. Samples shall illustrate materials, equipment or workmanship and established standards by which completed work is judged.

B. Unless otherwise specifically directed by the Construction Manager, all samples shall be of the precise article proposed to be furnished.

C. Submit all samples in the quantity which is required to be returned plus one sample which will be retained by the Construction Manager.

2.04 COLORS

A. Unless the precise color and pattern is specifically described in the Contract Documents, wherever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to the Construction Manager for review and selection.

B. Unless all available colors and patterns have identical costs and identical wearing capabilities, and are identically suited to the installation, completely describe the relative costs and capabilities of each.

PART 3 – EXECUTION

3.01 CONTRACTOR'S COORDINATION OF SUBMITTALS

A. Prior to submittal for the Construction Manager's review, the Contractor shall use all means necessary to fully coordinate all materials, including the following procedures:

1. Determine and verify all field dimensions and conditions, catalog numbers and similar data.
2. Coordinate as required with all trades and all public agencies involved.
3. Submit a written statement of review and compliance with the requirements of all applicable technical Specifications as well as the requirements of this Section.
4. Clearly indicate in a letter or memorandum on the manufacturer's or fabricator's letterhead, all deviations from the Contract Documents.

B. Each and every copy of the shop drawings and data shall bear the Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Construction Manager without the Contractor's stamp will be returned to the Contractor for conformance with this requirement.

C. The Owner may back charge the Contractor for costs associated with having to review a particular shop drawing, product data or sample more than two times to receive a “No Exceptions Taken” mark.

D. Grouping of Submittals

1. Unless otherwise specifically permitted by the Construction Manager, make all submittals in groups containing all associated items.
2. No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent.
    a. It is the Contractor's responsibility to assemble the shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to the Construction Manager along with Contractor's comments as to compliance, non-compliance or features requiring special attention.

E. Schedule of Submittals

1. Within 30 days of Contract award and prior to any shop drawing submittal, the Contractor shall submit a schedule showing the estimated date of submittal and the desired approval date for each shop drawing anticipated.
2. A reasonable period shall be scheduled for review and comments.
3. Time lost due to unacceptable submittals shall be the Contractor's responsibility and some time allowance for resubmittal shall be provided. The schedule shall provide for submittal of items which relate to one another to be submitted concurrently.

3.02 TIMING OF SUBMITTALS

A. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery.

B. In scheduling, allow sufficient time for the Construction Manager's review following the receipt of the submittal.

3.03 REVIEWED SHOP DRAWINGS

A. Construction Manager Review

1. Allow a minimum of 30 days for the Construction Manager's initial processing of each submittal requiring review and response, except allow longer periods where processing must be delayed for coordination with subsequent submittals.

    a. The Construction Manager will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination.

    b. Allow a minimum of two weeks for reprocessing each submittal.

    c. Advise the Construction Manager on each submittal as to whether processing time is critical to progress of the Work, and therefore the Work would be expedited if processing time could be foreshortened.

2. Acceptable submittals will be marked “No Exceptions Taken”. A minimum of three copies will be retained by the Construction Manager for Construction Manager's and the Owner's use and the remaining copies will be returned to the Contractor.

3. Submittals requiring minor corrections before the product is acceptable will be marked “Make Corrections Noted”. The Contractor may order, fabricate and ship the items included in the submittals, provided the indicated corrections are made. Drawings must be resubmitted for review and marked “No Exceptions Taken” prior to installation or use of products.

4. Submittals marked “Amend and Resubmit” must be revised to reflect required changes and the initial review procedure repeated.

5. The “Rejected See Remarks” notation is used to indicate products which are not acceptable. Upon return of a submittal so marked, the Contractor shall repeat the initial review procedure utilizing acceptable products.

6. Only two copies of items marked “Amend and Resubmit” and “Rejected See Remarks” will be reviewed and marked. One copy will be retained by the Construction Manager and the other copy with all remaining unmarked copies will be returned to the Contractor for resubmittal.

B. No work or products shall be installed without a drawing or submittal bearing the “No Exceptions Taken” notation. The Contractor shall maintain at the job site a complete set of shop drawings bearing the Construction Manager's stamp.

C. Substitutions: In the event the Contractor obtains the Construction Manager's approval for the use of products other than those which are listed first in the Contract Documents, the Contractor shall, at the Contractor's own expense and using methods approved by the Construction Manager, make any changes to structures, piping and electrical work that may be necessary to accommodate these products.

D. Use of the “No Exceptions Taken” notation on shop drawings or other submittals is general and shall not relieve the Contractor of the responsibility of furnishing products of the proper dimension, size, quality, quantity, materials and all performance characteristics, to efficiently perform the requirements and intent of the Contract Documents.

1. The Construction Manager's review shall not relieve the Contractor of responsibility for errors of any kind on the shop drawings.

2. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site.

3. The Contractor is also responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the work of all trades.

3.04 RESUBMISSION REQUIREMENTS

A. Shop Drawings

1. Revise initial drawings as required and resubmit as specified for initial submittal, with the resubmittal number shown.

2. Indicate on drawings all changes which have been made other than those requested by the Construction Manager.

B. Project Data and Samples:

1. Resubmit new data and samples as specified for initial submittal, with the resubmittal number shown.

END OF SECTION

SECTION 01 35 00

UNIQUE REQUIREMENTS

PART 1 – GENERAL

1.01 SCOPE

A. The scope of this Section is to convey to the Contractor unique and unusual stipulations and requirements which have been established for this Project.

1. Some of the stipulations and requirements are a result of negotiations with various entities and organizations which have an interest in this Project.

2. Some requirements are based on technical aspects of the Project which are not otherwise conveyed to the Contractor.

B. The provisions of this Section shall not supersede the Bidding Requirements, Contract Forms or Conditions of the Contract.

1.02 MILESTONE DATES

A. The Contractor shall be required to complete the following activities by the indicated date or days after the Notice to Proceed:

Consecutive Calendar Days after Notice to Proceed	Milestone Liquidated Damages per Calendar Day
30 Days	Completion of Administrative Period
210 Days	Substantial Completion of All Work $1,000
240 Days	Final Completion of All Work $250

Revise per specific contract term

B. Substantial Completion, for the purposes of assessing liquidated damages, shall be defined as the time at which the work (or a specified part thereof) has progressed to the point where, in the opinion of Construction Manager, the work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the work (or a specified part thereof) can be utilized for the purposes for which it is intended.

C. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof. At minimum, Substantial Completion shall be defined as:

1. That degree of completion of the Project’s operating facilities or systems sufficient to provide the Owner full time, uninterrupted, continuous operation of the work; and

2. All required functional, performance, and operational or startup testing has been successfully demonstrated for all components, devices, equipment, systems, including instrumentation and controls to the satisfaction of the Construction Manager in accordance with the requirements of the Specifications; and

3. All inspections required have been completed. Specific items of work that must be completed prior to the Construction Manager's issuance of a certificate of Substantial Completion include, but are not limited to, the following:

   a. Correcting deficient work items listed by any regulatory agencies.

   b. All submittals must be received and approved by the Construction Manager, including, but not necessarily limited to, the following:

      1) Record documents.

      2) Factory test reports.

      3) Equipment and structure test reports.

      4) Manufacturer's Certificate of Proper Installation.

      5) Operating and Maintenance information, instructions, manuals, documents, drawings, diagrams, and records.

      6) Spare parts lists.

   c. All additional warranty or insurance coverage requirements have been provided.

1.03 STANDARDS

A. Existing pavement, sidewalks and curb and gutter, driveways or storm sewer, if affected by the construction, shall be replaced, in accordance with the relevant City and/or the Georgia Department of Transportation specifications and standards to match existing conditions at a minimum.

1.04 SUBMITTALS

A. Sequence Submittal

1. Submit a proposed sequence in accordance with Section 01 32 16 with appropriate times of starting and completion of tasks to Construction Manager for review.

2. The Contractor may propose alternatives to the sequencing constraints to that shown in this Section in an attempt to reduce the disruption of the operation of the existing facility or streamline the tasks of this Contract.

3. The Owner and Construction Manager are not obligated to accept any of these alternatives.

B. All requested submittals must be approved by the Owner or Construction Manager, prior to any on site work.

1. This includes, but is not limited to the construction sequencing schedule, Erosion and Sedimentation Control Plan, Tree Protection Plan, Traffic Management Plan, product shop drawings, and health and safety and loss prevention programs.

1.05 EXISTING FACILITY OPERATIONS

A. All existing services and continuity of sewer service must be maintained during the time construction activities are in progress.

B. The Contractor shall coordinate all work with the Construction Manager, so that the construction will not restrain or hinder the operation of the existing services.

1. If, at any time, any portion of the existing service will be interrupted, the Contractor must obtain approval from the Construction Manager, one week in advance, as to the date, time and length of time that portion of the services will be interrupted, until the services are restored.

C. Connections to the existing facilities or alteration of existing facilities will be made at times when the facility involved is not in use or at times, established by the Owner, when the use of the facility can be conveniently interrupted for the period of time needed to make the connection or alteration.

D. After having coordinated the work with the Owner, the Contractor shall prepare a submittal in accordance with Section 01 33 23 to include the time, time limits and methods of each connection or alteration and have the approval of the Construction Manager before any work is undertaken on the connections or alterations.

E. The Contractor shall comply with the stipulations contained in permits obtained from the relevant or applicable government entity, pertaining to work hours, lane closures, noise pollution, traffic detours, and road closures.

F. Before driveways are interrupted, the Contractor is responsible to coordinate their work activities with the property residence, so that construction will not hinder excess to the property.

G. Before any roadway or facilities are blocked off, the Owner's approval shall be obtained to coordinate operations for the Work.

H. The Contractor shall not open or close valves or take any other such actions concerning the operation of existing systems.

1.06 SEQUENCING

A. General

1. The Contractor is responsible for all construction activities sequencing, unless adjustment to any construction activity sequencing, is due to the Project’s constraint, and/or requested by Construction Manager.

2. The completion of specific preliminary sequencing tasks will be required, prior to any construction activities.

3. The Contractor is responsible to verify the project's existing topography, prior to the procurement and delivery of pipe materials.

4. The Contractor is responsible to keep the road fully operational and functional, during the execution of the Project, unless approval is given by the relevant governing authority.

B. The Contractor shall notify the Construction Project Manager in writing at least 72 hours, prior to starting work that will require taking existing facilities out of service.

C. The Contractor may utilize multiple crews to construct the pipeline concurrently at various locations with the approval of the Construction Manager, in order to maintain the Project's completion schedule, or as required by the Construction Manager.

D. The Contractor is responsible to make their own assessment and determination of requirements that affect or may affect the work progress and sequencing.

E. Prior to the procurement of the proposed sewer line materials, the Contractor is responsible to field locate the starting and ending, tie-in points and connections locations of existing sewer pipe line. Field stake the horizontal center line of the proposed pipe line, in order to better procure the total amount of proposed sewer line linear footage.

F. The Contractor is responsible to provide, as an attachment to their Progress Payment Request Submittals, the applicable to date As-Built progress drawing of the installed sewer line that will support linear footage of the sewer line, to be approved for payment.

1.07 SEQUENCING CONSTRAINTS

A. The following construction sequencing constraints are to emphasize critical tasks of the work in this Contract. It is not a complete list of all work to be completed.

1. <add constraints>

1.08 SITE PHYSICAL CONDITIONS

A. The Contractor shall field verify the locations of existing subsurface structures, utilities, services, and depth of underground facilities, prior to the start of excavation and construction.

B. The Contractor is responsible to identify, locate, and make the necessary exploratory excavations where existing underground utilities, services, and structures may potentially conflict with propose construction.

C. All exploratory excavations shall be conducted sufficiently ahead to avoid possible delays to the Contractor's proposed sewer line installation schedule, and project's Contract Time.

D. The Contractor is responsible to field locate accurately and document, prior to start of work, the existing site condition of all landscaping features, walls, sidewalk, and curb and gutter alignment, including any existing features that may be impacted

1.09 TRAFFIC CONTROL

A. The Contractor is responsible to furnish the necessary traffic flagmen and/or escorts to direct traffic in the roadway areas affected by their construction operations, whenever and wherever, in the opinion of the Construction Manager traffic is sufficiently congested or public safety is endangered.

B. Under the Contract Terms, the employment or presence of traffic flagmen or escort, shall not in way relieve the Contractor of their responsible and/or liability.

1.10 CONSTRUCTION STAKING

A. The Project Construction Drawings show the alignment of the sewer line, and the location of manholes and other appurtenances.

B. The base line shall be defined as the centerline to which the location of the sewer line is referenced, or survey line. The Contractor shall be responsible for performing all survey work required for constructing the sewer line, including the establishment of its base line and/or centerline, and any details surveys needed for the sewer line installation and construction.

C. This work shall include the staking out of permanent and temporary easements, to ensure that the Contractor is not deviating from the designated easements.

D. The sewer line level of detail of survey shall be that the correct location, as described on the Construction Drawings or as laid out in the field can be established for construction and can be verified in the field by the Construction Project Manager.

1.11 REFERENCE POINTS

A. The Contractor shall take all precautions necessary, which includes, but not limited to, installing reference points, in order to protect and preserve the centerline or baseline established.

B. Reference points shall be placed at or no more than three (3) from the outside of the construction easement or right-of-way.

C. The location of the reference points shall be recorded in a log with a copy provided to the Construction Project Manager, prior to reference point locations verification.

D. The distances between reference points and the sewer centerline shall be accurately measured to 0.01 foot.

E. The Contractor shall give the Construction Project Manager reasonable notice to field verify the set reference points.

1.12 ADMINISTRATION PERIOD

A. During the Administration Period the Contractor shall be limited in site access to only the following:

1. Nondestructive field verification of existing conditions.
2. Construction of Contractor's temporary field offices.

B. During the Administration Period the Contractor shall complete, as a minimum, the following:

1. Issuance of contracts, subcontracts, and purchase orders for all major products and systems.
2. Complete all submittals, release for manufacture, and schedule delivery for the products or systems referenced above.
3. Prepare and submit approvable documents required by Section 01 32 16, including OPS.
4. Install Contractor's temporary field offices complete with all required utilities, internet, network, supplies, and furnishings required.
5. Complete and submit all preconstruction photos, videos, and initial aerial photographs.

C. The duration of the Administration Period is 30 consecutive calendar days, after which time the Construction Period shall automatically begin.

D. Construction Period may begin prior to the 30 days, provided all requirements of the Administration Period have been completed, submitted, and approved by the Construction Manager.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 35 29

HEALTH, SAFETY AND EMERGENCY RESPONSE PROCEDURES

PART 1 – GENERAL

1.01. CONTRACTOR'S RESPONSIBILITY FOR SAFETY

A. The Contractor shall determine the safety hazards involved in prosecuting the Work and the precautions necessary to conduct the Work safely.

1. If the Contractor is unsure as to any special hazards which may be unique to the various processes and facilities involved in wastewater conveyance and treatment, it shall be Contractor's responsibility to determine such information prior to beginning the Work.

B. The Contractor shall conduct its operations and perform all work safely and perform all work necessary to ensure the safety of its personnel and others and shall be solely and completely responsible for the conditions on the jobsite, including the safety of all persons and property, both public and private, during the Contract period.

C. This protection shall be provided for all persons including but not limited to his employees, employees of other contractors or subcontractors, members of the general public, Owner's employees including the Construction Manager, Engineer's employees, and regulatory agencies' personnel that may be on or about the work. Protection of public and private property including but not limited to utilities, pipes, equipment, motor vehicles, and structures.

D. The Contractor's responsibility for protection is described in Article 25 of the General Conditions.

E. These requirements shall apply continuously and not be limited to normal working hours.

F. The Contractor shall bear all risks associated with performing the Work and shall fully indemnify and hold harmless the Owner, the Construction Manager and Engineer.

PART 2 – SAFETY AND HEALTH REGULATIONS

2.01. GENERAL

A. Safety provisions shall conform to the Federal and State Departments of Labor Occupational Safety and Health Act (OSHA), and all other applicable Federal, State, County, and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified elsewhere in these Contract Documents.

B. Where any of these are in conflict, the more stringent requirement shall be followed. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations or relieve him of the penalties set forth therein.

C. All construction shall be conducted in accordance with the latest applicable requirements of the following:

1. Part 1926 - Safety and Health Regulations for Construction of the Occupational Safety and Health Act.
2. Section 107 of the Contract Work Hours and Safety Standards Act.
3. Any other local, state or federal safety codes, laws, regulations and standards that apply.

D. Copies of these regulations may be obtained from Labor Building, 14th and Constitution Avenue N.W., Washington, DC 20013.

PART 3 – EXECUTION

3.01. SAFE ACCESS TO THE WORK

A. The Contractor shall at all times provide proper facilities for safe access to the work by the Owner, the Construction Manager, their authorized representatives and by all authorized government officials.

3.02. CONSTRUCTION SAFETY PROGRAM

A. Contractor shall develop a written job safety program specifically suited for this project.

B. The Contractor shall appoint for the duration of this Contract a qualified supervisory employee to develop and supervise the Contractor's job safety program that will effectively implement the required safety provisions.

C. Neither the Owner nor the Construction Manager shall be responsible for safety precautions and programs in connection with the construction work.

D. The Contractor shall provide the Owner and Construction Manager with two copies of the Contractor's safety program within 15 working days after the Notice to Proceed.

3.03. EXCAVATION PLANS

A. In accordance with the governing State and Federal requirements, the Contractor shall submit a detailed excavation plan to the Construction Manager before excavation, showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground during the excavation of any trench or trenches five feet or more in depth.

B. The excavation plan shall be prepared, sealed and signed by a licensed engineer registered in the state of Georgia.

C. This submittal is for record purposes only and will not be reviewed and approved by the Owner or Construction Manager.

D. The plan is the complete responsibility of the Contractor and submitting it to the Owner and Construction Manager shall not relieve the Contractor for overall responsibility and liability for the work.

E. It shall be understood that the above stipulated requirements are considered to be the minimum to be provided. It shall be the Contractor's responsibility to provide the additional strength required to support the side of the excavation against loads which may exceed those employed to derive the criteria set forth in the Industrial Safety Orders.

F. The Contractor shall be solely responsible for any and all liabilities which may arise from his failure to provide adequate shoring, bracing, or sheeting as necessary to support the excavation under any or all of the conditions of loading which may exist, or which may arise during the construction of the project.

3.04. SAFETY EQUIPMENT

A. The Contractor shall maintain at the jobsite safety equipment applicable to the Work as prescribed by the governing safety authorities and all articles necessary for giving first aid to the injured and shall establish the procedure for the immediate removal to a hospital or a doctor's care of persons who may be injured on the jobsite.

B. The performance of all work and all construction, particularly with respect to ladders, platforms, structure opening, scaffolding, shoring, lagging, and machinery guards, shall be in accordance with the requirements of applicable governing safety authorities.

3.05. ACCIDENT REPORTS

A. If death or serious injuries or serious damage are caused, the accident shall be reported immediately by telephone or messenger to the Owner. In addition, the Contractor must promptly report in writing to the Owner all accidents in connection with work, giving full details, names, and statements of witnesses.

B. If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Owner, giving full details of the claim.

3.06. TRAFFIC SAFETY AND ACCESS TO PROPERTY

A. Comply with all rules and regulations of the City, State, and County authorities regarding closing or restricting the use of public street or highways.

B. No public or private road shall be closed, except by express permission of the Owner.

C. Conduct the work so as to assure the least possible obstructions within traveled roadways by installing approved signs, barricades, and lights where necessary for the safety of the public.

D. The convenience of the general public and residents adjacent to the project, and the protection of the persons and property are of prime importance and shall be provided for in an adequate and satisfactory manner.

3.07. FIRE PREVENTION AND PROTECTION

A. The Contractor shall execute all work in a fire-safe manner and shall supply and maintain on the site adequate fire-fighting equipment capable of extinguishing incipient fires.

B. The Contractor shall comply with applicable federal, local, and state fire prevention regulations.

C. Where these regulations do not apply, applicable parts of the National Fire Prevention Standards for Safeguarding Building Construction Operations, (NFPA No. 241) shall be followed.

D. Sufficient number of fire extinguishers of the type and capacity required to protect the Work and ancillary facilities, shall be provided and maintained by the Contractor in readily accessible locations.

3.08. SPECIAL REQUIREMENTS

A. The Contractor's attention is directed to the fact that construction activities involving existing wastewater facilities and sewer systems will occasionally involve work in potentially hazardous environments in which oxygen deficient, toxic or explosive conditions may exist.

B. Additional hazards arise from the presence of pathogens in the wastewater and sludge and from the slime and scum layer that coat walking, working and other surfaces.

C. In dealing with these hazards, the Contractor shall take special precautions to ensure worker safety. Such precautions shall include, but are not limited to, the following, as applicable:

1. Installing temporary forced air ventilation equipment and ducts for fresh air in enclosed areas.

2. Using pneumatic tools and equipment instead of electric driven equipment in hazardous areas.

3. Avoiding the use of cutting torches, field welding and grinders in hazardous areas.

4. Cleaning and disinfecting working surfaces with hot water, high pressure washers prior to commencing work.
5. Installing sealed wooden baffles or bulkheads to isolate working areas from hazardous atmospheres.
6. Providing portable oxygen meters, combustible gas detectors and hydrogen sulfide detectors to continuously monitor the atmosphere in enclosed working areas.
7. Providing safety harnesses, safety lines and recovery crews for workers in hazardous areas.
8. Providing self-contained breathing apparatus with spare air cylinders for workers in hazardous areas.
9. Providing dry chemical fire extinguishers and connected fire hoses in areas where a danger of fire or explosion exists.
10. Providing adequate, oxygen equipped, first aid facilities.
11. Providing suitable wash up areas and facilities for workers.
12. Installing temporary lighting using explosion proof fixtures in hazardous environments.
13. Installing approved warning and hazard signs and posting safety procedures.
14. Instructing all workers as to the hazards present, the procedures to be followed and the proper function and use of all safety and emergency equipment furnished.

D. Prior to entering or commencing work in a hazardous area, the Contractor shall ensure that all safety and emergency equipment is in place and in satisfactory operating condition.

E. Prior to commencing Work on existing facilities and equipment, the Contractor shall notify the system/facility superintendent and shall ensure that the source of electrical energy to all affected equipment is shut off and locked out at the appropriate motor control center. Local switches and pushbutton stations, where provided, shall be locked in the “off” position.

3.09. EMERGENCY PHONE NUMBERS

A. Emergency phone numbers (fire, medical, police) shall be posted at all telephone locations at the Site of the Work and their locations made known to all.

END OF SECTION

SECTION 01 35 43

ENVIRONMENTAL PROCEDURES

PART 1 – GENERAL

1.01 SITE MAINTENANCE

A. The Contractor shall keep the work site clean and free from rubbish and debris. Materials and equipment shall be removed from the site when they are no longer necessary.

B. Upon completion of the Work and before final acceptance, the work site shall be cleared of equipment, unused materials, and rubbish to present a clean and neat appearance.

1.02 TEMPORARY DAMS

A. Except in time of emergency, earth dams are not acceptable at catch basin openings, local depressions or elsewhere.

B. Temporary dams of sand bags, asphaltic concrete, or other acceptable material will be permitted when necessary to protect the Work, provided their use does not create a hazard or nuisance to the public.

C. Such dams shall be removed from the site as soon as they are no longer necessary.

1.03 AIR POLLUTION CONTROL

A. The Contractor shall not discharge smoke, dust, and other contaminants, into the atmosphere that violate the regulations of any legally constituted authority.

B. The Contractor shall also abate dust nuisance by cleaning, sweeping, and sprinkling with water or other means as necessary. The use of water, in amounts that result in mud on public streets, is not acceptable as a substitute for sweeping or other methods.

C. The Contractor shall provide dust control at no additional cost to the Owner.

1.04 NOISE CONTROL

A. Noise from Contractor's operations shall not exceed limits established by applicable laws or regulations and local noise ordinances.

1.05 SEDIMENTATION AND EROSION CONTROL

A. Contractor shall employ best management practices in accordance with Local, State and Federal guidelines and regulations for erosion and sedimentation

control. Unless otherwise noted, Contractor shall obtain related permits or approvals and pay applicable fees.

1.06 STATE OR FEDERAL WATERS

A. State or Federal waters, wetlands or other environmental features shall not be disturbed without proper approvals, permits or notifications, which are the responsibility of the Contractor.

1.07 HAZARDOUS MATERIALS STORAGE

A. The Contractor shall submit Material Safety Data Sheets (MSDSs) for all hazardous chemicals contained onsite to the Construction Manager.

B. The Contractor shall also maintain a copy of all applicable MSDSs onsite at all times.

C. The Contractor shall notify the Owner and the Construction Manager upon receipt of any hazardous chemicals onsite.

D. All hazardous chemicals onsite must be placed in approved containment with an appropriate leak detection system. Flammable materials such as paints, thinners, solvents, etc. must be stored in approved fire storage cabinets.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.01 SCOPE

A. Permits and Responsibilities: The Contractor shall, without additional expense to the Owner, be responsible for obtaining all necessary licenses and permits, including building permits, and for complying with any applicable federal, state, county and municipal laws, codes and regulations, in connection with the prosecution of the Work.

B. In addition, City Work Permits, Right of Way Encroachment permits, plumbing permits and similar type permits, and all appropriate licenses are the responsibility of the Contractor.

C. If land disturbance permits, DOT permits or easements are required, they will be obtained by the County as part of the design process.

D. The Contractor shall take proper safety and health precautions to protect the Work, the workers, the Owner and his representatives, the Construction Manager, the Engineer and his representatives, the public and the property of others.

E. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the Work, except for any completed unit of construction thereof which may heretofore have been accepted.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 42 00

CODES AND STANDARDS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Whenever reference is made to conforming to the standards of any technical society, organization, body, code or standard, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the time of advertisement for Bids. This shall include the furnishing of materials, testing of materials, fabrication and installation practices. In those cases where the Contractor's quality standards establish more stringent quality requirements, the more stringent requirement shall prevail. Such standards are made a part hereof to the extent which is indicated or intended.

B. The inclusion of an organization under one category does not preclude that organization' standards from applying to another category.

C. In addition, all work shall comply with the applicable requirements of local codes, utilities and other authorities having jurisdiction.

D. All material and equipment, for which a UL Standard, an AGA or NSF approval or an ASME requirement is established, shall be so approved and labeled or stamped. The label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.

E. The standards which apply to this Project are not necessarily restricted to those organizations which are listed in Article 1.02.

1.02 STANDARD ORGANIZATIONS

A. PIPING AND VALVES

ACPA	American Concrete Pipe Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
DIPRA	Ductile Iron Pipe Research Association
FCI	Fluid Controls Institute
MSS	Manufacturers Standardization Society
NCPI	National Clay Pipe Institute
NSF	National Sanitation Foundation
PPI	Plastic Pipe Institute
Uni Bell	PVC Pipe Association

B. MATERIALS

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials

C. PAINTING AND SURFACE PREPARATION

NACE	National Association of Corrosion Engineers
SSPC	Steel Structures Painting Council

D. ELECTRICAL AND INSTRUMENTATION

AEIC	Association of Edison Illuminating Companies
AIEE	American Institute of Electrical Engineers
EIA	Electronic Industries Association
ICEA	Insulated Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	The Instrumentation, Systems, and Automation Society
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
REA	Rural Electrification Administration
TIA	Telecommunications Industries Association
UL	Underwriter's Laboratories
VRCI	Variable Resistive Components Institute

E. ALUMINUM

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association

F. STEEL AND CONCRETE

ACI	American Concrete Institute
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
CRSI	Concrete Reinforcing Steel Institute
NRMA	National Ready Mix Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

G. WELDING

ASME	American Society of Mechanical Engineers
AWS	American Welding Society

H. GOVERNMENT AND TECHNICAL ORGANIZATIONS

AIA	American Institute of Architects
APHA	American Public Health Association
APWA	American Public Works Association
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASQC	American Society of Quality Control
ASSE	American Society of Sanitary Engineers
CFR	Code of Federal Regulations
CSI	Construction Specifications Institute
EDA	Economic Development Administration
EPA	Environmental Protection Agency
FCC	Federal Communications Commission
FmHA	Farmers Home Administration
FS	Federal Specifications
IAI	International Association of Identification
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
NBFU	National Board of Fire Underwriters
(NFPA)	National Fluid Power Association
NBS	National Bureau of Standards
NISO	National Information Standards Organization
OSHA	Occupational Safety and Health Administration
SI	Salt Institute
SPI	The Society of the Plastics Industry, Inc.
USDC	United States Department of Commerce
WEF	Water Environment Federation

I. GENERAL BUILDING CONSTRUCTION

AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AITC	American Institute of Timber Construction
APA	American Parquet Association, Inc.
APA	American Plywood Association
BHMA	Builders Hardware Manufacturers Association
BIFMA	Business and Institutional Furniture Manufacturers Association
DHI	Door and Hardware Institute
FM	Factory Mutual Fire Insurance Company
HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute
IME	Institute of Makers of Explosives
ISANTA	International Staple, Nail and Tool Association
ISDSI	Insulated Steel Door Systems Institute
IWS	Insect Screening Weavers Association
MBMA	Metal Building Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NAGDM	National Association of Garage Door Manufacturers

NCCLS	National Committee for Clinical Laboratory Standards
NFPA	National Fire Protection Association
NFSA	National Fertilizer Solutions Association
NKCA	National Kitchen Cabinet Association
NWMA	National Woodwork Manufacturers Association
NWWDA	National Wood Window and Door Association
RMA	Rubber Manufacturers Association
SBC	SBCC Standard Building Code
SDI	Steel Door Institute
SIA	Scaffold Industry Association
SMA	Screen Manufacturers Association
SPRI	Single Ply Roofing Institute
TCA	Tile Council of America
UBC	Uniform Building Code

J. ROADWAYS

AREA	American Railway Engineering Association
DOT	Department of Transportation
SSRBC	Standard Specifications for Construction of Transportation Systems, Georgia Department of Transportation

K. PLUMBING

AGA	American Gas Association
NSF	National Sanitation Foundation
PDI	Plumbing Drainage Institute
SPC	SBCC Standard Plumbing Code

L. REFRIGERATION, HEATING, AND AIR CONDITIONING

AMCA	Air Movement and Control Association
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
CGA	Compressed Gas Association
CTI	Cooling Tower Institute
HEI	Heat Exchange Institute
IIAR	International Institute of Ammonia Refrigeration
NB	National Board of Boilers and Pressure Vessel Inspectors
PFMA	Power Fan Manufacturers Association
SAE	Society of Automotive Engineers
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SMC	SBCC Standard Mechanical Code
TEMA	Tubular Exchangers Manufacturers Association

M. EQUIPMENT

AFBMA	Anti Friction Bearing Manufacturers Association, Inc.
AGMA	American Gear Manufacturers Association
ALI	Automotive Lift Institute

CEMA	Conveyor Equipment Manufacturers Association
CMAA	Crane Manufacturers Association of America
DEMA	Diesel Engine Manufacturers Association
MMA	Monorail Manufacturers Association
OPEI	Outdoor Power Equipment Institute, Inc.
PTI	Power Tool Institute, Inc.
RIA	Robotic Industries Association
SAMA	Scientific Apparatus Makers Association

1.03 SYMBOLS

A. Symbols and material legends shall be as scheduled on the Drawings.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 45 29

TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.01 SCOPE

A. This Section includes testing which the Owner may require, beyond that testing required of the manufacturer, to determine if materials provided for the Project meet the requirements of these Specifications.

B. This work also includes all testing required by the Owner to verify work performed by the Contractor is in accordance with the requirements of these Specifications, such as concrete strength and slump testing, soil compaction, etc.

C. This work does not include materials testing required in various sections of these Specifications to be performed by the manufacturer, such as testing of pipes.

D. The testing laboratory or laboratories will be selected by the Owner. The testing laboratory or laboratories will work for the Owner.

1.02 PAYMENT FOR TESTING SERVICES

A. The cost of testing services required by the Contract to be provided by the Contractor shall be paid for by the Owner through the CASH ALLOWANCE, e.g., concrete testing, soil compaction, asphalt testing, etc.

B. The cost of additional testing services not specifically required in the Specifications, but requested by the Owner or Construction Manager, shall be paid for by the Owner through the CASH ALLOWANCE.

C. The cost of material testing described in various sections of these Specifications or as required in referenced standards to be provided by a material manufacturer, shall be included in the price bid for that item and shall not be paid for by the Owner.

D. The cost of retesting any item that fails to meet the requirements of these Specifications shall be paid for by the Contractor. Retesting shall be performed by the testing laboratory working for the Owner.

1.03 LABORATORY DUTIES

A. Cooperate with the Owner, Construction Manager and Contractor.

B. Provide qualified personnel promptly on notice.

C. Perform specified inspections, sampling and testing of materials.

1. Comply with specified standards, ASTM, other recognized authorities and as specified.
2. Ascertain compliance with requirements of the Contract Documents.

D. Promptly notify the Construction Manager and Contractor of irregularity or deficiency of work which are observed during performance of services.

E. Promptly submit one copy of inspection and/or test reports to the Construction Manager and Contractor with the following information included:

1. Date issued
2. Project title and number
3. Testing laboratory name and address
4. Name and signature of inspector
5. Date of inspection or sampling
6. Record of temperature and weather
7. Date of test
8. Identification of product and Specification section
9. Location of Project
10. Type of inspection or test
11. Results of test
12. Observations regarding compliance with the Contract Documents

F. Perform additional services as required.

G. The laboratory is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.

1.04 CONTRACTOR RESPONSIBILITIES

A. Cooperate with laboratory personnel; provide access to Work and/or manufacturer's requirements.

B. Provide to the laboratory, representative samples and in required quantities, of materials to be tested.

C. Furnish copies of test reports.

D. Furnish required labor and facilities to:

1. Provide access to Work to be tested.
2. Obtain and handle samples at the site.
3. Facilitate inspections and tests.

4. Build or furnish a holding box for concrete cylinders or other samples as required by the laboratory.

E. Notify the laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.

F. Laboratory Tests: Where such inspection and testing are to be conducted by an independent laboratory agency, the sample(s) shall be selected by such laboratory or agency, or the Construction Manager, and shipped to the laboratory by the Contractor at Contractor's expense.

G. Copies of all correspondence between the Contractor and testing agencies shall be provided to the Construction Manager.

1.05 QUALITY ASSURANCE

A. Testing shall be in accordance with all pertinent codes and regulations and with procedures and requirements of the American Society for Testing and Materials (ASTM).

1.06 PRODUCT HANDLING

A. Promptly process and distribute all required copies of test reports and related instructions to insure all necessary retesting or replacement of materials with the least possible delay in the progress of the Work.

1.07 FURNISHING MATERIALS

A. The Contractor shall be responsible for furnishing all materials necessary for testing.

1.08 CODE COMPLIANCE TESTING

A. Inspections and tests required by codes or ordinances or by a plan approval authority, and made by a legally constituted authority, shall be the responsibility of, and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.09 CONTRACTOR’S CONVENIENCE TESTING

A. Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

1.10 SCHEDULES FOR TESTING

A. ESTABLISHING SCHEDULE

1. The Contractor shall, by advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings, and make all

arrangements for the testing laboratory to be on site to provide the required testing.

2. Provide all required time within the construction schedule.

B. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the testing laboratory as required.

C. When the testing laboratory is ready to test according to the determined schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra costs for testing attributable to the delay will be back charged to the Contractor and shall not be borne by the Owner.

1.11 TAKING SPECIMENS

A. Unless otherwise provided in the Contract Documents, all specimens and samples for tests will be taken by the testing laboratory or the Construction Manager.

1.12 TRANSPORTING SAMPLES

A. The Contractor shall be responsible for transporting all samples, except those taken by testing laboratory personnel, to the testing laboratory.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 50 10

TEMPORARY FACILITIES

PART 1 – GENERAL

1.01 SCOPE

A. Contractor shall provide temporary facilities required for this Work include, but are not necessarily limited to:

1. Temporary utilities such as water and electricity.
2. First aid facilities.
3. Sanitary facilities.
4. Potable water.
5. Temporary enclosures and construction facilities.

1.02 GENERAL

A. Contractor shall provide first aid facilities, sanitary facilities and potable water. These shall be available on the Project site on the first day that any activities are conducted on site. The other facilities shall be provided as the schedule of the Project warrants.

B. Maintenance: Contractor shall use all means necessary to maintain temporary facilities in proper and safe condition throughout progress of the Work. In the event of loss or damage, immediately make all repairs and replacements necessary, at no additional cost to the Owner.

C. Removal: Contractor shall remove all such temporary facilities and controls as rapidly as progress of the Work will permit.

1.03 STAGING AREAS

A. The Contractor shall establish a staging area for construction as required.

B. Allowable staging areas shall be within site property, road right of way, temporary easements, or permanent easements where approved by the Owner.

C. Any required grading within the staging areas shall be the responsibility of the Contractor and shall be approved by Owner and Construction Manager.

D. The Contractor shall be solely responsible for damages to equipment or materials due to heavy rains or flooding.

1.04 TEMPORARY UTILITIES

A. General

1. Contractor shall provide and pay all costs for all water, electricity and other utilities required for the performance of the Work.
2. Contractor shall pay all costs for temporary utilities until Project completion.
3. Contractor shall pay all costs for temporary utilities and shall include all power, water and the like necessary for testing equipment as required by the Contract Documents.

B. Temporary Water:

1. The Contractor shall coordinate with the Owner in providing metered water suitable for flushing and testing the mains, and for any other construction purposes.
2. The Contractor shall be responsible for providing an Owner approved backflow and metering device.
3. The Contractor shall provide all necessary temporary piping and, upon completion of the Work, remove all such temporary piping.
4. The Contractor is responsible for paying service charges for water used.

C. Temporary Power and Lighting:

1. Provide all necessary wiring for the Contractor's use.
2. The Contractor shall make arrangements with the electrical utility and with the Owner for power takeoff points from the existing service, voltage and phasing requirements, transformers and metering and shall pay the costs and fees arising therefrom.
3. The Contractor shall provide the special connections required for his work.
4. Furnish, locate and install area distribution boxes such that the individual trades may use, their own construction type extension cords to obtain adequate power, and artificial lighting at all points where required by inspectors and for safety.
5. The Contractor shall provide sufficient electrical lighting so that all work may be done in an efficient manner when there is not sufficient daylight.
6. The Contractor shall remove all temporary lighting when such light is no longer necessary.

D. Telephone

1. The Contractor shall provide telephone service for all construction site offices.
2. Cell phones are an acceptable substitute.

1.05 FIRST AID FACILITIES

A. The Contractor shall provide a suitable first aid station, equipped with all facilities and medical supplies necessary to administer emergency first aid treatment.

B. The Contractor shall have standing arrangements for the removal and hospital treatment of any injured person.

C. All first aid facilities and emergency ambulance service shall be made available by the Contractor to the Owner and the Construction Manager's personnel.

1.06 SANITARY FACILITIES

A. Prior to starting the Work, the Contractor shall furnish, for use of Contractor's personnel on the job, all necessary toilet facilities which shall be secluded from public observation. These facilities shall be either chemical toilets or shall be connected to the Owner's sanitary sewer system.

B. All facilities, regardless of type, shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the area in which the Work is performed.

C. Adequacy of these facilities will be subject to the Construction Manager's review and maintenance of same must be satisfactory to the Construction Manager at all times.

1.07 POTABLE WATER

A. The Contractor shall be responsible for furnishing a supply of potable drinking water for employees, subcontractors, inspectors, Construction Manager, engineers and the Owner who are associated with the Work.

1.08 ENCLOSURES AND CONSTRUCTION FACILITIES

A. The Contractor shall furnish, install and maintain for the duration of construction, all required storage, scaffolds, tarpaulins, canopies, steps, bridges, platforms and other temporary construction necessary for proper completion of the Work in compliance with all pertinent safety and other regulations.

1.09 PARKING FACILITIES

A. Parking facilities for the Contractor's and Contractor's subcontractors' personnel shall be the Contractor's responsibility.

B. The storage and work facilities provided by the Owner shall not be used for parking by the Contractor's or subcontractor's personnel.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 56 16

DUST CONTROL

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall limit blowing dust caused by construction operations by applying water or employing other appropriate means or methods to maintain dust control, subject to the approval of the Construction Manager.

B. As a minimum, this may require the use of a water wagon twice a day to suppress dusty conditions.

1.02 PROTECTION OF ADJACENT PROPERTY

A. The Contractor shall visit the site and note the buildings, landscaping, roads, parking areas and other facilities near the Work site that may be damaged by their operations.

B. The Contractor shall make adequate provision to fully protect the surrounding area and will be held fully responsible for all damages resulting from Contractor's operations.

C. The Contractor shall protect all existing facilities (indoors or out) from damage by dust, fumes, spray or spills (indoors or out).

D. Protect motors, bearings, electrical gear, instrumentation and building or other surfaces from dirt, dust, welding fumes, paint spray, spills or droppings causing wear, corrosion, malfunction, failure or defacement by enclosure, sprinkling or other dust palliatives, masking and covering, exhausting or containment.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 56 33

JOB SITE SECURITY

PART 1 – GENERAL

1.01 BARRICADES, LIGHTS AND SIGNALS

A. The Contractor shall furnish and erect such barricades, fences, lights and danger signals and shall provide such other precautionary measures for the protection of persons or property and of the Work as necessary.

B. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the Contractor shall furnish and maintain at least one light at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any Work under construction.

C. The Contractor will be held responsible for all damage to the Work due to failure of barricades, signs and lights and whenever evidence is found of such damage, the Contractor shall immediately remove the damaged portion and replace it at Contractor's cost and expense.

D. The Contractor's responsibility for the maintenance of barricades, signs and lights shall not cease until the Project has been accepted by the Owner.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 58 00

PROJECT IDENTIFICATION AND SIGNS

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section shall include the furnishing of a minimum of two painted signs for each Division of work of not less than 32 square feet in area, with painted graphic content that includes:

1. Project title.
2. Owner's name.
3. Names of governmental units participating in the Project.
4. Names and titles of other parties to be directed by the Construction Manager.
5. Logos.

1.02 DESIGN

A. The Contractor shall provide a scale drawing showing the graphic design, style of lettering and colors to the Construction Manager for approval.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Structure and framing: May be new or used, wood or metal in sound condition, structurally adequate to work and suitable for specified finish.

B. Sign Surfaces: Exterior soft wood plywood with medium density overlay, standard large sizes to minimize joints.

C. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.

D. Rough Hardware: Galvanized.

E. Paint: Exterior quality.

PART 3 – EXECUTION

3.01 ERECTION

A. Erect the sign on the site in a high visibility location, adjacent to the Project as approved by the Construction Manager.

3.02 MAINTENANCE

A. Contractor shall maintain the Project Sign in good condition during the Contract period.

END OF SECTION

SECTION 01 65 00

TRANSPORTATION AND HANDLING

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall provide transportation of all equipment, materials and products furnished under these Contract Documents to the work site.

B. The Contractor shall provide preparation for shipment, loading, unloading, handling and preparation for installation and all other work and incidental items necessary or convenient to the Contractor for the satisfactory prosecution and completion of the work.

C. All equipment, materials and products damaged during transportation or handling shall be repaired or replaced by the Contractor at no additional cost to the Owner prior to being incorporated into the work.

D. The Contractor shall maintain and keep in good repair the Work covered by these Drawings and Specifications until acceptance by the Owner.

1.02 TRANSPORTATION

A. All equipment shall be suitably boxed, crated or otherwise protected during transportation.

B. Where equipment will be installed using existing cranes or hoisting equipment, the Contractor shall ensure that the weights of the assembled sections do not exceed the capacity of the cranes or hoisting equipment.

C. Small items and appurtenances such as gauges, valves, switches, instruments and probes which could be damaged during shipment shall be removed from the equipment prior to shipment, packaged and shipped separately.

D. All openings shall be plugged or sealed to prevent the entrance of water or dirt.

1.03 HANDLING

A. All equipment, materials and products shall be carefully handled to prevent damage or excessive deflections during unloading or transportation.

B. Lifting and handling drawings and instructions furnished by the manufacturer or supplier shall be strictly followed.

1. Eyebolts or lifting lugs furnished on the equipment shall be used in handling the equipment.

2. Shafts and operating mechanisms shall not be used as lifting points.

3. Spreader bars or lifting beams shall be used when the distance between lifting points exceeds that permitted by standard industry practice.

C. Under no circumstances shall equipment or products such as pipe, structural steel, castings, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground.

D. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 66 00

STORAGE AND PROTECTION

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section includes, but is not necessarily limited to, the furnishing of all labor, tools and materials necessary to properly store and protect all materials, equipment, products and the like, as necessary for the proper and complete performance of the Work.

1.02 PIPE

A. Pipe and appurtenances shall be handled, stored, and installed as recommended by the manufacturer. Pipes with paint, tape coatings, linings or the like shall be stored to protect the coating or lining from physical damage or other deterioration. Pipes shipped with interior bracing shall have the bracing removed only when recommended by the pipe manufacturer.

1.03 STORAGE

A. During the interval between the delivery of equipment to the site and installation, all equipment, unless otherwise specified, shall be stored in an enclosed space affording protection from weather, dust and mechanical damage and providing favorable temperature, humidity and ventilation conditions to ensure against equipment deterioration. Manufacturer's recommendations shall be adhered to in addition to these requirements.

B. Equipment and materials to be located outdoors may be stored outdoors if protected against moisture condensation. Equipment shall be stored at least 6 inches above ground. Temporary power shall be provided to energize space heaters or other heat sources for control of moisture condensation. Space heaters or other heat sources shall be energized without disturbing the sealed enclosure.

C. Should the Contractor choose to store material or equipment or use for assembly property which is not owned by the Fulton County or the Contractor, a letter of permission signed by the legal owner of the property shall be obtained by the Contractor and submitted to the Construction Manager a minimum of 24 hours prior to delivery. All material and equipment stored at any facility other than the site shall be tagged with the Owner’s name and the project number. Payment shall not be made for “Stored Materials” for any material stored at locations or in any manner not suitable to the Owner.

D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel and sheet construction products shall be stored with one end elevated to facilitate drainage.

E. Unless otherwise permitted in writing by the Construction Manager, building products and materials such as cement, grout, plaster, gypsum board, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc., shall be stored indoors in a dry location.

F. Building products such as rough lumber, plywood, concrete block and structural tile may be stored outdoors under a properly secured waterproof covering.

G. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

H. All materials shall meet the requirements of these Specifications at the time that they are used in the Work.

I. Store products in accordance with manufacturer's instructions.

1.04 PROTECTION

A. Use all means necessary to protect the materials, equipment and products of every section before, during and after installation and to protect the installed work and materials of all other trades.

B. All materials shall be delivered, stored and handled to prevent the inclusion of foreign materials and damage by water, breakage, vandalism or other causes.

C. Substantially constructed weathertight storage sheds, with raised floors, shall be provided and maintained as may be required to adequately protect those materials and products stored on the site which may require protection from damage by the elements.

1.05 DAMAGE

A. Equipment, products and materials shall be shipped, handled, stored, and installed in ways which will prevent damage to the items. Damaged items will not be permitted as part of the work except in cases of minor damage that have been satisfactorily repaired.

B. In the event of damage, immediately make all repairs and replacements necessary for the approval of the Construction Manager and at no additional cost to the Owner.

C. Damage shall be corrected to conform to the requirements of the Contract before the assembly is incorporated into the Work.

D. All property damaged by reason of storing of material shall be properly replaced at no additional cost to the Owner.

1.06 EXTENDED STORAGE

A. In the event that certain items of major equipment, such as large diameter valves, have to be stored for an extended period of time, the Contractor shall provide satisfactory long-term storage facilities which are acceptable to the Construction Manager.

B. The Contractor shall provide all special packaging, protective coverings, protective coatings, power, nitrogen purge, desiccants, lubricants and exercising necessary or recommended by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

C. All equipment, materials and products shall be carefully handled to prevent damage or excessive deflections during unloading or transportation.

1.07 PACKAGE AND MARKING

A. All equipment shall be protected against damage from moisture, dust, handling, or other cause during transport from manufacturer's premises to site. Each item or package shall be marked with the number unique to the specification reference covering the item.

B. Stiffeners shall be used where necessary to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or sub-assembled units where possible

1.08 IDENTIFICATION

A. Each item of equipment and valve shall have permanently affixed to it a label or tag with its equipment or valve number designated in this contract. Marker shall be of stainless steel. Location of label will be easily visible.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 71 33

PROTECTION AND MAINTENANCE OF PROPERTY AND WORK

PART 1 – GENERAL

1.01. SUMMARY

A. This Section specifies protection and maintenance of underground and above ground utilities, structures, fences, parking strips, sidewalks, driveways, streets, and other improvements which may be affected by the Work.

1.02. SUBMITTALS

A. Procedures: Section 01 33 00.

B. Action submittal items:

1. Listing and schedule of all potholing.
2. Listing of all utilities/facilities to be physically protected and relocated.

C. Informational submittal items for this section:

1. Shoring for all affected structures and utilities.
2. Submit detail drawings of proposed methods to support, protect, and buttress utilities and structures where the depth of the excavation is greater than the horizontal distance from the structure or utility.

1.03. LOCATION OF EXISTING UNDERGROUND FACILITIES

A. The Drawings indicate the existence of underground facilities known to the Owner.

1. Utilities are shown schematically on the plans and are not necessarily accurate in location as to plan or elevation.
2. Determine the location of all utilities that may be impacted during construction.
3. The Contractor shall familiarize himself with and comply with the provisions of O.C.G.A. Section 25-9-1 et. seq.

B. The Contractor shall call, by law, the Utilities Protection Center, d/b/a Georgia 811 at “811” or 1-800-282-7411 and shall request that all owners of utilities, including, but not limited to, gas companies, electric companies, telephone companies, cable companies and governmental units, prior to starting any excavation of the Project, locate and mark their respective facilities.

C. Locate existing underground utilities. Review with the Owner the locations of existing utilities in relation to the new construction and evaluate areas of conflict.

D. Excavate and expose all major and minor existing utilities prior to new construction to determine utility elevations in relation to the new facilities.

E. Examine and repair all pipelines prior to pipelines being buried.

1.04. EXISTING UTILITIES AND FACILITIES

A. Protect, modify, and/or relocate all existing utilities required to complete the Work.

B. The locations of existing major utilities, whether above ground or underground, are indicated on the Drawings.

1. This information has been obtained from utility maps and field surveys.

2. The Owner does not guarantee the accuracy or completeness of this information, and it is to be understood that other above ground or underground facilities not shown on the Drawings may be encountered during the course of the Work.

C. Contractor shall be responsible for damages resulting from any failure to contact utility owners for location, routing and marking of a specific utility and its subsequent effects.

D. The Drawings may show underground utilities which are to be relocated. Contractor shall be responsible for all these relocations prior to commencing work in the area.

E. Protect, modify or relocate existing utilities and facilities required to accommodate Contractor’s means and methods.

1. Specific means and methods to be utilized by the Contractor are not known to the Owner. Therefore, the Owner will not be liable for utility protection, modification and relocation not shown on the Drawings that are required by the Contractor due to its means and methods.

2. It is the Contractor’s responsibility to determine the work required by the Construction Documents and make provision for protection, modification and relocation required.

3. Coordinate all protection, modification and relocation work through the affected utility.

4. Complete work to the utility owner's requirements and standards.

F. Underground Utilities:

1. For the purpose of this Section an underground utility will be defined as a transmission, collection or distribution line where it would be customary to expect that drawings would exist for the line and the utility owner would be aware of the line.

2. An existing underground utility is considered to be in conflict if it crosses or projects into the specified excavation at an elevation between the top and

bottom of the new facility or when parallel to the new facility, and projects into the specified excavation.

3. Contractor shall be responsible for all protection, affects and damage on utilities not in conflict with the new construction, whether or not the utilities are shown on the Drawings.

4. When not shown on the Drawings and in conflict with the new construction, meet and agree with the Owner on how to proceed.

5. When not shown on the Drawings and no conflict with the new facility exists, no additional payment will be considered.

6. When in a substantially different location and not in conflict with the new construction, no additional payment will be considered.

7. When in a substantially different location and in conflict with the new construction, reimbursement for additional work per the General Conditions.

G. Abandoned pipelines shown on the Drawings shall be removed and plugged per the local agency requirements when encountered.

H. Locate existing underground utilities with the field staking. Review with the Owner the locations of existing utilities in relation to the new construction and evaluate areas of conflict

I. Storm and Sanitary Sewers:

1. Existing live sewers shall remain in service. Adequate provision shall be made for disposal of existing sewage flow.

   a. Immediately repair construction damage to the existing sewer system and manholes to a condition equal to or better than that existing prior to the damage.

   b. Repair all damage which results from the disturbance of the existing sewer.

2. Remove water accumulating during construction from the new sewers and prevent it from entering existing lines.

3. Flush existing pipes which were affected by the construction to the point of the next upstream connection and repair any pipelines or manholes damaged by gravel, rocks, or other debris that has entered the existing system during construction.

4. The physical connection to an existing manhole or sewer line shall not be made until so authorized by the Owner.

J. Aboveground Electrical, Cable, and Communication Facilities:

1. Attention is called to all overhead items including, but not limited to, power, communication and telephone lines, temporary traffic signals, traffic signal mast arms, overhead sign bridges, sign support span wires, signs, and street lights.

2. Observe the location of these overhead facilities and plan and conduct work operations, accordingly.
3. Take precautions to protect and avoid damage to all overhead facilities.
4. Relocate facilities as required to meet the means and methods to be utilized.
5. Observe and investigate the presence of facilities that may be affected by the Work.
    a. Consult with and rely on the information given by utility owners and operators to determine the extent of any hazards and measures required.
    b. Determine the extent of any hazard created by facilities in all areas and follow approved safety procedures during the work.
6. Support poles at risk of being undermined by the Work.
7. Follow the requirements of the local power company for all energized primary conductors.
    a. For 50 kV lines and less, at no time shall personnel or equipment approach closer than 10 feet to any energized primary conductors.
    b. For greater than 50 kV, meet the requirements of the local power company.

K. Underground Electrical, Cable, and Communication Facilities:

1. Determine the protection necessary to proceed safely to protect these underground facilities.

L. Gas:

1. As required by the appropriate utility owner, protect, maintain, support in place, or relocate all gas mains crossing the pipeline trenches.
2. Provide a minimum of 12 inches of clearance, measured from edge to edge, between gas mains or gas service lines and new facilities
    a. If relocating either utility is not practical, a protective wrap shall be provided for the entire distance where less than 12 inches of vertical clearance and less than 6 inches of horizontal clearance are provided.
    b. Wrapping material shall consist of either a split polyvinyl chloride (PVC) pipe or PVC wrapping of at least 0.04 inch in thickness, and shall be applied to either one of the pipes.
3. All abandoned gas mains encountered in the trench area shall be removed.
4. All temporary gas service slack lines shall be protected and maintained during pipeline installation.
5. Notify the Owner and the utility at least two business days (minimum of 48 hours) in advance of any excavation in the vicinity of any gas piping.

6. The utility may require one of its inspectors to be onsite anytime work is conduct near gas lines.

M. Water:

1. As required by the appropriate utility, protect, maintain, support in place, or relocate all water pipelines affected by the Work.
2. Maintain water service along the alignment of work at all times.
3. Thrust blocks may not be shown on the Drawings and shall be assumed to be present at all water line deflections of 11-1/4 degrees or greater.
4. Notify the Owner in writing immediately of any damage. Begin repairs immediately, and work continuously until water service is restored.

N. Roadways:

1. Take adequate precautions to protect existing sidewalks, curbs, pavements, utilities, adjoining property, and structures, and avoid damage.
2. Traffic signage, paint striping, and channelization shall be protected and replaced if damaged.
3. Maintain the existing illumination pattern for signs and roads at all times.
4. Install temporary roadway lighting as necessary.
5. Access for emergency equipment shall be maintained at all times.

1.05. SHORING AND BRACING

A. Shore up, brace, under-pin, and protect as necessary, the foundations and other parts of existing structures adjoining the site of the Work that may be affected by the Work.

B. Contractor is responsible for any damages because of settlements or the loss of lateral or subjacent support of adjoining property and from all loss and damages to adjoining and adjacent structures and their premises.

C. Fully comply with the requirements of the authority having jurisdiction (AHJ) and the State of Georgia, as applicable.

1.06. EMERGENCIES

A. Whenever work endangers the safety of life or property, including adjoining property or property in the immediate proximity of the Work, take all reasonable and prudent actions to prevent threatened loss or injury.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

3.01. GENERAL

A. Contact the Owner and the affected utilities prior to an excavation per the General Conditions.

B. Pothole to locate and expose all utility locations to be affected by the Work prior to new construction in the area of the utility.

C. Adjust work when location of utility is different than shown on the Drawings and materially impacts construction.

D. If the utility requires relocation not shown on the Drawings and the Contractor incurs additional cost, the Owner will consider additional costs.

E. Relocation of minor utilities such as irrigation lines less than 4 inches, water service lines, building drainage pipes will be considered incidental and will not be considered for additional costs.

F. If damage to a utility occurs, repair damage to the requirements of the utility owner prior to backfilling said utility.

END OF SECTION

SECTION 01 74 00

CLEANING AND WASTE MANAGEMENT

PART 1 – GENERAL

1.01 SCOPE

A. This Section covers the general cleaning which the Contractor shall be required to perform both during construction and before final acceptance of the Project unless otherwise shown on the Drawings or specified elsewhere in these Specifications.

1.02 QUALITY ASSURANCE

A. Daily, and more often if necessary, conduct inspections verifying that requirements of cleanliness are being met.

B. In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction.

1.03 HAZARDOUS MATERIAL AND WASTE

A. The Contractor shall handle hazardous waste and materials in accordance with applicable local, State, and Federal regulations. Waste shall also be disposed of in approved landfills as applicable.

B. The Contractor shall prevent accumulation of wastes which create hazardous conditions.

C. Burning or burying rubbish and waste materials on the site will not be allowed.

D. Disposal of hazardous wastes or materials into sanitary or storm sewers will not be allowed.

PART 2 – PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

A. Provide all required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY

A. Use only the cleaning materials, methods and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Construction Manager.

PART 3 – EXECUTION

3.01 PROGRESS CLEANING

A. General

1. Do not allow the accumulation of scrap, debris, waste material and other items not required for construction of this Work.
2. At least each week and more often if necessary, completely removes all scrap, debris and waste material from the job site.
3. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the environment.

B. Site

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.
2. Restack materials stored on site weekly.
3. At all times maintain the site in a neat and orderly condition which meets the approval of the Construction Manager.

C. Structures

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.
2. Weekly, and more often if necessary, sweep all interior spaces clean. “Clean”, for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by using a hand-held broom.
3. As required preparatory to installation of successive materials, clean the structures or pertinent portions as recommended by the manufacturer of the successive material.
4. Following the installation of finish floor materials, clean the finish floor daily. “Clean”, for the purpose of this Paragraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Construction Manager, may be injurious to the finish floor material.
5. Schedule cleaning operation so that dust and other contaminants resulting from cleaning operations will not fall on wet, recently painted surfaces.

3.02 FINAL CLEANING

A. Definitions: Unless otherwise specifically specified, “clean” for the purpose of this Article shall be interpreted as the level of cleanliness generally provided by

commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.

B. General: Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris and waste. Conduct final progress cleaning as described in 3.01 above.

C. Site: Unless otherwise specifically directed by the Construction Manager, hose down all paved areas on the site and all public sidewalks directly adjacent to the site; rake clean other surfaces of the grounds. Completely remove all resultant debris.

D. Structures

1. Remove all traces of soil, waste material, splashed material, and other foreign matter to provide a uniform degree of exterior cleanliness.
    a. Visually inspect all exterior surfaces and remove all traces of soil, waste material, and other foreign matter.
    b. Remove all traces of splashed materials from adjacent surfaces.
    c. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure.
    d. In the event of stubborn stains not removable with water, the Construction Manager may require light sandblasting or other cleaning at no additional cost to the Owner.
2. Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges and other foreign matter. Remove all paint droppings, spots, stains and dirt from finished surfaces.
3. Clean all glass inside and outside.
4. Polish all surfaces requiring the routine application of buffed polish. Provide and apply polish as recommended by the manufacturer of the material being polished.

E. Post Construction Cleanup: All evidence of temporary construction facilities, haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other evidence of construction, as directed by the Construction Manager.

F. Restoration of Landscape Damage: Any landscape feature damaged by the Contractor shall be restored as nearly as possible to its original condition at the Contractor's expense. The Construction Manager will decide what method of restoration shall be used.

G. Timing: Schedule final cleaning as approved by the Construction Manager to enable the Owner to accept the Project.

3.03 CLEANING DURING OWNER'S OCCUPANCY

A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the Construction Manager in accordance with the Supplementary Conditions of the Contract Documents.

3.04 DISPOSAL OF WASTE

A. The definitions contained in Georgia Environmental Protection Division Rules 391-3-4-.01 shall be applicable to this Project. The term waste shall include excess and surplus materials, and shall include liquid and solid wastes.

B. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

C. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

D. Remove and transport waste in a manner that will prevent spillage on adjacent surfaces and areas.

E. Burning: Do not burn waste materials on site.

F. Waste removed from the Project site shall be disposed of in sites permitted by the Georgia Environmental Protection Division for the acceptance of type of waste being disposed. The acceptable types of permitted disposal facilities are as follows:

1. Inert Waste Landfills
2. Municipal Solid Waste Landfills
3. Municipal Solid Waste Landfills permitted to receive only construction and demolition wastes.

G. Exceptions to Paragraph F are as follows:

1. Hazardous waste shall be disposed of in accordance with Georgia Environmental Protection Division Rules 391-3-11.
2. Asbestos-containing waste shall also be handled and disposed of in accordance with Georgia Environmental Protection Division Rules 391-3-14.

H. No waste shall be placed at a transfer station facility.

I. The Contractor shall maintain records related to all waste removed from the Project site so as to allow the Owner or the Construction Manager to readily determine the following:

1. Date waste removed from Project site.
2. Name of hauler (company and driver) transporting such waste.
3. General description of waste transported.
4. “Truck tickets” indicating the waste disposal site and amount of waste disposed therein.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.

1.02 REQUIREMENTS

A. Conditions of the contract. Fiscal provisions, legal submittals and additional administrative requirements.

B. Section 01 78 39: Record Documents.

C. The respective sections of Specifications: Closeout Submittals Required of Trades.

1.03 SUBSTANTIAL COMPLETION

A. When Contractor considers the Work is substantially complete, he shall submit the following to the Construction Manager:

1. A written notice that the Work, or designated portion thereof, is substantially complete.
2. A list of items remain to be completed or corrected.

B. Within a reasonable time after receipt of such notice, the Construction Manager will make an inspection to determine the statue of completion.

C. Should the Construction Manager determine that the work is not substantially complete:

1. Construction Manager will promptly notify the Contractor in writing, giving the reasons therefore.
2. Contractor shall remedy the deficiencies in the Work, and send second written notice of substantial completion to the Construction Manager.
3. Construction Manager will reinspect the work.

D. When the Construction Manager finds that the work is substantially complete, he will:

1. Prepare and deliver to the Owner a tentative Certificate of Substantial Completion, with a tentative list of items to be completed or corrected before final payment.

2. After consideration of any objections made by the Owner as provided in Conditions of the Contract, and when the Construction Manager considers the Work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected.

E. Substantial Completion: The Certificate will identify the date of Substantial Completion and list any incomplete Work.

1.04 FINAL COMPLETION

A. Prior to Final Completion: Final Completion is achieved when all Work is fully complete in accordance with the Construction Documents.

B. Tasks to complete include, but are not limited to, the following:

1. All Work is complete and correct to the satisfaction of the Owner.
2. All temporary facilities and controls removed.
3. All final cleaning complete per Cleaning Specification.
4. Final Operation and Maintenance Manuals provision per Section 01 78 23.
5. Warranties and Bond Manual submission per Section 01 78 36.
6. Submittal of the Project Record Documents per Section 01 78 39.
7. Spare parts delivery and acceptance.
8. Landscaping complete.
9. All final permits submitted, including Certificates of Occupancy.
10. All Change Orders are approved and signed by both parties.
11. Draft Final Application for Payment submitted.

C. FINAL INSPECTION

1. When Contractor considers the work is complete, he shall submit written certification that:
   a. Documents have been reviewed.
   b. Work has been inspected for compliance with Contract Documents.
   c. Work has been completed in accordance with Contract Documents.
   d. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
   e. Work is completed and ready for final inspection
2. Construction Manager will make the final inspection to verify the status of completion with reasonable promptness after receipt of such certification.
3. Should the Construction Manager consider that the work is incomplete or defective:

a. Construction Manager will promptly notify the Contractor in writing, listing the incomplete or defective work.

b. Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to the Construction Manager that the work is complete.

c. Construction Manager will reinspect the work.

4. When the Construction Manager finds that the work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

1.05 REISNPECTION FEES

A. When the Construction Manager performs reinspections due to failure of the work to comply with the claims of status of completion made by the Contractor:

1. Contractor shall compensate the Owner for expenses incurred by the Construction Manager for such additional services.

2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.06 CLOSEOUT SUBMITTALS TO CONSTRUCTION MANAGER

A. Evidence of compliance with requirements of governing authorities.

B. Record Documents: To requirements of Section 01 78 39.

C. Evidence of payments and Release of Liens: To requirements of General and Supplementary Conditions.

D. Certificate of Insurance for Products and Completed Operations.

1.07 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to Construction Manager.

B. Statement shall reflect all adjustments to the Contract Sum:

1. The original Contract Sum.

2. Additions and deductions resulting from:

a. Previous Change Orders.

b. Allowances.

c. Unit Prices.

d. Deductions for uncorrected work.

e. Penalties and Bonuses.

f. Deductions for liquidated damages.

g. Deductions for re-inspection payments.

h. Other adjustables.

3. Total Contract Sum as adjusted.

4. Previous payments.

5. Sum remaining due.

C. Construction Manager will prepare a final Change Order reflecting approved adjustments to the Contract Sum which were not made by previous Change Orders.

1.08 APPLICATION FOR PAYMENT

A. Contractor shall submit the final Application for Payment in accordance with procedures.

1.09 FINAL ACCEPTANCE

A. Final Application for Payment approved and payment made to Contractor.

B. The Owner will establish the date of Final Acceptance and issue the Letter of Final Acceptance after the Contractor completes all Construction Document requirements.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 SCOPE

A. Operation and maintenance (O&M) instructions shall be provided in accordance with this section and as required in the technical sections of this project manual. O&M information shall be provided for each maintainable piece of equipment, equipment assembly or subassembly, and material provided or modified under this contract.

B. O&M instructions must be submitted and accepted before on-site training may start.

1.02 TYPES OF INFORMATION REQUIRED

A. General:

1. O&M information shall contain the names, addresses, and telephone numbers of the manufacturer, the nearest representative of the manufacturer, and the nearest supplier of the manufacturer's equipment and parts. In addition, one or more of the following items of information shall be provided as applicable.

B. Operating Instructions:

1. Specific instructions, procedures, and illustrations shall be provided for the following phases of operations:

a. Safety Precautions: List personnel hazards for equipment and list safety precautions for all operating conditions.

b. Operator Prestart: Provide requirements to set up and prepare each system for use.

c. Start-Up, Shutdown, and Post-shutdown Procedures: Provide a control sequence for each of these operations.

d. Normal Operations: Provide control diagrams with data to explain operation and control of systems and specific equipment.

e. Emergency Operations: Provide emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.

f. Operator Service Requirements: Provide instructions for services to be performed by the operator such as lubrication, adjustments, and inspection.

g. Environmental Conditions: Provide a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which equipment should not be allowed to run.

C. Preventive Maintenance:

1. The following information shall be provided for preventive and scheduled maintenance to minimize corrective maintenance and repair:

a. Lubrication Data: Provide lubrication data, other than instructions for lubrication in accordance with paragraph 1.02 Operator Service Requirements.

1) A table showing recommended lubricants for specific temperature ranges and applications;

2) Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities; and

3) A lubrication schedule showing service interval frequency.

b. Preventive Maintenance Plan and Schedule: Provide manufacturer's schedule for routine preventive maintenance, inspections, tests, and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair. Provide manufacturer's projection of preventive maintenance man-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft.

D. Corrective Maintenance:

1. Manufacturer's recommendations shall be provided on procedures and instructions for correcting problems and making repairs.

a. Troubleshooting Guides and Diagnostic Techniques: Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

b. Wiring Diagrams And Control Diagrams: Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job-specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type identically to actual installation numbering.

c. Maintenance and Repair Procedures: Provide instructions and list tools required to restore product or equipment to proper condition or operating standards.

d. Removal and Replacement Instructions: Provide step-by-step procedures and list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings, and adjustments required. Instructions shall include a combination of test and illustrations.

e. Spare Parts and Supply Lists: Provide lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonably delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead time to obtain.

f. Corrective Maintenance Man-hours: Provide manufacturer's projection of corrective maintenance man-hours including craft requirements by type of craft. Corrective maintenance that requires participation of the equipment manufacturer shall be identified and tabulated separately.

E. Appendices:

1. The following information shall be provided; include information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment.

a. Parts Identification: Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies.

b. Warranty Information: List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents to keep warranties in force.

c. Personnel Training Requirements: Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.

d. Testing Equipment and Special Tool Information: Provide information on test equipment required to perform specified tests

and on special tools needed for the operation, maintenance, and repair of components.

1.03 TRANSMITTAL PROCEDURE

A. Unless otherwise specified, O&M manuals, information, and data shall be transmitted in accordance with Section 01 33 00 accompanied by Transmittal Form 01 78 23-A and Equipment Record Forms 01 78 23-B and/or 01 78 23-C, as appropriate, all as specified in Section 01 99 90. The transmittal form shall be used as a checklist to ensure the manual is complete. Only complete sets of O&M instructions will be reviewed for acceptance.

B. One (1) electronic and six (6) hard copies of the specified O&M information in final format, with all prior comments addressed to the satisfaction of the Construction Manager, shall be provided following preliminary review and pre-final review of the O&M information.

1. Electronic copies of O&M manuals also shall be provided per Section 01 33 00. For electronic copies, files shall be proved on flash drive in an indexed PDF file format.

2. For ease of identification, each manufacturer's brochure and manual shall be appropriately labeled with the equipment name and equipment number as it appears in the project manual.

3. The information shall be organized in the binders in numerical order by the equipment numbers assigned in the project manual.

4. The binders shall be provided with a table of contents and tab sheets to permit easy location of desired information.

5. Binders shall be heavy-duty, D-ring.

C. If manufacturers' standard brochures and manuals are used to describe O&M procedures, such brochures and manuals shall be modified to reflect only the model or series of equipment used on this project. Extraneous material shall be crossed out neatly or otherwise annotated or eliminated.

1.04 PAYMENT

A. Acceptable O&M information for the project must be delivered to the Construction Manager prior to the project being 65 percent complete. Progress payments for work in excess of 65 percent completion will not be made until the specified acceptable O&M information has been delivered to the Construction Manager.

1.05 FIELD CHANGES

A. Following the acceptable installation and operation of an equipment item, the item's instructions and procedures shall be modified and supplemented by the Contractor to reflect any field changes or information requiring field data.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 78 36

WARRANTIES AND BONDS

PART 1 – GENERAL

1.01 SUMMARY

A. This Section specifies general administrative and procedural requirements for warranties required by the Construction Documents, including manufacturer's Standard Product Warranties and Special Warranties.

B. Refer to the General Conditions for terms of the Contractor's Warranty of Construction.

C. If there is any discrepancy in the Construction Documents regarding the warranty period or its date of commencement, the passage granting the Owner the longest warranty period ending on the latest date shall govern.

D. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and Subcontractors that are required to countersign Special Warranties with the Contractor.

1.02 DEFINITIONS

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by, or incorporated in, the Construction Documents, either to extend time limits provided by Standard Product Warranties or to provide greater rights to the Owner. Refer to individual sections of the Specifications for Special Warranty requirements.

1.03 PROJECT MAINTENANCE AND WARRANTY

A. The Contractor shall maintain and keep in good repair the Work covered by these Drawings and Specifications until acceptance by the Owner.

B. The Contractor shall warrant for a period of two years, except where specified otherwise, from the date of Owner's written acceptance of certain segments of the Work and/or Owner's written final acceptance of the Project, as defined in the Contract Documents that the completed Work is free from all defects due to faulty products or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects.

1. The Owner will give notice of observed defects with reasonable promptness.

2. In the event that the Contractor should fail to make such repairs, adjustments or other work that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost thereby incurred.

3. The Performance Bond shall remain in full force and effect throughout the warranty period.

C. The Contractor shall not be obligated to make replacements which become necessary because of the following:

1. Ordinary wear and tear.

2. As a result of improper operation or maintenance.

3. As a result of improper work or damage by another Contractor or the Owner.

4. Any work performed by personnel other than a maintenance crew during operation.

D. In the event of multiple failures of major consequences prior to the expiration of the two year warranty described above, the affected unit shall be disassembled, inspected and modified or replaced as necessary to prevent further occurrences.

1. All related components which may have been damaged or rendered non serviceable as a consequence of the failure shall be replaced.

2. A new 24 month, except where specified otherwise, warranty against defective or deficient design, workmanship, and materials shall commence on the day that the item is reassembled and placed back into operation.

3. As used herein, multiple failure shall be interpreted to mean two or more successive failures of the same kind in the same item or failures of the same kind in two or more items.

4. Major failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts, broken or chipped gear teeth, premature bearing failure, excessive wear or excessive leakage around seals.

5. Failures which are directly and clearly traceable to operator abuse, such as operations in conflict with published operating procedures or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant over or under lubrication and using maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the one year warranty.

6. Should multiple failures occur in a given item, all products of the same size and type shall be disassembled, inspected, modified or replaced as necessary and re-warranted for two years.

E. The Contractor shall, at Contractor's own expense, furnish all labor, materials, tools and equipment required and shall make such repairs and removals and shall perform such work or reconstruction as may be made necessary by any structural or functional defect or failure resulting from neglect, faulty workmanship or faulty materials, in any part of the Work performed by the Contractor.

1. Such repair shall also include refilling of trenches, excavations or embankments which show settlement or erosion after backfilling or placement.

F. Except as noted on the Drawings or as specified, all structures such as embankments and fences shall be returned to their original condition prior to the completion of the Contract.

1. Any and all damage to any facility not designated for removal, resulting from the Contractor's operations, shall be promptly repaired by the Contractor at no cost to the Owner.

G. The Contractor shall be responsible for all road and entrance reconstruction and repairs and maintenance of same for a period of one year from the date of final acceptance. In the event the repairs and maintenance are not made immediately and it becomes necessary for the owner of the road to make such repairs, the Contractor shall reimburse the owner of the road for the cost of such repairs.

H. In the event the Contractor fails to proceed to remedy the defects upon notification within 15 days of the date of such notice, the Owner reserves the right to cause the required materials to be procured and the work to be done, as described in the Drawings and Specifications, and to hold the Contractor and the sureties on Contractor's bond liable for the cost and expense thereof.

I. Notice to Contractor for repairs and reconstruction will be made in the form of a registered letter addressed to the Contractor at Contractor's home office.

J. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the Contractor's liability within the law of the place of construction.

K. Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

L. The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Construction Documents.

M. The Owner reserves the right to refuse to accept Work for the Project where a Special Warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

N. Owner acceptance of warranties does not relieve the Contractor of the warranty requirements specified in the General Conditions.

O. Ensure all Standard Product Warranties and Special Warranties are transferrable to Owner.

1.04 SUBMITTALS

A. Procedures: Section 01 33 00.

B. Warranties and Bonds Manual: Assemble executed licenses, certificates, warranties, bonds, and any required service and maintenance contracts from the respective manufacturers, suppliers, and Subcontractors. Provide two (2) preliminary review copies, identified “Preliminary.” Provide four (4) final signed copies of the Warranties and Bonds Manual following review and acceptance of the preliminary manual by the Owner.

1. Out of the four final signed copies, one (1) shall be an original.
2. Provide one (1) flash drive with scanned Adobe Acrobat (.pdf) files, including an index with hyperlinks to the individual sections.

C. Include complete information for each of the following:

1. Neatly typed Table of Contents, in a complete and orderly sequence.
2. Product or work item, including applicable specification section number(s) per the Construction Documents.
3. Firm, with name of principal, address, telephone number, email address, and web site address.
4. Scope of warranty.
5. Start date of warranty or service and maintenance contract.
6. Duration of warranty or service and maintenance contract.
7. Proper procedure in case of failure.
8. Instances which might affect validity of warranty or bond.
9. Contractor, name or responsible principal, address, and telephone number.
10. For Special Warranties, prepare a written document containing all pertinent information and ready for execution by the required parties.

D. Copies shall be bound in slant-D, 3 ring view binders with an insert accepting clear vinyl overlay on the front cover and spine.

1. Provide cover slip sheet typed with "WARRANTIES AND BONDS", Project name, Project number, Contractor, and blank field for the date. Label volumes consecutively.
2. Each copy shall have a typewritten index and tabbed dividers between equipment categories or specification sections.
3. The contents of the manual shall be printed on white 8-1/2” x 11” acid free, recycled copy paper and shall not exceed 75% capacity of the binder.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 78 39

RECORD DOCUMENTS

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section includes, but is not necessarily limited to, the compiling, maintaining, recording and submitting of project record documents as herein specified.

B. Record documents refer to those documents maintained and annotated by the Contractor during construction and are defined as:

1. A neatly and legibly marked set of contract drawings showing the final location of piping, equipment, structures, electrical conduits, outlet boxes and cables.
2. Specifications annotated with addenda and change order items, by section.
3. Change orders and other modifications to the Contract.
4. Construction Manager field orders or written instructions, including Requests for Information (RFI) and Clarification Memorandums.
5. Reviewed shop drawings, product data and samples.
6. Daily work reports.
7. Field test data.
8. Additional documents such as schedules, lists, drawings, and electrical and instrumentation diagrams included in the Specifications.

C. The Contractor shall maintain on the Project site throughout the Contract Time an up to date set of Record Drawings.

1.02 GENERAL REQUIREMENTS

A. Unless otherwise specified, record drawings shall be full size and maintained in a clean, dry and legible condition.

B. Record documents shall not be used for construction purposes and shall be available for review by the Owner and Construction Manager during normal working hours.

C. At the completion of the Work, prior to final payment, all record drawings and any CAD files shall be submitted to the Owner.

D. The record documents shall be maintained continuously.

E. Prior to each request for partial progress payment, Construction Manager will review record drawings with Contractor.

F. Progress payment requests will not be processed unless record drawings are current.

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Storage

1. The Contractor shall store documents and samples in the Contractor's field office, apart from documents used for construction.
2. The Contractor shall provide files and racks for storage of documents.
3. The Contractor shall provide locked cabinet or secure storage space for storage of samples.

B. The Contractor shall file documents and samples in accordance with format of these Specifications.

C. Maintenance

1. The Contractor shall maintain documents in a clean, dry, legible condition and in good order.
2. Do not use record documents for construction purposes.
3. The Contractor shall maintain at the site for the Owner one copy of all record documents.

D. Failure to maintain the Record Documents in a satisfactory manner may be cause for withholding of a certificate for payment.

1.04 QUALITY ASSURANCE

A. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain Record Documents.

B. Accuracy of Records:

1. Unless noted otherwise, Record Drawings shall provide dimensions, distances and coordinates to the nearest 0.1 foot.
2. Unless noted otherwise, Record Drawings shall provide elevations to the nearest 0.01 foot for all pertinent items constructed by the Contractor.
3. Coordinate changes within Record Documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
4. Purpose of Project Record Documents is to document factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement

C. Make entries within 24 hours after receipt of information that a change in Work has occurred.

D. Prior to submitting each request for progress payment, request Construction Manager's review and approval of current status of Record Documents. Failure to properly maintain, update, and submit Record Documents may result in a deferral by Construction Manager to recommend the whole or any part of the Contractor's Application for Payment, either partial or final.

1.05 CONTRACTOR MARK-UPS AND DATA ENTRY REQUIREMENTS

A. The Contractor shall provide one set of the Contract drawings, with all changes recorded in that one set.

B. Marking of the drawings shall be kept current and shall be done at the time the material and equipment are installed.

C. Annotations to the record drawings shall be made with an erasable colored pencil conforming to the following color code:

1. Additions – Red
2. Deletions – Green
3. Comments – Blue
4. Dimensions – Graphite

D. Legibly mark drawings to record actual construction, including:

1. Changes of dimension and detail.
2. Changes made by Requests for Information (RFI), field order, work change directives, clarification memorandums or by change order.
3. Details not on original Drawings.

E. Legibly mark to record actual depths, horizontal and vertical location of underground facilities, piping, taps, fitting, valves, underground structures, equipment, raceways, cables, and appurtenances referenced to permanent surface improvements. The horizontal locations shall be referenced to at least two easily identifiable, permanent landmarks (e.g., power poles, valve markers, etc.) or benchmarks.

F. Horizontal and vertical locations of all exposed and underground utilities and appurtenances, both new facilities constructed and those utilities encountered, referenced to permanent surface improvements.

G. Location of and dimensions of roadways and parking areas, providing dimensions to back of curb when present.

H. Provide elevation of piping through vaults / structures, invert elevation of all pipes entering manholes, junction boxes, valves, clean outs, etc. Provide center of manholes, and corners of facilities or structures with northing, easting and bottom / top elevations.

I. The Contractor shall obtain a set of signed/sealed as-built drawings from the Georgia registered surveyor and submit to the Owner. Survey shall accurately reflect installed location, depth, pipe size and other pertinent details.

J. Record Drawings shall be prepared using a survey that ties the site and improvements horizontally and vertically to the following state plane coordinate system or as amended by the Owner.

1. Horizontal Control: North American Datum 83 (NAD83) (HARN) 1994
2. Vertical Control: North American Vertical Datum of 1988 (NAVD88).
3. Grid Zone: Georgia West 1002 (US Survey feet)

K. As-built drawings shall include the following:

1. GPS coordinates for manholes and other above grade appurtenances.
2. Top and invert elevations of the manholes
3. Size and invert of all sewers entering/exiting the manholes

L. Label each document “Project Record” in neat, large printed letters.

M. Specifications

1. Legibly mark each section to record:
   a. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
   b. Changes made by Requests for Information (RFI), field order, clarification memorandums, or by change order.

N. For CCTV work, PACP data requirements are as follows:

1. PACP database must be NASSCO compliance.
2. Data must be delivered in PACP or GaniteXP format.
3. PACP format is only acceptable for the following versions: Nothing earlier then 2.0.2 nothing later 6.0.3.
4. Asset ID in the database needs to be implemented as provided by Fulton County. If the CCTV contractor discovers additional assets that are not currently mapped by Fulton County, then the discovered asset(s) should be identified with a TMP prefix joined with the next known downstream Asset ID. If there is no downstream and upstream IDs contractor need to use sequence number identified with a TMP.
5. If a new Data (manhole, pipe) is found, map update (sketch) needs to be provided.
6. Data and videos should be provided on a flash drive with the label of the project
7. Videos will only be accepted in MPG format.
8. Video needs to be delivered per section of the pipe from manhole to manhole.

1.06 SUBMITTAL

A. At contract closeout, deliver Record Documents to the Construction Manager for the Owner.

B. Accompany submittal with transmittal letter containing:

1. Date
2. Project title and number
3. Contractor's name and address
4. Title and number of each record document
5. Signature of Contractor or Contractor's authorized representative

C. Cad Files

1. All as-built plans submitted to the Fulton County Department of Public Works must be provided in electronic computer aided design (CAD) format. CAD files to be submitted in accordance with Appendix A – “Fulton County As-Built CAD Standards”.

PART 2 – MATERIALS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

APPENDIX A

Fulton County As-Built CAD Standards Effective Date: JANUARY 01, 2010 Version 0.2

Revised: 20 Feb 2009

As of *01 JANUARY 2010*, all water and wastewater as-built plans submitted to the Fulton County Department of Public Works must be provided in electronic computer aided design (CAD) format. The following standards must be followed for all plans. Construction will not be approved until these standards are met.

Template (or seed) drawing file available at http://www.fultoncountyga.gov/county/dpw under Developer Information on the left side-bar.

Table of contents

1) General Requirements
2) Layers
3) Drawing
4) Table Specifications
5) Symbolization
6) Annotation
7) File Names and Revisions
8) Deliverable Formats

1) General Requirements

a) All as-built drawings must be georeferenced to the US State Plane coordinate system, NAD 83, GA West Zone, US Survey Feet. All drawings must contain two reference pins (i.e. property corners), which are labeled and tied to the Fulton County (FULCO) GPS monument network (please identify referenced GPS monuments with the monument number and coordinates). Reference pins must be able to be field verified using GPS and must be easily accessible (i.e., must not be in a creek). The survey method (GPS or conventional) used to place the reference pins should be identified in the HORIZONTAL_AND_VERTICAL_TEXT layer. Information on the FULCO GPS survey monuments can be found using the FULCO Monument Locator map application web site at:

http://wms.co.fulton.ga.us/ms/gps/ or may be obtained in person at the Fulton County Government Center, Department of Public Works.

b) All features depicted in the as-built drawings must be surveyed ***after*** construction. FULCO will spot check all coordinates to ensure accuracy. Table 1 specifies the features that must be surveyed. Water system features must be surveyed at a horizontal accuracy of ≤ 0.3 ft and vertical accuracy of ≤ 0.5 ft. Sewer system features must be surveyed at a horizontal accuracy of ≤ 0.5 ft and a vertical accuracy of ≤ 0.1 ft.

c) The following feature geometry types must be shot directly using the survey instrument and tied to the FULCO GPS monument network:

1) All point features (hydrants, valves, sewer manholes, etc.),

2) All line features at all endpoints, bends, and turns (pipes, etc.),

3) All polygon features at all corners and bends (project boundaries, lots, right-of- ways, etc.)

d) The following feature types are acceptable: Lines, Polylines, Text, Insert/Blocks. The Leaders as feature types must not be used. Where there is a need for Leaders they shall be drawn using *Line* features and must be put on a text layer. For example, the leader for the diameter of a water pipe should be on the WATER_LINE_TEXT layer, not the WATER_LINE layer.

e) A template (or seed) drawing file, file containing the required FULCO blocks and AutoCAD tool pilot will be provided through the Department of Public Works website http://www.fultoncountyga.gov/county/dpw.

f) The project boundary must be labeled on the PROJECT_BOUNDARY_TEXT layer, and the label must be within the extent of the project boundary.

2) Layers:

a) Layer names for required layers must appear exactly as in Table 1.

b) All required layers listed in FULCO CAD layers must contain only the features that are described for that layer. For example, the BOUNDARY_LINE layer must only contain the boundary line and not such features as north arrows or parcels.

c) All required layers must be present in the drawing except for features that do not pertain to a particular project. For example, some commercial projects or apartment complexes may not contain sewer taps as part of the construction and should not be included in the drawing.

d) All layers must be clearly differentiated from each other.
   1) Two layers having the names "WATER_LINE" and "WATER_LINES" should not exist in the same drawing.

e) SEWER_LINE_TEXT and SEWER_TEXT should not exist in the same drawing. All text must appear on separate layers from the layers they annotate. For example, text describing a sewer line must be on the SEWERLINE_TEXT layer, not the SEWER_LINE layer.

3) Drawing

a) All layers must conform to the proper geometry type (insert/block, line, polygon, text) as indicated in Table 1 below.

Table 1: Layer Names and Geometry Types

Layer Name	*Type*	*Layer Contents*	*Surveyed*
ADDRESS_TEXT	Text	Street postal address number	No
BLOCK_LETTER_TEXT	Text	Indicates the block letter of a subdivision	No
CITY_BOUNDARY	Line	City boundary line	No
CITY_BOUNDARY_TEXT	Text	City names associated with the CITY_BOUNDARY	No
COUNTY_BOUNDARY	Line	County boundary lines	No
COUNTY_BOUNDARY_TEXT	Text	County Names for the COUNTY_BOUNDARY layer	No
CONTOUR	Line	Topological delineation information	
CONTOUR_TEXT	Text	Description info for contour layer	
CORNER_POINTS	Point	Establishing Reference points	
FIRE_HYDRANT	Insert	Fire Hydrants	Yes
FIRE_HYDRANT_TEXT	Text	Text Associated with FIRE_HYDRANT layer	No
FLOODPLAIN_100YR	Line	Existing floodplain delineation	
FLOODPLAIN_100YR_FUTURE	Line	Proposed floodplain delineation	
FLOODPLAIN_100YR_FUTURE_TEXT	Text	Text for proposed floodplain delineation	
FLOODPLAIN_100YR_TEXT	Text	Text for existing floodplain delineation	
FLOW_ARROW	Insert	Sewer line flow arrows	No
GABION_WALL	block	Any retaining type wall construction	
GREASE_TRAPS	block	Grease traps	
HORIZONTAL_AND_VERTICAL_CONTROL_POINT	Point	Survey control points (rebar or monuments) with x,y,z	Yes
HORIZONTAL_AND_VERTICAL_TEXT	Text	Corresponding text (coordinate values, monument number, Survey method etc.).	No
LAND_LOT_LINE	Line	Layer Contents	
LAND_LOT_LINE_TEXT	Text	Land lot numbers and other text.	No
LOT_NUMBER_TEXT	Text	Individual lot numbers	No

Table 1: Layer Names and Geometry Types			
PROJECT_BOUNDARY	Poly	The boundary line of the subdivision or property.	Yes
PROJECT_BOUNDARY _TEXT	Text	Project (Development) Name	No
PROPERTY_ID_TEXT	Text	Property Information	
PROPERTY_LINE	Poly	Property Lines (parcel lines)	Yes
PUMP_STATION	Point	Represents the centermost point of a pump station	Yes
PUMP_STATION_TEXT	Text	Text associated with PUMP_STATION	No
RAILROAD_LINE	Line	Railroad Lines	Yes
RAILROAD_TEXT	Text	Text Associated with RAILROAD	No
ROAD_EDGE_OF_PAVEMENT	Poly	Street Edge of Pavement (not back of curb); this layer should not include parking lots or curbing	Yes
ROAD_TEXT	Text	Road Names	No
ROAD_RIGHT-OF-WAY	Poly	Road Right-of-Way	Yes
ROAD_RIGHT-OF-WAY_TEXT	Text	Text relating to the road right of way layer	No
SEWER_END-OF-LINE	Insert	End of sewer line.	Yes
SEWER_END-OF-LINE_TEXT	Text	Text associated with SEWER_END-OF-LINE	No
SEWER_EXISTING	Line	Sewer lines present before the subdivision/project	Yes
SEWER_EXISTING_TEXT	Text	Text associated with the SEWER_EXISTING layer	No
SEWER_MANHOLE_EXISTING	Block	Existing Sewer Manholes	Yes
SEWER_MANHOLE_ EXISTING_TEXT	Text	Text for the SEWER_MANHOLE EXISTING layer	No
SEWER_FORCE_MAIN	Line	Sewer force mains	Yes
SEWER_FORCE_MAIN_TEXT	Text	Text associated with SEWER_FORCE_MAIN	No
SEWER_LINE	Line	Sewer lines built as part of the subdivision/project.	Yes
SEWER_LINE_TEXT	Text	Text associated with the SEWER_LINE layer.	No
SEWER_MANHOLE	Block	Sewer Manholes	Yes
SEWER_MANHOLE_TEXT	Text	Text associated with the SEWER_MANHOLE layer	No
SEWER_SEPTIC_TANK	Line	Septic tank	
SEWER_TAP	Line	Sewer taps	Yes
SEWER_TAP_TEXT	Text	Distance between taps in feet	Yes
SEWER_TUNNEL	Line	Subsurface Sewer tunnel construction	
STORM_BMP	Poly	Engineered structures designed to improve management of Stormwater system (see section e-I)	
STORM_BMP_TEXT	Text	Label showing the BMP_ID (see section e-II)	No
STORM_BMP_EXISTING	Poly	Engineered structures designed to improve management of Stormwater system (see section e-I)	No
STORM_BMP_EXISTING_TEXT	Text	Text associated with the STORM_BMP_EXISTING	No
STORM_CULVERT	Poly	A polygon representing the extent of pipe culvert or box Culvert structure (see section e-III)	Yes
STORM_CULVERT_TEXT	Text	Label for the features ID (see section e-III)	No
STORM_CULVERT_EXISTING	Poly	A polygon representing the extent of a culvert structure (see section e-III), prior to construction	Yes

Table 1: Layer Names and Geometry Types			
STORM_CULVERT_EXISTING_TEXT	Text	Label for the features (see section e-III)	No
STORM_CULVERT_CHART	n/a	Describes the required parameters (e-III)	n/a
STORM_DROPINLET	Block	Stormwater drop inlet. (see section e-IV)	Yes
STORM_DROPINLET_TEXT	Text	Text describing layer (i.e. Invert Elevation)	No
STORM_DROPINLET_EXISTING	Block	Stormwater drop inlet (see section e-IV) that existed prior to construction	Yes
STORM_DROPINLET_EXISTING_TEXT	Text	Text describing layer	No
STORM_FLUME	Line	The centerline drawn in flow direction (see section V)	Yes
STORM_FLUME_TEXT	Text	Text for: material (lining), slope (see section e-VI)	No
STORM_FLUME_EXISTING	Line	The centerline that existed prior to construction Must be drawn in flow direction (see section V).	Yes
STORM_FLUME_EXISTING_TEXT	Text	Text associated with layer (see section e-VI)	No
STORM_HEADWALL	Block	Proposed new placement point of construction	
STORM_HEADWALL_TEXT	Text	Text associated with new headwall	
STORM_HEADWALL_EXISTING	Block	Headwall which existed prior to construction	
STORM_HEADWALL_EXISTING_TEXT	Text	Text associated which existed prior to construction	
STORM_JUNCTION_BOX	Insert	Block in the location of a Stormwater Junction Box	Yes
STORM_JUNCTION_BOX_TEXT	Text	Text for layer that must at least show: Rim Elevation, Invert Elevation, and Junction Box material.	No
STORM_JUNCTION_BOX_EXISTING	Insert	Pre-existing block for the Storm Junction Box	Yes
STORM_JUNCTION_BOX_EXISTING_TEXT	Text	Text for layer that must at least show: Rim Elevation, material, Invert Elevation, and Junction Box	No
STORM_LINE	Line	Pipe (i.e. Pipe line or driveway pipe) (see section e-VII)	Yes
STORM_LINE_TEXT	Text	Text for layer (i.e. slope, diameter, material)	No
STORM_LINE_EXISTING	Line	Pre-existing stormwater line (pipe line or driveway pipe) drawn in the direction of flow (see section e-VII)	Yes
STORM_LINE_ EXISTING_ TEXT	Text	Text associated with layer (i.e. slope, diameter, material)	No
STORM_OPEN_CHANNEL	Line	Centerline drawn in the direction of flow (see section e-V)	Yes
STORM_OPEN_CHANNEL_TEXT	Text	Text layer: material (lining), slope (see section e-VI)	No
STORM_OPEN_CHANNEL_EXISTING	Line	Centerline of structure. Must be drawn in the direction of flow (see section e-V)	Yes
STORM_OPEN_CHANNEL_EXISTING_ TEXT	Text	Text associated with layer (see section e-VI)	No
STORM_LINE_END	Insert	The structure at the Line End or a node representing the bare end of pipe (see section e-VIII)	Yes
STORM_LINE_END_TEXT	Text	Text layer (i.e. slope, diameter, material)	No
STORM_LINE_END_EXISTING	Insert	The structure at the Line End or a node representing the	Yes
		bare end of pipe (see section e-VIII)	
STORM_LINE_END_EXISTING_TEXT	Text	Text associated with layer	No
STRUCTURE	Line	Above ground construction (Buildings, apartments, etc.)	
STRUCTURE_TEXT	Text	Name, or other information associated with the structure	
TANK_PROPOSED	Line	Any proposed tank construction	
TRASH_RACKS	Block	Trash Racks	

Table 1: Layer Names and Geometry Types			
UTILITY_EASEMENT	Poly	Utility line easements	Yes
UTILITY_EASEMENT_TEXT	Text	Text Associated with Utility Easements	No
WATER_CAP	Insert	Cap at the end of water line.	Yes
WATER_CAP_TEXT	Text	Text associated with WATER_CAP_TEXT	No
WATER_EXISTING	Line	Water lines before the subdivision/project was built	Yes
WATER_EXISTING_TEXT	Text	Text associated with WATER_EXISTING	No
WATER_LINE	Line	Water lines built as part of the subdivision/project.	Yes
WATER_LINE_TEXT	Text	Text associated with WATER_LINE	No
WATER_METER	Insert	Customer water meters	Yes
WATER_METER_TEXT	Text	Text associated with WATER_METER	No
WATER_REDUCER	Insert	Water line reducer	Yes
WATER_REDUCER_TEXT	Text	Text associated with WATER_REDUCER	No
WATER_SERVICE	Line	Water service lines	Yes
WATER_SERVICE_TEXT	Text	Text associated with WATER_SERVICE	No
WATER_STORAGE_SYSTEM	Block	Water Storage System construction	
WATER_STORAGE_SYSTEM_TEXT	Text	Text for Water Storage System construction	
WATER_VALVE_EXISTING	Insert	Existing water valves	Yes
WATER_VALVE_EXISTING_TEXT	Text	Text associated with WATER_VALVE_EXISTING	No
WATER_VALVE	Insert	Water valves	Yes
WATER_VALVE_TEXT	Text	Text associated with WATER_VALVE	No
WATER_VAULT	Insert	Large meter or fire connection vault	Yes
WATER_VAULT_TEXT	Text	Text associated with WATER_VAULT	No
WETLAND	Line	Wetland area	
WETLAND_TEXT	Text	Text associated with the Wetland	

b) All Polygon type features must be completely closed. Lines may need to be duplicated on more than one layer.

1) Subdivision/project parcels must to be closed figures on their layer (not closed with the subdivision/project boundary).

2) Road edge-of-pavement and road right-of-way must be drawn as closed polygons.

3) Where a polygon feature extends beyond the edge of the plan, the property boundary (repeated on the polygon feature's layer) will be used to close the polygon.

4) All edges on polygon features must be snapped together at the vertices. Gaps in polygon boundaries will not be accepted.

c) Sewer Features

1) Sewer Lines and Sewer Taps need to be digitized with proper directionality: lines must be drawn from the uphill node to the downhill node or flipped after the lines have been digitized.

2) All tangents between sewer manholes need to be drawn with a single line. Lines must not continue for more than one tangent.

3) All tangents must be snapped at endpoints intersecting at the exact center of the manhole. No gaps should exist between tangents.

4) Manholes need to be symbolized consistently with an insert centered and snapped on the tangent endpoints.

5) Sewer tap locations must be snapped to the sewer tangent and accurately placed. Placement shall be based on the televising reports. FULCO will verify tap placement against the televising report. The as-built engineer is responsible for obtaining the televising report.

d) Water Features

1) Water lines must be digitized with all straight-line pipes consisting of only two end points. Straight-line pipes will begin and end at the following features (nodes): hydrants, valves, meters, pumps, tees, crosses, and valves. Polylines should be used wherever a water line contains elbows or bends (i.e., when the line does make a straight run from node to node).

2) Curves may be digitized with enough vertices to capture the curve geometry, but they must be single, continuous lines. Curves or arcs may also be used to designate curved pipe.

3) Hydrants must be shown in their true, surveyed location, and must be connected to the water main via a valved fire hydrant line.

4) All water lines must be continuous, with pipe endpoints snapped to each other at endpoints (nodes).

5) End-of-line caps must be drawn to differentiate end-of-lines from lines that extend beyond the extent of the drawing. Caps should be drawn for lines that are to be permanently capped when the project is complete, not for lines that are temporarily capped pending

inspection.

e) Stormwater Features

1) The entire BMP must be represented on the Storm_BMP layer using a polygon. The following are the examples of BMPs: Enhanced Swale, Stormwater Pond, Stormwater Wetland, Sand Filter, Bioretention Cell, Infiltration Trench, Filter Strip, Gravity Oil-Grit Separator, Proprietary Structural Control, Underground Detention, Porous Concrete, Modular Porous Paver System. Please consult with the FULCO water resources engineer for a list of currently accepted BMPs.

2) A BMP_ID is going to be assigned to each STORM_BMP feature by the FULCO engineer during the plan review process. The contractor must clearly mark every BMP feature with the assigned BMP_ID in the STORM_BMP_TEXT layer of the asbuilt.

3) In the STORM_CULVERT and STORM_CULVERT_EXISTING layers, the structures must be drawn as polygons to show their length, width, location, and orientation. All the corners of the culvert extents must be surveyed. All culverts must be labeled in the corresponding STORM_CULVERT_TEXT or STORM_CULVERT_EXISTING_TEXT layer with the number matching the culvert chart shown on the asbuilt. The storm culvert chart shall be put in the STORM_CULVERT_CHART layer. For Culvert Chart contents see the Stormwater Development Guidelines.

4) In the STORM_DROPINLET and STORM_DROPINLET_EXISTING layers, the structures shall be drawn with different inserts (blocks) according to the type of the Drop Inlet: Single Wing Catch Basin, Double Wing Catch Basin, Square Catch Basin, Rectangular Catch Basin, Grate Cover Inlet, Catch Basin with Grate, Curb Inlet, Circular Weir Inlet, Rectangular Weir Inlet. The contractor must only use the blocks provided by FULCO for these features.

5) In the STORM_OPEN_CHANNEL, STORM_OPEN_CHANNEL-EXISTING, STORM_FLUME and STORM_FLUME_EXISTING layers, the feature shall be represented by a line reflecting the centerline of the structure and must be drawn in the direction of flow. The lines shall be broken at any point where the slope percent changes. All endpoints (including the points of slope changes) shall be surveyed.

6) STORM_OPEN_CHANNEL_TEXT,

STORM_OPEN_CHANNEL_EXISTING_TEXT, STORM_FLUME_TEXT and STORM_FLUME_EXISTING TEXT layers shall contain a label indicating the percent slope and a type of material (lining) of the corresponding open channel or flume.

7) In the STORM_LINE or STORM_LINE_EXISTING layers, the features must be drawn in the direction of flow. This feature must be digitized with all straight-line pipes consisting of only two end points. Straight-line pipes will begin and/or end at the following features: STORM_LINE_END, STORM_JUNCTION_BOX, STORM_DROP_INLET.

8) In the STORM_LINE_END and STORM_LINE_END_EXISTING layers, the structures must be drawn with different inserts (blocks) according to the type: Straight Headwall, U-type Headwall, Tapered Headwall, L-Type Headwall, Flared- End Section, Straight Wingwall, Angled Wingwall, Bare End and BMP Outlet. STORM_LINE_END and STORM_LINE_END_EXISTING features must be snapped to the ends of the STORM_LINE or STORM_LINE _EXISTING or the centers of STORM_CULVERT or STORM_CULVERT_EXISTING openings. The contractor must only use the blocks provided by FULCO for these features (see section 4) Symbolization)

4) Table Specifications

a) A table with the following attribute data for each **sewer line**

1) Unique identifier matching the identifier in the as-built drawing

2) Unique identifier matching upstream manhole identifier in the as-built drawing

3) Upstream Measure Down - Distance from the upstream manhole lid top to invert of pipe as measured in feet

4) Upstream Invert – Elevation (z) of the invert of the upstream end of the pipe

5) Unique identifier matching downstream manhole identifier in the as-built drawing

6) Downstream Measure Down - Distance from downstream manhole lid top to invert of pipe as measured in feet

7) Downstream Invert – Elevation (z) of the invert of the downstream end of the pipe

8) Pipe diameter measured in inches

9) Pipe Material (CI, DI, PVC, VC, RCP, UNK, IRON, TRAN, PE, TR)

10) Pipe Length measured in feet

Example Table: Sewer Line

Pipe ID	Upstr MH ID	Upstr Measure Down	Upstr Invert	Downstr MH ID	Downstr Measure Down	Downstr Invert	Pipe Diameter	Pipe Material	Pipe Length
Pipe#1	SSMH#1	6.1	906.78	Pump Station	10.2	905.06	8	PVC	291
Pipe#2	SSMH#2	7.1	908.33	SSMH#1	6.05	906.83	8	PVC	238
Pipe#3	SSMH#3	8	908.76	SSMH#2	7.1	908.03	8	PVC	64

b) A table with the following attribute data for each **water line**

1) Unique identifier matching the identifier in the as-built drawing
2) Pipe diameter measured in inches
3) Pipe Material (CI, PVC, DI, GV, PB, CO, UNK, TRAN,CP, SC.)
4) Pipe Length measured in feet
5) End1 ID (Valve, Meter, Reducer, etc.)
6) End2 ID (Valve, Meter, Reducer, etc.)

Example Table: Water Line

Pipe ID	Pipe Diameter	Pipe Material	Pipe Length	End1 ID	End2 ID
WL #1	8	PVC	291	WV #2	FH #23
WL #2	8	PVC	238	WM #43	WV #2
WL #3	8	PVC	64	WV #2	WV #54

c) A table with the following attribute data for each **storm line**

1) Unique identifier matching the identifier in the as-built drawing
2) Unique identifier matching upstream structure identifier in the as-built drawing
3) Upstream Measure Down - Distance from the upstream structure elevation to invert of pipe measured in feet
4) Upstream Invert – Elevation (z) of the invert of the upstream end of the pipe
5) Unique identifier matching downstream structure identifier in the as-built drawing
6) Downstream Measure Down - Distance from downstream structure elevation to invert of pipe measured in feet
7) Downstream Invert – Elevation (z) of the invert of the downstream

end of the pipe

8) Pipe Shape (Box, Elliptical, Circular, etc.)

9) Pipe height measured in inches

10) Pipe width measured in inches

11) Pipe Material (BCCMP, RCP, HDPE, CMP.)

12) Pipe Length measured in feet

Example Table: Storm Line

Pipe ID	Upstr-ID	Upstr Measure Down	Upstr Invert	Downstr-ID	Downstr Measure Down	Downstr Invert	Pipe Shape	Pipe Height	Pipe Width	Pipe Material	Pipe Length
Pipe #1	DI #1	6.1	906.78	JB #3	10.2	905.06	Circular	24	24	BCCMP	291
Pipe #2	CB #2	7.1	908.33	FES #1	6.05	906.83	Ellipse	38	24	BCCMP	238
Pipe #3	HW #1	0	908.76	HW #2	0	908.33	Box	60	84	RCP	64

5) Symbolization

a) Symbols must be standardized according to examples provided in the FULCO template file. The following "point" features must be symbolized using standard FULCO CAD symbols and drawn as inserts:

1) Vault

2) Valve

3) Hydrant

4) Manhole

5) Meter

6) End of Line/Cap

7) Reducer

8) Junction Box

9) Grease Traps

10) Trash Racks

11) Water Cap

b) All blocks used in the STORM layers must be drawn as inserts. The blocks must be standard and symbolized using only FULCO CAD blocks provided on the FULCO CAD Digital Data Submission Standards template available through the Department of Public Works website http://www.fultoncountyga.gov/county/dpw.

1) Single Wing Catch Basin
2) Double Wing Catch Basin
3) Square Catch Basin
4) Rectangular Catch Basin
5) Grate Cover Inlet
6) Catch Basin with Grate
7) Curb Inlet
8) Circular Weir Inlet
9) Rectangular Weir Inlet
10) Straight Headwall
11) U-type Headwall
12) Tapered Headwall
13) L-type Headwall
14) Flared-End Section
15) Straight Wingwall
16) Angled Wingwall
17) Bare End
18) BMP Outlet
19) Junction Box
20) Rectangular Weir Inlet

6) Annotations

a) Any non-standard water and sewer lines must be annotated as such. Line diameter, material, ownership, etc. that does not conform to standard practice should be noted in the corresponding annotation layer. For example, standard subdivision sewer lines are 8" in diameter. Any other diameter must be annotated on the SEWER_LINE_TEXT layer.

b) All addresses and lot numbers must be number data type (that is no text or symbols: #, -, ft, _, ", ', etc.). If the lot does not have a number, this layer should be blank.

c) All required text must be single line text. Project (Development) name shall be on one line.

d) All annotation for polyline (polygon) features must be bounded by the polyline it annotates. For example, the project name must be within the

project boundary, and not extend beyond it.

7) File naming and revisions

a) File names should correspond exactly to the subdivision or project name and should be consistent from one version to the next. The file name should contain the drawing revision date (in YYMMDD format) as part of the name. There should be no blanks spaces in the name, only underscores. An example file name for the May 12, 2008 revision for the third phase of the Peaceful Valley subdivision is: “Peaceful_Valley_3_080512”. If a development name changes from that of indicated in the originally approved plans, the original name shall also be provided with the submittal of the as-built.

b) File revision dates should only be updated by the contractor/developer and not by FULCO or Fulton County.

8) Deliverable Format

a) All files shall be delivered in AutoCAD (release 14 or higher), DXF or DWG format (for projects created in Microstation) in a single flash drive. Files should not be spanned over more than one drive.

b) All deliverables will be labeled with the file name, company name, contact name, and phone number. A transmission letter restating this information along with a statement requesting as-built review will also accompany the disk.

SECTION 01 99 90
REFERENCE FORMS

PART 1 – FORMS

1.01 DESCRIPTION

A. The forms listed below and included in this section are referenced from other sections of the project manual:

Form No.	Title
01 33 00-A	Submittal Transmittal Form
01 78 23-A	Operation and Maintenance Transmittal Form
01 78 23-B	Equipment Record Form
01 78 23-C	Equipment Record Form
43 05 11-A	Manufacturer's Installation Certification Form

01 33 0-A. SUBMITTAL TRANSMITTAL FORM

Submittal Transmittal

Submittal Description:	Submittal No:[1]	Spec Section:

	Routing	Sent	Received
Owner:	Contractor/CM		
Project:	CM/Engineer		
	Engineer/CM		
Contractor:	CM/Contractor		

We are sending you:
☐ Attached
☐ Under separate cover via _____
☐ Submittals for review and comment
☐ Product data for information only

Remarks: _____

Item	Copies	Date	Section No.	Description	Review Action[a]	Reviewer Initials	Review Comments Attached

[a]Note: NET = No exceptions taken; MCN = Make corrections noted; A&R = Amend and resubmit; R = Rejected
Attach additional sheets if necessary.

Contractor

Certify either a or b:

a. ☐ We have verified that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work, specified (no exceptions).

b. ☐ We have verified that the material or equipment contained in this submittal meets all the requirements specified except for the attached deviations.

No.	Deviation

[1]See *Section 01 33 00-1.04. A, Transmittal Procedure.*

Certified by:

Contractor's Signature:

01 78 23-A. OPERATION AND MAINTENANCE TRANSMITTAL FORM

Date:	Submittal No:[2]
To:	Contract No:
	Spec. Section:
	Submittal Description:
Attention:	From:

Checklist		Contractor		Construction Manager	
		Satisfactory	N/A	Accept	Deficient
1.	Table of contents				
2.	Equipment record forms				
3.	Manufacturer information				
4.	Vendor information				
5.	Safety precautions				
6.	Operator prestart				
7.	Start-up, shutdown, and post-shutdown procedures				
8.	Normal operations				
9.	Emergency operations				
10.	Operator service requirements				
11.	Environmental conditions				
12.	Lubrication data				
13.	Preventive maintenance plan and schedule				
14.	Troubleshooting guides and diagnostic techniques				
15.	Wiring diagrams and control diagrams				
16.	Maintenance and repair procedures				
17.	Removal and replacement instructions				
18.	Spare parts and supply list				
19.	Corrective maintenance man-hours				
20.	Parts identification				
21.	Warranty information				
22.	Personnel training requirements				
23.	Testing equipment and special tool information				

Remarks:

[2] *See Section 01 33 00-1.04.A, Transmittal Procedure*.

Contractor's Signature :

01 78 23-B. EQUIPMENT RECORD FORM

Eqpt Description		Eqpt Location	
Eqpt No.	Shop Dwg No.	Date Installed	Cost
Mfr		Mfr Contact	
Mfr Address			Phone
Vendor		Vendor Contact	
Vendor Address			Phone

Maintenance Requirements	D	W	M	Q	S	A	Hours

Lubricants: Recommended:

Alternative:

Misc. Notes:

Recommended Spare Parts			
Part No	Quantity	Part Name	Cost

Electrical Nameplate Data			
Equipment			
Make			
Serial No.		Id No.	
Model No.		Frame No.	
HP	V	Amp	Hz
Ph	Rpm	Sf	Duty
Code	Insl. Cl	Des	Type
Nema Des	C Amb	Temp Rise	Rating
Misc.			

Mechanical Nameplate Data			
Eqpt			
Make			
Serial No.		Id No.	
Model No.		Frame No.	
HP	RPM	Cap	Size
TDH	Imp Size	Belt No.	Cfm
PSI	Assy No.	Case No.	
Misc			

01 78 23-C. EQUIPMENT RECORD FORM

Eqpt Description		Eqpt Location	
Eqpt No.	Shop Dwg No.	Date Installed	Cost
Mfr		Mfr Contact	
Mfr Address			Phone
Vendor		Vendor Contact	
Vendor Address			Phone

Maintenance Requirements	D	W	M	Q	S	A	Hours

43 05 11-A. MANUFACTURER'S INSTALLATION CERTIFICATION FORM

Contract No: Specification section:

Equipment name:

Contractor:

Manufacturer of equipment item:

The undersigned manufacturer of the equipment item described above hereby certifies that he has checked the installation of the equipment and that the equipment, as specified in the project manual, has been provided in accordance with the manufacturer's recommendations, and that the trial operation of the equipment item has been satisfactory.

Comments:

Manufacturer	Contractor
Signature of Authorized Representative	Signature of Authorized Representative
Date	Date

SECTION 02 41 13.33

PAVING REMOVAL

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. Equipment
2. Trench paving removal
3. Milling Operations

1.02 REFERENCES

A. Drawings and general provisions of the Contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this section.

B. Georgia Department of Transportation Standard Specifications.

1.03 WORK INCLUDED

A. The Contractor shall furnish all labor, equipment, tools and materials necessary to remove asphalt and/or concrete paving as required for the installation of proposed water mains or sewer mains and related appurtenances under the Contract and as directed by Owner.

1.04 SUBMITTALS

A. The Contractor shall submit for approval to Owner, County DOT and Georgia DOT when work is within a state road right-of-way, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.

B. The Contractor shall submit photographs or video recordings, sufficiently detailed, of existing conditions of project site. These shall be used to evaluate project areas that might be misconstrued as damage, caused by debris, or construction material removal.

PART 2 – PRODUCTS

2.01 EQUIPMENT

A. Milling Equipment:

1. Use power-driven, self-propelled milling equipment that is the size and shape that allows traffic to pass safely through areas adjacent to the work. Also use equipment that is:

   a. Designed to mill and remove specified depth of existing asphalt and/or concrete paving

   b. Equipped with grade slope controls operating from a string line or ski and based on mechanical or sonic operation

   c. Capable of removing pavement to an accuracy of 1/8 in.

   d. Furnished with lighting system for night work, as necessary

   e. Provided with conveyors capable of side, rear, or front loading to transfer the milled material from the roadway to a truck.

B. Dust Control

1. Provide power brooms, vacuum sweepers, power blowers, or other means to remove loose debris or dust. Do not allow dust control to restrict visibility of passing traffic or to disrupt adjacent property owners.

PART 3 – EXECUTION

3.01 TRENCH PAVING REMOVAL

A. Where trench excavation within a paved surface is required, the Contractor shall saw cut in a straight line, vertical joints for the entire depth of pavement. The saw cut joints shall extend for the entire length of trench on both sides of the trench. Ragged edges shall be trimmed so as to provide a substantially straight line juncture between the old and new surfaces.

B. The removal of existing pavement shall be performed in accordance with the requirements of the authority within whose jurisdiction such pavement is located.

C. The saw cut joints shall be a minimum of 12 inches outside of the maximum width of excavated trench.

D. Whenever the removal of pavements (other than gravel types) is required, the Contractor shall outline the area to be removed by making straight saw cuts, providing vertical kerfs in straight lines in order to permit removal in a straight line.

E. Should pavement breakage occur beyond the original saw cut, the Contractor shall be required to make a new saw cut beyond the farthest point of breakage.

F. Pavement shall be removed, hauled off site and disposed of in a proper legal manner. Contractor shall be careful not to disturb or damage any pavement that is to remain.

3.02 MILLING OPERATION

A. Follow the Plans to mill the designated areas and depths, as required. Ensure the following requirements are met:

1. Schedule the construction operation. Use milling methods that will produce a uniform finished surface and maintain a constant cross slope between extremities in each lane.
2. Provide positive drainage to prevent water accumulation on the milled pavement, as shown on the Plans or directed by the Construction Manager.
3. Bevel back the longitudinal vertical edges greater than 2 inches that are produced by the removal process and left exposed to traffic. Bevel them back at least 3 inches for each 2 inches of material removed. Use an attached mold board or other approved method.
4. When removing material at ramp areas and ends of milled sections, taper the transverse edges 10 ft to avoid creating a traffic hazard and to produce a smooth surface.
5. Protect with a temporary asphaltic concrete tie-in (paper joint) vertical edges at other areas such as bridge approach slabs, drainage structures, and utility appurtenances greater than ½-inch that are left open to trans versing vehicles. Place the temporary tie-in at taper rate of at least 6 to 1 horizontal to vertical distance.
6. Remove dust, residue, and loose milled material from the milled surface. Do not allow traffic on the milled surface and do not place asphaltic concrete on the milled surface until removal is complete.

B. The reclaimed asphaltic and/or concrete pavement becomes the Contractor's property unless otherwise specified.

END OF SECTION

SECTION 02 42 11

REMOVAL OF CONSTRUCTION MATERIALS

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. Workmanship

1.02 REFERENCES

A. Drawings and general provisions of the Contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this section.

1.03 WORK INCLUDED

A. The Contractor shall furnish all labor, equipment, and materials necessary to remove all unwanted construction material and debris, as directed by Owner and/or Construction Manager.

1.04 SUBMITTALS

A. The Contractor shall submit for approval to Owner and Fulton County DOT, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.

B. The Contractor shall supply identification and license of company hauling/transporting material from the site.

C. The Contractor shall submit photographs and/or videotape, sufficiently detailed, of existing conditions of project site. These shall be used to evaluate project areas that might be misconstrued as damage, caused by debris, or construction material removal.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

3.01 WORKMANSHIP

A. The Contractor shall follow all Federal, State, and local regulations related to removal, hauling, and disposal of trash and debris.

B. The Contractor shall comply with any ordinances / regulations for hauling and disposal of all solid waste removed from the site for the duration of the Work.

C. The Contractor shall load, haul away, and dispose of debris, trash, structures, automobiles, etc., that may be pre-existing on the Worksite, to a legally permitted location.

D. The Contractor shall load, haul away, and dispose of construction material that is generated in execution of the Work, to a legally permitted location; including, but not limited to any debris, trash, structures, piping, etc.

E. The Contractor shall remove and dispose of all unused construction materials prior to Final Acceptance of the Work by Owner and the Engineer.

F. No additional payment shall be made for excavation or disposal of excavated material required for placement or removal of backfill placed above the foundation of the pavement; or for preparation of subgrade. The cost thereof shall be considered included in the pavement unit prices bid.

END OF SECTION

SECTION 03 30 00

CAST IN PLACE CONCRETE

PART 1 – GENERAL

1.01 SUMMARY

A. This Section specifies cast in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures and finishes.

1.02 SUBMITTALS

A. In accordance with specification Section 01 33 23 and in addition to the requirements of that section, the following submittals shall be provided.

B. Design Mixtures: For each concrete mixture.

C. Shop Drawings: For steel reinforcement. Material test reports.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C 94M requirements for production facilities and equipment.

B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 – PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A 615M, Grade 60, deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A185, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded Wire Reinforcement: ASTM A497, flat sheet.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.03 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C150, Type I/II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class C.

B. Normal-Weight Aggregates: ASTM C33, graded, 1-inch (25-mm) nominal maximum coarse-aggregate size.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C94/C 94M and potable.

D. Air-Entraining Admixture: ASTM C260.

2.04 VAPOR RETARDERS

A. Plastic Vapor Retarder: ASTM E1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.05 RELATED MATERIALS

A. Expansion- and Isolation- Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.

2.06 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Cementitious Materials: Use fly ash and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.

2. Maximum Water-Cementitious Materials Ratio: 0.45.

3. Slump Limit: 4 inches, plus or minus 1 inch.

4. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

2.07 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.08 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85° F and 90° F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes.

2. When air temperature is above 90° F, reduce mixing and delivery time to 60 minutes.

PART 3 – EXECUTION

3.01 FORMWORK

A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Chamfer exterior corners and edges of permanently exposed concrete.

3.02 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded

3.03 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.04 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.05 JOINTS

A General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8 inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

3.06 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.07 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities. Revise locations in subparagraph below to suit Project. Retain rubbed finish option if additional finishing is required.

1. Apply to concrete surfaces exposed to public view.

B. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.

2. Do not apply cement grout other than that created by the rubbing process

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.08 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4 inch (6 mm).

3.09 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer. Retain subparagraph below if requiring removal of curing compounds that may interfere with adhesion of floor coverings. Curing and sealing compound in subparagraph below is usually for floors and slabs and may act as a permanent surface finish.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Construction Manager. Remove and replace concrete that cannot be repaired and patched to Construction Manager's approval.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports. Testing Services: Tests shall be performed according to ACI 301.

END OF SECTION

SECTION 03 40 00

PRECAST CONCRETE

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope

1. This section specifies the materials and labor required for the manufacture and erection of precast concrete structures.

B. Type

1. Precast concrete includes precast boxes, manholes and precast structural concrete.

1.02 QUALITY ASSURANCE

A. General

1. The Contractor shall provide certification from the precast concrete manufacturer that the materials and manufacture of precast work supplied conforms to these specifications. The certification shall be signed by an officer of the manufacturer's corporation.

2. The responsibility for furnishing and installing precast concrete conforming to the specifications is solely that of the Contractor.

B. Testing Laboratory

1. All testing shall be performed by recognized independent laboratories specializing in the particular test to be performed, and conforming to the requirements of the National Bureau of Standards and ASTM E329.

C. Reference Standards

1. The appropriate reference standards are specified in the following documents. They are part of this Section as specified and modified. In case of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.

Reference	Title
ACI 318	Building Code Requirements for Reinforced Concrete
AWS D1.1	Structural Welding Code - Steel
AASHTO	Standard Specification for Highway Bridges
MNL-116	Prestressed Concrete Institute's Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products, third edition

1.03 SUBMITTALS

A. In accordance with specification Section 01 33 23 and in addition to the requirements of that section, the following submittals shall be provided:

B. Concrete Mix

1. Prior to casting any precast elements, concrete mix design shall be submitted to the Construction Manager for acceptance.

C. Shop Drawings

1. Three copies of shop drawings shall be provided showing product location, fabrication details, number identification marks, reinforcement, connection details including field installed anchor sizes and locations, if required, openings, loose or embedded items and inserts, dimensions and relationship to adjacent materials in sufficient detail to cover manufacture, handling, and erection.

2. Shop drawings shall be accompanied by a letter signed by the manufacturer, certifying that, the shop drawings submitted represent construction which meets or exceeds the requirements of the Contract Documents and the requirements of codes and agencies having jurisdiction over the Work.

1.04 LABELING

A. Each precast unit shall have an identification mark indicating its location in the structure as shown on the placing diagrams and date of casting.

1.05 HANDLING AND STORAGE

A. Unless specified otherwise herein, fabrication, handling and erection of precast elements shall be in accordance with the recommendations made by ACI 318 and ACI Committee 533.

B. Precast elements shall be properly supported off the ground to avoid damage during curing, storage, handling and hauling.

C. Lateral support shall be sufficient to prevent bowing, warping, or permanent set due to creep.

D. Edges of the units shall be adequately protected by padding or other means to prevent staining, chipping or spalling of concrete.

E. Lifting devices shall have a minimum safety factor of 4.

PART 2 – PRODUCTS

2.01 PERFORMANCE AND DESIGN REQUIREMENTS

A. Concrete mix design and compressive strength shall meet 4000 psi at 28 days.

B. Design live loads shall be AASHTO H-20.

2.02 PRECAST CONCRETE MATERIALS

A. Cement

1. Concrete in contact with soil or liquids shall be formulated using Type II portland cement conforming to ASTM C150.
2. Concrete not in contact with soil or liquids may be formulated using Type I or Type III portland cement.
3. Cement shall contain less than 0.60 percent alkalies and shall be from one source throughout the entire project.

B. Aggregates

1. Aggregates for normal weight concrete shall conform to ASTM C33 with a maximum size of 3/4 inch.

C. Water

1. Water shall be clean, potable, and free from injurious amounts of oil, alkalies, organic materials and other deleterious substances.

D. Admixture

1. Admixture shall be Pozzolith 300 R manufactured by Master Builders, Plastiment manufactured by Sika Chemical Corp. or equal.
2. Admixture shall be used in strict accordance with manufacturer's recommendations.
3. Calcium chloride or any admixture containing calcium chloride shall not be used.

E. Reinforcing Steel

1. Reinforcing steel shall conform to ASTM A615, including supplementary requirements, and shall be Grade 60 except that bars to be welded shall be Grade 40 or ASTM A706.

F. Embedded Items and Anchorage Devices

1. All embedded items, inserts, and anchorage devices exposed to view, moisture or weather shall be hot dipped galvanized steel.
2. Anchorage devices shall be fabricated from ASTM A36 steel.

G. Penetrations

1. All required penetrations and openings larger than 6 inches in diameter or 6 inches square shall be formed in place at the time of casting.
2. Additional reinforcing shall be added where required to meet loading requirements.
3. Openings and penetrations smaller than 6 inches may be core drilled.

H. Molds

1. Material from which molds are to be fabricated shall be steel, concrete, fiberglass, reinforced plastic or wood.
2. The selection of materials for molds shall be at the manufacturer's option, except that wood shall not be used without the express approval of the Construction Manager.
3. All elements shall be cast in molds of rigid construction, accurate in detail with precise corners and arises, and designed to provide a close control of dimensions and details as indicated on the drawings.
4. Prior to casting of precast elements, molds shall have all surface joints, radii, corners, etc., filled, ground, filed, straightened or otherwise removed to provide a finished concrete surface that is smooth and dense, free of honeycombing, large air pockets, offsets, sinkages or other irregularities.

I. Parting Compound

1. All molds shall be coated with parting compound to facilitate removal of elements from molds.
2. Parting compound shall be non-petroleum, nonstaining and shall be of a nature and composition not deleterious to concrete.

J. Manhole Steps

1. Manhole steps shall be the cast aluminum type or extruded aluminum type.
2. Manhole steps are only allowed where specifically required. Steps typically will not be allowed in manholes.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Casting

1. Casting shall be accomplished by methods and equipment that are in conformance with generally acceptable systems for this type of work.
2. All precast concrete shall be manufactured by a plant thoroughly experienced in this type of work.
3. The manufacturer shall meet all production schedules.
4. Surfaces on which units are cast shall be level and free from any imperfections detrimental to the surface appearance of the finished units.
5. Parting compound shall be applied evenly as per manufacturer's recommendations.
6. Concrete shall be so handled as to prevent segregation of materials and shall be continuously vibrated during casting, either internally or externally, to achieve proper compaction, finish and distribution of concrete.
    a. All precautions must be taken to keep the reinforcing steel in the proper location during placing and consolidation of the concrete.
    b. Unless shown otherwise and except at concrete faces exposed to soil or liquids, all reinforcing steel shall have a minimum cover of 3/4 inch.
    c. At concrete faces exposed to soil or liquids, cover shall be 1-1/2 inches minimum.
    d. Embedded items shall be accurately placed and maintained in their proper location during the casting operation.
    e. Special inserts or other devices for handling of the units for the convenience of the manufacturer shall not be exposed to view after members are erected.
    f. Embedded anchors, inserts, plates, angles and other cast in items shall have sufficient anchorage and embedment for design requirements.
7. Precast sections shall be manufactured to contain wall and roof openings of the minimum size to receive the ends of the pipes and such openings being accurately set to conform to line and grade of the pipelines.
    a. Subsequent cutting or tampering in the field, for the purpose of creating new openings or altering existing openings, will not be permitted except as directed by the Construction Manager.
8. No more than four lift holes may be cast or drilled in each section.
9. Casting, bowing, warpage and dimensional tolerances shall be in accordance with MNL 116, current edition.

B. Curing

1. All precast units shall be steam cured for a period of at least 12 hours. Fog spraying may be used when reviewed by the Construction Manager

2 Precast elements shall not be removed from molds for a minimum period of 12 hours after casting, or until concrete has attained a minimum compressive strength of 3500 pounds per square inch, whichever governs.

3. After removal from the forms, curing by steam or fog spraying shall be continued until concrete has attained specified strength and confirmed by standard tests.

4. Curing procedures shall be consistent and uniform throughout the entire project.

C. Welding

1. The quality of material and fabrication of all welded connections shall conform to the latest AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings."

2. All weldments shall be made in accordance with the applicable provisions of AWS.

   a. All welding, other than tacks, shall be done by certified welders. All units shall be protected from damage by field welding or cutting operations.

   b. Noncombustible shields shall be provided as necessary for this purpose.

D. Joints and Joint Sealants

1. In all instances, the edges of precast concrete units and of adjacent material shall be sound, smooth, clean and free of all contaminants prior to joint treatment.

2. Sealant and primer shall be supplied by the same manufacturer and the primer, when required, shall be as recommended for the particular sealant used.

3. All sealant compounds shall be delivered to the job in the manufacturer's original sealed containers with labels intact and shall be applied in strict accordance with the manufacturer's recommendations.

E. Miscellaneous

1. All exterior surfaces of the concrete units shall be given a minimum of one shop coat of bituminous damp-proofing.

2. Gasket materials shall be top grade (100% solids, vulcanized) butyl rubber and shall meet or exceed AASHTO M 198.

3.02 ERECTION

A. Any errors or misalignment in the structure which would prevent the proper setting of the elements shall be corrected by the Contractor before the erection is commenced.

B. Erection shall be supervised and performed by workmen skilled in this type of Work.

C. Each element shall be set in the proper position, carefully plumbed and anchored securely to the structural frame.

D. Adjustments or changes in connections which could involve additional stresses in the products or connections shall not be permitted without approval of the Construction Manager.

E. All bearing surfaces shall be true to line and grade.

F. Erection tolerances shall be in accordance with MNL 116.

G. All joints shall be uniform and straight.

3.03 CLEANING AND REPAIRING

A. After installation, precast elements shall be protected from all damage until final acceptance by the Owner.

B. Precast units with cracks, spalls, and other defects shall be subject to rejection. Units reviewed for repair shall be repaired to the satisfaction of the Construction Manager.

3.04 ALTERNATIVE DESIGN

A. The Contractor may offer an alternative design for any precast element.

B. Such design shall be comparable in terms of strength, deflection, finish and all other design criteria indicated.

C. Complete drawings prepared and sealed by a Structural engineer registered in the State of Georgia where applicable shall be submitted to the Construction Manager for his review in accordance with specification Section 01 33 23 of these Contract Documents.

D. No alternative design will be permitted unless it has been specifically accepted in writing by the Construction Manager.

E. If an alternative design is accepted, all expenses resulting therefrom shall be borne by the Contractor.

END OF SECTION

SECTION 08 31 00

ACCESS DOORS AND FRAMES

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes access doors and frames.

B. Unless indicated otherwise, provide access doors as follows:

1. Type I access doors over spaces intended to be dry such as pipe galleries and pump rooms.
2. Type II access doors over spaces intended to be wet such as wet wells and liquid holding basins.
3. Type III access doors where doors are subject to vehicular traffic.

1.02 REFERENCES

A. This section contains references to the following documents.

1. They are a part of this Section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.
2. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM A666	Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
ASTM B308	Aluminum-Alloy 6061-T6 Standard Structural Profiles
ASTM C578	Rigid, Cellular Polystyrene Thermal Insulation

1.03 SUBMITTALS

A. Action Submittals:

1. Procedures: Section 01 33 00.
2. A copy of this Specification Section with addendum updates included, and all referenced and applicable sections with addendum updates included with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
   a. Check-marks (✓) shall denote full compliance with a paragraph as a whole.

b. If deviations from the specifications are indicated and, therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph.

c. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications.

d. The submittal shall be accompanied by a detailed, written justification for each deviation.

e. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

3. Shop Drawings including profiles, accessories, location, adjacent construction interface and dimensions.

B. Informational Submittals:

1. Procedures: Section 01 33 00

2. Manufacturer's product data.

3. Warranty.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Procedures: Sections 01 65 00 and 01 66 00

1.05 SPECIAL WARRANTY

A. Special Warranty: manufacturer shall warrant access doors and frames against defects in materials and workmanship for 5 years.

PART 2 – MATERIALS

2.01. MANUFACTURERS

A. Manufacturers: Candidate manufacturers are listed below. The manufacturer's standard product may require modification to conform to specified requirements:

1. Bilco

2. Halliday

3. Approved Equal

2.02. GENERAL

A. Door leaf(s) shall withstand a live load of 300 pounds per square foot.

B. Where access doors are subject to vehicular traffic, Door leaf(s) shall withstand an AASHTO H-20 wheel load with a maximum deflection of 1/150th of the span.

C. All aluminum plate and structural shapes shall conform to ASTM B308, Type 6061-T6.

D. Hardware shall be ASTM A666 Type 316 stainless steel.

E. Aluminum in direct contact with concrete shall receive a protective coating on all surfaces that will be in contact with concrete.

F. The door shall open to 90 degrees and lock automatically in that position.

2.03. ACCESS FOOR LEAF

A. Door leaf(s) shall be minimum 1/4 inch thick aluminum diamond pattern plate stiffened with aluminum members as required. Finish of door leaf(s) and frame shall be mill.

B. Door leaf hinges shall be forged stainless steel with stainless steel pins.

1. Door leaf hinges shall be through bolted to the door leaf with tamperproof stainless steel lock bolts and to the frame with stainless steel bolts and locknuts.

2. Stainless steel hinges shall be bolted to the underside and pivot on torsion bars that counterbalance the door for easy operation.

C. Door leaf latches shall be stainless steel slam lock with fixed interior handle and removable exterior turn/lift handle. Latch release shall be protected by a flush, gasketed, removable screw plug.

D. Double leaf access doors shall have a stainless steel chain on both sides of the door opening for personnel protection.

E. Door leaf(s) shall have compression spring lifting operators enclosed in telescopic tubes and automatic hold-open arm with release handle to automatically lock the door leaf(s) in the open (90 degree) position.

F. Door leaf(s) over spaces intended for human occupancy shall be insulated with 2 inches preformed, cellular polystyrene thermal insulation, Type X or Type IV, conforming to ASTM C578.

1. Insulation shall be fully enclosed within door leaf with minimum 1/8 inch aluminum plate.

G. A vinyl grip handle shall be provided to release the cover for closing.

H. Door shall be equipped with a snap lock and removable handle.

I. Where specifically indicated on the drawings, provide a recessed padlock hasp lock with a flush hinged lid and fully welded receptacle designed to receive a standard padlock.

2.04. SAFETY GRATE

A. All access doors shall have a safety grate directly under the door leaf(s).

1. Safety grate shall be located directly under the door leaf(s), of aluminum or fiberglass construction and shall be lockable independent of the door leaf.

2. Safety grate shall hinged to match the access door leaf(s): one piece for single access doors and two-piece for double access doors.

3. The spacing of the grid shall be no greater than five inches square.

4. The safety grate shall be designed to withstand a live load of 150 pounds per square foot.

2.05. ACCESS DOOR FRAME

A. The frame shall be ¼ inch extruded aluminum alloy 6063-T6, with built in neoprene cushion.

B. Door frame shall be on all four sides of the openings, of aluminum construction, with anchor tabs around the perimeter.

C. Where specifically indicated on the drawings, provide an EPDM gasket system that will provide an air infiltration rate of less than 1 cubic foot per minute per linear foot of cover perimeter.

D. Door frame shall have a channel profile to capture water. A 1 1/2-inch drainage coupling shall be provided in at least one corner of the frame.

PART 3 – EXECUTION

3.01. INSTALLATION

A. Install in strict accordance with manufacturer's instructions and approved submittals.

B. Access doors and frames shall be level, plumb and square. Adjust as necessary for proper operation. Repair damaged finishes to like new appearance.

C. Frames with drainage coupling shall be piped with PVC pipe to location as indicated on the drawings or prescribed by the Owner.

3.02. CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer.

END OF SECTION

SECTION 31 10 00

SITE PREPARATION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Specification Sections, apply to this Section.

1.02 DEFINITIONS

A. Subsoil:

1. All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil:

1. Soil that is present at the top layer of the existing soil profile at the Project site.
    a. In undisturbed areas, the surface soil is typically topsoil.
    b. In disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil:

1. Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.
2. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

D. Plant-Protection Zone:

1. Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

E. Tree-Protection Zone:

1. Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

F. Vegetation:

1. Trees, shrubs, groundcovers, grass, and other plants.

1.03 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.04 SUBMITTALS

A. Existing Conditions:

1. Documentation of existing trees and plantings, adjoining construction, and site improvements that establish preconstruction conditions that might be misconstrued as damage caused by site clearing.

a. Use sufficiently detailed photographs and/or videotape.

b. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings:

1. Identifying and accurately showing locations of capped utilities and other structural, electrical, and mechanical conditions.

1.05 QUALITY ASSURANCE

A. Pre-installation Conference:

1. Conduct conference at Project site.

1.06 PROJECT CONDITIONS

A. Traffic:

1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Construction Manager and authorities having jurisdiction.

b. Provide alternate routes around closed or obstructed traffic ways if required by Construction Manager or authorities having jurisdiction.

B. Salvable Improvements:

1. Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service:

1. Utilize a utility locator service for area where Project is located before site clearing.

2. Do not commence site clearing operations until temporary erosion and sedimentation control and plant-protection measures are in place.

D. Protection Zones

1. The following practices are prohibited within protection zones:
   a. Storage of construction materials, debris, or excavated material.
   b. Parking vehicles or equipment.
   c. Foot traffic.
   d. Erection of sheds or structures.
   e. Impoundment of water.
   f. Excavation or other digging unless otherwise indicated.
   g. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
2. Do not direct vehicle or equipment exhaust towards protection zones.
3. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

E Soil Stripping, Handling, And Stockpiling:

1. Perform only when the topsoil is dry or slightly moist.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Satisfactory Soil Material:

1. Requirements for satisfactory soil material are specified in Section 31 23 00 – Trench Excavation and Fill.
2. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

B. Antirust Coating:

1. Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #79, Alkyd Anticorrosive Metal Primer or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.

PART 3 – EXECUTION

3.01 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to the Construction Manager.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion and sedimentation control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion and sedimentation control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.03 TREE AND PLANT PROTECTION

A. General:

1. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by the Construction Manager.

3.04 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.

2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Interrupting Existing Utilities:

1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after

arranging to provide temporary utility services according to requirements indicated:

a. Notify Owner and Construction Manager not less than two days in advance of proposed utility interruptions.

b. Do not proceed with utility interruptions without Owner or Construction Manager's written permission.

2. Excavate for and remove underground utilities indicated to be removed.

3. Removal of underground utilities as included on the Drawings.

3.05 CLEARING AND GRUBBING

A. The sites of all excavation and grading shall be first cleared of all paving, trees, stumps, roots, brush, organic matter, crops, paving, structures, fences, sidewalks, rubbish, debris, etc., which shall be removed or disposed of in a satisfactory manner in a legally permitted location.

B. Refer to Section 31 11 10 for detailed Clearing and Grubbing requirements.

3.06 TIMBER

A. Salvage all timber within cleared area having a marketable value.

B. The timber within the cleared area shall become the property of the Contractor and the Contractor shall be responsible for selling and/or disposing the timber.

3.07 DISPOSAL OF CLEARED AND GRUBBED MATERIALS

A. Dispose of the cleared and grubbed materials by burning or chipping. Burning shall be permitted during approved burning seasons only. During non-burning season periods, use chipping for debris disposal. Remove chipped material from the site or disposed of in areas approved by Owner.

B. If burning is allowed, do not allow a fire to be unattended. The Contractor is responsible for damage caused by such fires. Do not bury burned and nonflammable materials.

1. All Contractors should be aware that the Georgia Environmental Protection Division has issued a burning ban for thirteen (13) Metro Atlanta Counties. The ban went into effect in 1996 and shall continue each year from May 1 through September 30. This ban should be considered when bidding projects that require clearing and debris removal. It is the Contractor's responsibility to remove all construction debris from the jobsite. Any costs incurred as a result of the burning ban are the sole responsibility of the Contractor.

C. Disposal of materials in streams will not be permitted. Do not pile materials in stream channels or along the banks where it might be washed away by flood.

D. Remove all fence material within the areas to be cleared from the job site. Fence materials become the property of the Contractor.

3.08 DISCING

A. After grubbing is complete, discing of the entire area is required. Perform discing in two directions at approximate right angles. Generally, perform the second discing along the contour.

B. The construction area is to be left free-draining with a finished agricultural appearance.

3.09 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to a depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, other objects more than 2 inches in diameter, trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to 72 inches.
2. Do not stockpile topsoil within protection zones.
3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
4. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.10 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.11 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property and/or Project site.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION

SECTION 31 11 10

CLEARING AND GRUBBING

PART 1 – GENERAL

1.01 SCOPE

A. Clearing and grubbing includes, but is not limited to, removing from the Project site, trees, stumps, roots, brush, structures, abandoned utilities, trash, debris and all other materials found on or near the surface of the ground in the construction area and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated.

B. Precautionary measures that prevent damage to existing features including trees, to remain are part of the Work.

C. The sites of all excavation and grading shall first be cleared of all paving, trees, walls, fences, sidewalks, stumps, brush, rubbish, and crops, which shall be removed and disposed of in a satisfactory manner.

D. On all lawns and other improved grass areas, the sod shall be carefully removed, kept alive when possible, and replaced after the backfilling is completed.

E. The Contractor shall also remove all spoil from such areas as quickly as possible after the excavation is backfilled, and shall leave the premises in as good a condition as before undertaking the work.

F. Fences which have been removed, damaged, or broken down shall be replaced at or before completion of the work to pre-construction quality or better.

G. Clearing and grubbing operations shall be coordinated with temporary and permanent erosion and sedimentation control procedures.

1.02 QUALITY ASSURANCE

A. The Contractor shall comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, State or Federal authorities having jurisdiction over the Project. All required permits of a temporary nature shall be obtained for construction operations by the Contractor.

B. Open burning, if allowed, shall first be permitted by the local authority having jurisdiction. The Contractor shall notify the local fire department and abide by fire department restrictions.

C. All Contractors should be aware that the Georgia Environmental Protection Division has issued a burning ban for thirteen (13) Metro Atlanta Counties. The ban went into effect in 1996 and shall continue each year from May 1 through September 30. This ban should be considered when bidding projects that require

clearing and debris removal. It is the Contractor's responsibility to remove all construction debris from the jobsite. Any costs incurred as a result of the burning ban are the sole responsibility of the Contractor.

1.03 JOB CONDITIONS

A. Location of the Work: The area to be cleared and grubbed is shown schematically on the Drawings or specified below. It includes all areas designated for pipeline construction.

PART 2 – PRODUCTS

2.01 EQUIPMENT

A. The Contractor shall furnish equipment of the type normally used in clearing and grubbing operations including, but not limited to, tractors, trucks, loaders and root rakes.

PART 3 – EXECUTION

3.01 SCHEDULING OF CLEARING

A. The Contractor shall clear at each construction site only that length of the right-of-way, permanent or construction easement which would be the equivalent of two week's pipe laying. This length shall be determined from the Contractor's Progress Schedule.

B. The Construction Manager may permit clearing for additional lengths of the pipe line provided that temporary erosion and sedimentation controls are in place and a satisfactory stand of temporary grass is established. Should a satisfactory stand of grass not be possible, no additional clearing shall be permitted beyond that specified above.

C. A satisfactory stand of grass shall have no bare spots larger than one square yard. Bare spots shall be scattered and the bare area shall not comprise more than one percent of any given area.

3.02 CLEARING AND GRUBBING

A. Clear and grub no more than 3 feet on each side of the pipeline before excavating. Remove all trees, growth, debris, stumps and other objectionable matter. Clear the construction easement or road right-of-way only if necessary.

B. Materials to be cleared, grubbed and removed from the Project site include, but are not limited to, all trees, stumps, roots, brush, trash, organic matter, paving, miscellaneous structures, houses, debris and abandoned utilities.

C. Grub, stockpile, and/or place in embankments surface rocks and boulders from the soil in accordance with the Specifications.

D. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

E. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

1. When it is necessary to cut tree roots on the surface of the ground, the ends shall be cut off smooth, without splitting or shattering and scars greater than one inch in diameter shall be sealed with an approved asphalt sealant tree paint.

2. The trunks of the trees shall be carefully protected from damage, and if unavoidable damage occurs, the injured portions shall be neatly trimmed and covered with an application of an approved asphalt sealant tree paint.

3. Excavating machinery, cranes, etc., shall be handled with care to prevent damage to trees, particularly to overhanging branches, and branches shall not be cut off except by permission of Owner.

F. Grubbing shall consist of completely removing roots, stumps, trash and other debris from all graded areas so that topsoil is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.

G. All stumps, roots, foundations and planking embedded in the ground shall be removed and disposed of. Piling and butts of utility poles shall be removed to a minimum depth of two feet below the limits of excavation for structures, trenches and roadways or two feet below finish grade, whichever is lower.

H. Grind down stumps and remove roots, obstructions, and debris to a depth of 24 inches below exposed subgrade.

I. Use only hand methods for grubbing within protection zones.

J. Chip removed tree branches and stockpile in approved areas or dispose of offsite, as directed by Construction Manager.

K. Landscaping features shall include, but are not necessarily limited to, fences, cultivated trees, cultivated shrubbery, property corners, man-made improvements, subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.

L. Surface rocks and boulders shall be grubbed from the soil and removed from the site if not suitable as rip rap.

M. Where the tree limbs interfere with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility.

N. Any work pertaining to utility poles shall coordinate and comply with the requirements of the appropriate utility.

O. All fences adjoining any excavation or embankment that, in the Contractor's opinion, may be damaged or buried, shall be carefully removed, stored and replaced. Any fencing that, in the Construction Manager's opinion, is significantly damaged shall be replaced with new fence material.

P. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, etc. situated within the limits of the construction area but not directly within excavation and/or fill limits. The Contractor shall be held liable for any damage the Contractor's operations have inflicted on such property.

Q. The Contractor shall be responsible for repairs and/or replacement of all damage to existing improvements resulting from Contractor's operations.

R. Fill depressions caused by clearing and grubbing operations with proper backfill soil material, unless further excavation or earthwork is indicated by the Drawings or directed by Owner.

1. Place fill material in horizontal layers or lifts, not exceeding a loose depth of eight (8) inches, and compact each layer to 85% of maximum dry density – Standard Proctor (ASTM D698).

3.03 DISPOSAL OF DEBRIS

A. The debris resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of Federal, State, County and municipal regulations.

B. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley.

C. No debris shall be deposited upon any private property except with written consent of the property owner. In no case shall any material or debris be left on the Project, shoved onto abutting private properties or buried on the Project.

END OF SECTION

SECTION 31 23 00

TRENCH EXCAVATION AND BACKFILL

PART 1 – GENERAL

1.01. SUMMARY

A. Scope

1. The work under this Section consists of furnishing all labor, equipment and materials and performing all operations in connection with the trench excavation and backfill required to install the pipelines as shown on the Drawings and as specified.

B. All excavation shall be by open cut unless otherwise indicated on the Drawings or directed by the Construction Manager.

1. In general, topsoil may be removed by machine method.
2. Excavation below topsoil may also be performed by machine, but shall be supplemented by such hand dressing or leveling as may be required to conform to lines and grades as directed by the Construction Manager.
3. Material so removed shall be used in backfill, making embankments, filling low areas, or as otherwise directed.
4. Hand tool excavation shall be used where necessary to protect existing utilities and structures.

C. Excavation shall include the removal of any trees, stumps, brush, debris or other obstacles which remain after the clearing and grubbing operations, which may obstruct the work, and the excavation, removal, and disposal of all earth, rock or other materials including the existing pipe if any to the extent necessary to install the new pipelines and appurtenances in conformance with the lines and grades shown on the Drawings and as specified.

D. Backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface or road grade at crossing. The trench is divided into five specific areas:

1. Foundation: The area beneath the bedding, sometimes also referenced to as trench stabilization.
2. Bedding: The area above the trench bottom (or foundation) and below the bottom of the barrel of the pipe.
3. Haunching: The area above the bottom of the barrel of the pipe up to a specified height above the bottom of the barrel of the pipe.
4. Initial Backfill: The area above the haunching material and below a plane 18 inches above the top of the barrel of the pipe.

5. Final Backfill: The area above a plane 18-inches above the top of the barrel of the pipe.

E. The choice of method, means, techniques and equipment rests with the Contractor.

1. The Contractor shall select the method and equipment for trench excavation and backfill depending upon the type of material to be excavated and backfilled, the depth of excavation, the amount of space available for operation of equipment, storage of excavated material, proximity of man-made improvements to be protected, available easement or right-of-way and the prevailing practice in the area.

1.02. QUALITY ASSURANCE

A. Density:

1. All references to “maximum dry density” shall mean the maximum dry density defined by the “Maximum Density-Optimum Moisture Test”, ASTM D698,

2. Except that for non-cohesive materials “maximum dry density” shall mean the maximum index density as determined by the “Maximum Index Density of Soils Using a Vibratory Table”, ASTM D4253.

B. Determination of the density of foundation, bedding, haunching, or backfill materials in place shall meet with the requirements of:

1. ASTM D1556, “Density of Soil In Place by the Sand Cone Method”.

2. ASTM D2937, “Density of Soil In Place by the Drive-Cylinder Method”.

3. ASTM D2922, “Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)”.

C. Sources and Evaluation Testing: Testing of materials to certify conformance with the Specifications shall be performed by an independent testing laboratory in accordance with Section 01 45 29 of these Specifications. All imported fill materials shall meet the requirements of on-site fill materials.

1.03. SAFETY

A. Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended.

B. The Contractor shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P “Excavation, Trenching & Shoring” as described in OSHA publication 2226.

PART 2 – PRODUCTS

2.01. TRENCH FOUNDATION MATERIALS

A. Crushed stone shall be utilized for trench foundation (trench stabilization) and shall meet the requirements of the Georgia Department of Transportation Specification 800.2.01, Group I (limestone, marble or dolomite) or Group II (quartzite, granite or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

2.02. BEDDING AND HAUNCHING MATERIALS

A. Bedding requirements specified herein shall apply to sanitary sewer lines only. These requirements are to be considered minimum bedding requirements and as such, do not relieve the Contractor of the responsibility to provide any additional bedding necessary for proper support of the sewer and construction.

B. Unless specified otherwise, bedding and haunching materials shall be crushed stone as specified below.

C. Crushed stone utilized for bedding and haunching shall meet the requirements of the Georgia Department of Transportation Specification 800.2.01, Group I (limestone, marble or dolomite) or Group II (quartzite, granite or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

D. Earth materials utilized for bedding and haunching shall be suitable materials selected from materials excavated from the trench.

1. Suitable materials shall be clean and free of rock larger than 2 inches at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials.
2. Should the material excavated from the trench be saturated, the saturated material may be used as earth material, provided it is allowed to dry properly and it is capable of meeting the specified compaction requirements.
3. When necessary, earth bedding and haunching materials shall be moistened to facilitate compaction by tamping.
4. If materials excavated from the trench are not suitable for use as bedding or haunching material, provide select material conforming to the requirements of this Section at no additional cost to the Owner.

E. Filter Fabric Woven Type

1. Filter fabric associated with bedding shall be a polypropylene woven fabric.
2. The fabric shall be a high modulus type with good separation capabilities.
3. The fabric shall be inert to biological degradation and naturally occurring chemicals, alkalies and acids.
4. The fabric shall have an equivalent opening size EOS of 20 to 45.

5. The fabric shall also conform to the minimum property values listed in the following table:

Fabric Property	Unit	Test Method	Minimum Value
Grab Tensile Strength	lbs.	ASTM D 4632	200
Grab Tensile Elongation	%	ASTM D 4632	15
CBR Puncture Strength	lbs.	ASTM D 6241	700
Trapezoid Tear Strength	lbs.	ASTM D 4533	75
Permittivity	Sec^{-1}	ASTM D 4491	0.05
Water Flow rate	gpm/ft^2	ASTM D 4491	5
UV Resistance @ 500 Hours	%	ASTM D 4355	70

6. If ordered by the Construction Manager, the filter fabric manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe.
7. This service will be furnished for a minimum of 10 days during initial pipe installation.
8. Filter fabric shall be Mirafi 500X, Amoco 2002 or Exxon GTF-200.

2.03. BACKFILLING – GENERAL

A. Materials used for backfilling shall be free from all perishable and objectionable materials; no stones larger than two (2) inches in the longest dimension shall be placed directly above the pipe. All larger stones must be placed to the sides of the ditch such that the pipe can be excavated for repair without digging through them.

B. Select compactable material shall be used in pipe trenches under roadways and other paved areas. When required on the plans or required by the Owner, graded aggregate base shall be used in pipe trenches under roadways.

2.04. BACKFILLING – INITIAL BACKFILL

A. Initial backfill material shall be crushed stone or earth materials as specified for bedding and haunching materials.

B. When necessary, initial backfill materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are not suitable for use as initial backfill material, provide select material conforming to the requirements of this Section at no additional cost to the owner.

2.05. BACKFILLING – FINAL BACKFILL

A. Final backfill material shall be general excavated earth materials, shall not contain rock larger than 2 inches at its greatest dimension, cinders, stumps, limbs, man-made wastes and other unsuitable materials.

B. If materials excavated from the trench are not suitable for use as final backfill material, provide select material conforming to the requirements of this Section.

2.06. SELECT BACKFILL

A. Select backfill shall be materials which meet the requirements as specified for bedding, haunching or initial backfill materials, including compaction requirements.

2.07. CONCRETE

A. Concrete for bedding, haunching, initial backfill or encasement shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches.

B. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C94.

C. Reinforcing steel shall conform to the requirements of ASTM A615, Grade 60.

2.08. FLOWABLE FILL

A. Low strength flowable fill concrete shall meet the requirements of Section 600 of the Georgia Department of Transportation specifications.

2.09. GRANULAR MATERIAL

A. Granular material, where required for trench backfill, shall be sand, river sand, crushed stone or aggregate, pond screenings, crusher run, recycled concrete, or other angular material.

B. Granular material shall meet gradation requirements for Size No. 57 or finer.

PART 3 – EXECUTION

3.01. TRENCH EXCAVATION

A. Topsoil and grass shall be stripped a minimum of 6 inches over the trench excavation site and stockpiled separately for replacement over the finished grading areas.

B. Topsoil shall be removed to its entire depth from all areas to be excavated or graded.

1. The topsoil shall be piled in designated or approved locations where it will not interfere with construction operations.
2. Topsoil as stored shall be reasonably free of subsoil, debris, and stones larger than two (2) inches in diameter.
3. The stored topsoil shall be left in piles to be used for finished grading.

C. Trenches shall be excavated to the lines and grades shown on the Drawings with the centerlines of the trenches on the centerlines of the pipes and to the dimensions which provide the proper support and protection of the pipe and other structures and accessories.

D. All excavations shall be adequately shored to ensure worker safety. All pipe laying operations shall comply with OSHA requirements for trench safety.

E. Trench Width for Pipelines

1. The sides of all trenches shall be vertical to a minimum of one foot above the top of the pipe.
2. Unless otherwise indicated on the Drawings, the maximum trench width shall be equal to the sum of the outside diameter of the pipe plus two feet.
3. In order to limit loads on the pipe, the maximum width of the trench shall not be more than 36 inches wider than the outside diameter of the pipe. This trench width restriction applies to that portion of the trench 4 inches below the bottom of the pipe to 12 inches above the top of the pipe.
4. The minimum trench width shall be that which allows the proper consolidation of the haunching and initial backfill material.
5. Excavation of pipe trenches with sides sloping to the trench bottom will not be permitted.
6. Excavate the top portion of the trench to any width within the construction easement or right-of-way which will not cause unnecessary damage to adjoining structures, roadways, pavement, utilities, trees or private property. Where necessary to accomplish this, provide sheeting and shoring.
7. Where rock is encountered in trenches, excavate to remove boulders and stones to provide a minimum of 9-inches clearance between the rock and any part of the pipe barrel.

8. Wherever the prescribed maximum trench width is exceeded, the Contractor shall use the next higher Class or Type of bedding and haunching as shown on the Drawings for the full trench width as actually cut.

9. The excessive trench width may be due to unstable trench walls, inadequate or improperly placed bracing and sheeting which caused sloughing, accidental over-excavation, intentional over-excavation necessitated by the size of the Contractor's tamping and compaction equipment, intentional over-excavation due to the size of the Contractor's excavation equipment, or other reasons beyond the control of the Construction Manager or Owner.

F. Depth

1. The trenches shall be excavated to the required depth or elevation which allow for the placement of the pipe and bedding to the dimensions shown on the Drawings.

2. Where rock is encountered in trenches for pipelines, excavate to the minimum depth which will provide clearance below the pipe barrel of 8 inches for pipe 21 inches in diameter and smaller and 12 inches for larger pipe and valves.

G. Length of Trench to Be Opened

1. The length of trench to be opened, or the areas of the surface to be disturbed or unrestored at any one time, shall be limited with regard both to expeditious construction, and to the convenience, safety, and comfort of citizens directly or indirectly affected by the Work.

2. New trenches will not be permitted to be excavated if there are previously excavated trenches that require backfilling, or surface areas that require restoration.

3. In any event, no additional work of any kind will be permitted if there are existing streets or roadways that require attention to return them to a safe and proper condition.

4. IN GENERAL, NO TRENCH SHALL BE OPEN MORE THAN 500 FEET AHEAD OF PIPE LAYING AND BACKFILLING.

H. Excavated Materials

1. Excavated materials shall be placed adjacent to the work to be used for backfilling as required.

2. Top soil shall be carefully separated and lastly placed in its original location.

3. Excavated material shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and not cause any drainage problems.

4. Excavated material shall be placed so as not to damage existing landscape features or man-made improvements.

I. Storage of Materials:

1. All salvageable materials which may be removed from the site, together with all materials taken from the trenches, shall be stored in an approved, suitable place, or as directed by the Owner.

2. The Contractor shall be responsible for any loss of, or damage to, salvageable materials through careless removal or neglectful or wasteful storage of such materials.

3. In the storing of excavated material, which is to be used as backfill, the Contractor shall exercise care so as to avoid inconveniencing the public.

a. If, in the opinion of the Construction Manager, it is necessary to remove this excavated material from the streets or lots, the Contractor shall be required to do so.

3.02. SHEETING, BRACING AND SHORING

A. The Contractor shall be responsible for supporting and maintaining required excavations including sheeting and shoring the sides and ends of excavations with timber or other supports.

1. The requirement of sheeting or shoring, or the addition of supports, shall not relieve the Contractor of his responsibility of their sufficiency.

B. The need and adequacy of sheeting, shoring, bracing, or other provisions to protect workmen and equipment in a trench or other excavation, and to meet local and OSHA safety requirements, shall be the sole and exclusive responsibility of the Contractor.

C. Sheeting, bracing and shoring shall be installed in the following instances:

1. Where sloping of the trench walls do not adequately protect persons within the trench from slides or cave-ins.

2. In caving ground.

3. In wet, saturated, flowing or otherwise unstable materials.

4. Where necessary to prevent damage to adjoining buildings, structures, roadways, pavement, utilities, trees or private properties which are required to remain.

5. Where necessary to maintain the top of the trench within the available construction easement or right-of-way.

D. In all cases, excavation protection shall strictly conform to the requirements of the Occupational Safety and Health Act of 1970, as amended.

E. Timber: Timber for shoring, sheeting, or bracing shall be sound and free of large or loose knots and in good, serviceable condition. Size and spacing shall be in accordance with OSHA regulations.

F. Steel Sheeting and Sheet Piling

1. Steel sheet piling shall be the continuous interlock type.
2. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations and live loads.
3. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times.
4. The Contractor shall provide closure and sealing between sheet piling and existing facilities.

G. Trench Shield

1. A trench shield or box may be used to support the trench walls. The use of a trench shield does not necessarily preclude the additional use of bracing and sheeting.
2. When trench shields are used, care must be taken to avoid disturbing the alignment and grade of the pipe or disrupting the haunching of the pipe as the shield is moved.
3. When the bottom of the trench shield extends below the top of the pipe, the trench shield will be raised in 6-inch increments with specified backfilling occurring simultaneously.
4. At no time shall the trench shield be “dragged” with the bottom of the shield extending below the top of the pipe or utility.

H. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the pipe and adjacent property.

1. Leave sheeting in place when, in the opinion of the Construction Manager, it cannot be safely removed or is within three feet of an existing structure, utility, or pipeline.
2. Cut off any sheeting left in place at least two feet below the surface.

I. Sheet piling within three feet of an existing structure or pipeline shall remain in place, unless otherwise directed by the Construction Manager.

3.03. ROCK EXCAVATION

A. Definition of Rock: Solid mineral material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 3/4 cubic yard for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Late-model, track-mounted hydraulic excavator equipped with a 42-inch wide, maximum, short-tip-radius rock bucket.

a. Rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf.

b. With extra-long reach boom measured according to SAE J-1179.

B. Unless otherwise directed by the Construction Manager, rock shall be fully taken out at least twenty-five (25) feet in advance of pipe laying, at least 6 inches below the invert of the pipe, and to a trench width for the size of the pipe to be laid, as specified in Fulton County Standard Details.

C. All pipe installed within rock excavation shall be laid upon a minimum of six (6) inches of # 57 stone coarse aggregate.

D. Blasting may be allowed for removing rock for excavation when properly permitted.

1. Blasting will only be allowed with pre-approval from Fulton County.
2. Typically, blasting will not be approved.
3. When blasting, the Contractor must use all possible precautions against accidents or damages due to use or storage of explosives, and assumes all responsibility/liability associated with blasting activities.
4. ONLY LICENSED EMPLOYEES OR SUBCONTRACTORS WILL BE ALLOWED TO CONDUCT BLASTING ACTIVITIES – PROOF OF SUCH LICENSING MUST BE PROVIDED TO THE CONSTRUCTION MANAGER PRIOR TO ENGAGING IN ANY BLASTING ACTIVITIES.
5. Explosives shall be used, handled and stored as prescribed by the laws and regulations of the State of Georgia, and all applicable local laws and regulations pertaining to such.
6. All explosives shall be stored in a safe place at a sufficient distance from the work so that no damage will occur to any portion of the work should an accident occur relating to the stored explosives.
7. Conduct blasting operations in accordance with all existing ordinances and regulations. Protect all buildings and structures from the effects of the blast. Repair any resulting damage. If the Contractor repeatedly uses excessive blasting charges or blasts in an unsafe or improper manner, the Construction Manager may direct the Contractor to employ an independent blasting consultant to supervise the preparation for each blast and approve the quantity of each charge.
8. Removal of Rock: Dispose of rock off site that is surplus or not suitable for use as rip rap or backfill.
9. The Contractor shall notify the Construction Manager prior to any blasting. Additionally, the Contractor shall notify the Construction Manager and local fire department before any charge is set
10. Furnish all labor, equipment and materials required to drill, blast, loosen, excavate, and dispose material to complete the work shown on the Drawings and specified herein.

11. The work includes, but is not be limited to:
    a. Blast round design.
    b. Planning and execution of appropriate site-specific safety measures to be employed during all blasting operations, and the safe handling and storage of high explosives and blasting agents.
    c. Drilling blast holes, loading blast holes with explosives, and wiring and safe detonation of blast rounds.
    d. Removal from the site of all excess excavated soil, debris, and rock as indicated in the Contract Documents, or as directed, and disposal of excess materials at a permitted disposal site.
    e. Dewatering and maintenance of groundwater and surface water in all excavations.
    f. Performance of all surveys necessary to establish and verify the lines and grades and to determine the amount of material removed.
    g. Implementation of monitoring program to monitor condition of existing structures and utilities in vicinity of proposed blasting operations to insure existing features remain undamaged by blasting procedures.
12. Make all excavations in conformance with the lines, grades and cross sections on the Drawings or established by the Construction Manager. Where blasting is required, blasting should ensure removal of six inches (6”) of rock below proposed grade line.
13. All over-blast shall be removed and the resulting over-excavation backfilled and compacted with #57 gradation stone coarse aggregate.
14. Conduct all blasting operations, including transporting and storing of explosives in compliance with the Georgia State Fire Commissioner’s Rules and Regulations for Explosives and Blasting Agents, latest edition and all applicable local codes.
15. Blasting Submittals
    a. Submit the following in accordance with the procedures and requirements set forth in Section 01 33 00 Submittal Procedures, at least thirty (30) working days prior to beginning any blasting operations:
        1) Names, addresses, telephone numbers, and qualifications of the blasting subcontractor(s) and explosives supplier(s) that will be used, including the designated Blaster-In-Charge.
        2) Copies of Training Certificates for the designated Blaster-In-Charge, blasting foreman and any other key personnel that will be responsible for the work, showing that they have received specialized training in the proper handling of explosives.

3) A Blasting Plan, indicating the methods, materials and equipment to be used. The Blasting Plan should indicate the types of explosives to be used, drilling patterns, and a general layout and schedule for executing the work in accordance with state regulations.

4) A ground vibration and air blast monitoring plan, indicating structures that will be monitored, monitoring equipment that will be used, and personnel that will perform the monitoring.

16. At least 24 hours before each blast round, submit a detailed blast round design plan to the Construction Manager. The blasting plan submitted is for quality control and record keeping purposes. Review by the Construction Manager does not relieve the Contractor of his responsibilities as provided herein. Include the following in the blast round design submittals:

a. Location (state, grid coordinates) and limits of the shot.

b. Number, diameter, and depth of blast holes to be detonated in the round, and a plan showing the drill hole pattern, spacing and distance to the free face.

c. Depth of overburden.

d. Total weight of explosives in the round and the types of explosives to be used.

e. Loading diagram showing the location of explosives, primers, and initiators; and location, depth, and type of stemming to be used in each hole.

f. Initiation sequence, including delay timer and delay system, total weight of explosive to be detonated on each delay, and a list of the timing of the delays.

g. Manufacturer's data sheet for all explosives, primers, and initiators to be used.

h. Planned seismic monitoring positions, distances from the blast round, and seismograph types to be used to monitor vibrations and air blast overpressures.

i. Type and amount of blasting mats and/or depth of soil cover to be used over the top surface of the shot.

j. Any other information required by applicable state and federal regulations.

17. Within 24 hours after each blast round, submit a blasting report to the Construction Manager. Include the following in the blasting report:

a. Date and time of shot.

b. Foreman's name.

c. Number and depth of holes detonated.

d. Weather conditions at the time of detonation.

e. Type of explosives and detonators used.

f. Peak particle velocity of ground motion and primary frequency for all ground vibration monitoring stations.

g. Peak air blast overpressure measured.

h. Distance from the blast round to each monitoring station for vibrations and air blast.

i. Amount of explosive used in each hole, and maximum weight of explosive detonated on any single delay in the blast round.

E. Pre-Blast Survey

1. Contractor shall have an approved vibration consultant conduct the pre-blast survey on the residences and facilities adjacent to the proposed rock blasting in accordance with the submitted survey and monitoring plan.

2. The survey shall include, but not be limited to the following:

a. A site plan or drawing of the structure to be examined showing the structure in relationship to the proposed rock blasting area and a full description of the structure including type of materials and construction.

b. Examination of the structure (interior and exterior surfaces) by experienced and qualified personnel, noting any visible structural and aesthetic flaws in or on the structure. Note existing cracks and flaws, with significant cracks measured, and all cracks and flaws photographed.

c. Upon completion of the examination, ask the structure's owner to review the report, note any corrections or omissions, and sign a statement that to the best of his knowledge, the examination report reflects the conditions of the structure prior to any rock blasting. If the structure’s owner refuses to sign said report, it should be noted in the report by the examiner.

d. Nothing contained herein shall relieve the Contractor of responsibility for claims arising from his construction operations. Failure to inspect any structure, whether or not required by these Contract Documents, or inadequacy of the inspections shall not relieve the Contractor of his responsibility. The Contractor shall indemnify the Owner from such claim.

e. In the event that any property owner denies access for the survey of structures and facilities, notify such property owner, by certified mail, stating that this is final notification. Submit to the Construction Manager, copies of all correspondence between the Contractor and the property owner(s). The Construction Manager, upon review of the submitted correspondence may waive requirements set forth above. However, the Contractor is fully responsible for claims and damage arising from his construction operations regardless of property location.

f. Submit two (2) sets of copies of the examination reports to the Construction Manager and Engineer for their records.

F. Use of Explosives

1. When the use of explosives is necessary for the prosecution of the Work, exercise the utmost care not to endanger life or property. Be responsible for any and all damage or injury to persons or property resulting from the use of explosives.

2. Store all explosives in a secure manner, in compliance with all laws, and clearly mark all such storage places "DANGEROUS EXPLOSIVES".

3. Notify any public utility company having facilities in close proximity to the site of the Work of the intention to use explosives.

a. Provide this notice sufficiently in advance to enable the utility companies to take whatever steps they may consider necessary to protect their property from injury.

b. Also give the Construction Manager, all occupants of adjacent property, and all other Contractors working in or near the Project, notice of the intention to use explosives.

4. Only non-electric type initiators maybe used.

G. Blasting Operations

1. Provide explosives of such quantity and power and use in such locations as will neither open seams nor otherwise disturb the material outside the prescribed limits of excavation.

2. As the excavation approaches its final limits, reduce the depth of holes for blasting and the amount of explosives used for each hole so that the underlying or adjacent rock will not be disturbed or shattered.

3. Do not perform blasting within 100 feet of newly placed concrete that has cured less than 7 days.

4. Do not perform blasting within 50 feet of any existing structure or any new structure in progress.

H. Blast Monitoring

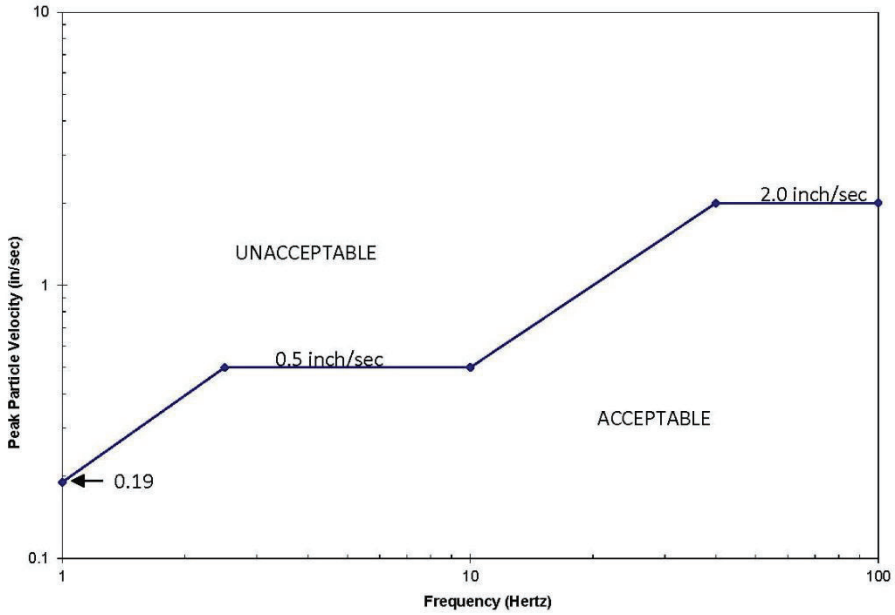
1. Following review by the Construction Manager regarding the proximity of permanent buildings and structures to the blasting site, Construction Manager may direct the Contractor to employ an independent, qualified specialty sub-contractor, approved by the Construction Manager to:

a. Monitor the blasting by use of seismograph,

b. Identify the areas where light charges must be used,

c. Conduct pre-blast and post-blast inspections of structures, including photographs or videos, and maintain a detailed written log.

2. The Contractor shall exercise the utmost care not to damage property on-site and off-site.
    a. Notify each adjoining property owner within 5,000 feet of the site of the anticipated ground vibrations and noise which will occur due to the blasting operations.
    b. Provide this notice 30 days in advance to enable the adjacent property owners to take whatever precautions they may consider necessary.
    c. Limit operations to minimize any disturbance to the adjacent property owners.
    d. Notify motorists on adjacent roadways in accordance with state regulations.
    e. Take responsibility for any damage to any structure or utility line, pipes, etc., on-site and off-site as a result of his operations.
3. For each blast round, monitor and record noise and air blast overpressures at the site perimeter nearest the blast location and at the on-site or off-site structure located nearest to the round.
    a. Peak air blast overpressure shall not exceed 0.018 psi, measured at the site perimeter.
4. Sufficiently cover the site of every blast round with blasting mats or other devices to prevent any flying debris.
    a. The Contractor will be fully responsible for any damage caused by flying debris, both to on-site and off-site properties.
5. Whenever blasting is to be performed within 2,500 feet of any structure, measure the peak particle velocities of ground vibration resulting from each blast at the structure.
6. Monitor vibrations utilizing a seismograph capable of providing a record of particle velocity and frequency along three mutually perpendicular axes utilizing internal calibration.
7. Measured peak particle velocity of ground motion at the monitored structure shall not exceed the values shown in the following graph:



I. Blasting Notification

1. Give twenty-four (24) hour notice to Construction Manager and adjacent residences and/or businesses prior to each blast.

J. Complaints

1. Submit notice of blasting complaints to Construction Manager in writing within twenty-four (24) hours of receipt thereof.

   a. Identify the origin of complaint in the notice and provide a brief description of alleged damage or other circumstances upon which the complaint is predicated.

   b. Assign a number to each complaint consecutively in the order of receipt.

   c. Assign each complaint a separate number and show in each letter complaint all previous complaint numbers registered by the same complainant.

   d. In addition, make a summary report each month to Construction Manager. Indicate date, time and name of person investigating the complaint and amount of damages (or an estimate thereof), if any, in the summary report.

K. Post Blast Survey

1. Contractor shall have the same vibration consultant who performed the pre-blast survey conduct the post-blast survey.

2. The consultant shall examine all structures from which a complaint has originated after the blast. The survey shall include, but not be limited to the following:

a. A full description of the alleged damage caused by the blast.

1) Where appropriate, provide a sketch to more fully describe the location and type of damage.

2) Measure cracks and compare to any original measurements which may have been taken in the Pre-Blast Survey.

b. Take colored photographs of any alleged damage.

c. Submit two (2) copies of the Post Blast Survey report to the Construction Manager. The report shall include the consultant's assessment of the alleged damage and an opinion as to its likely cause.

3.04. DEWATERING EXCAVATIONS

A. Dewater excavation continuously to maintain a water level two feet below the bottom of the trench.

B. The Contractor shall pump out, or otherwise remove and properly dispose of any water (including storm water), which may be found or may accumulate, as fast as it may collect in the excavation. The removal is required regardless of the source.

C. All necessary precautions shall be taken to prevent disturbance of, and to properly drain, any areas upon which concrete is to be poured or pipe is to be laid.

D. There shall be located at the work site at all times during construction, proper and approved equipment with such sufficient capacity for the removal of any water that accumulates in excavations and in such manner as not to withdraw sand or cement from any concrete.

1. Where the utility crosses natural drainage channels, the work shall be conducted in such a manner that unnecessary damage or delays in the prosecution of the work will be prevented.

2. Provision shall be made for the satisfactory disposal of surface water to prevent damage to public or private property.

E. Contractor is also to ensure that removal of any liquids will not interfere with the proper laying of masonry or pipe, or execution of any required work for the complete construction of the project.

F. The flow in storm drains, gutters, or water courses encountered during the construction shall be adequately provided for by the Contractor to ensure these flows do not interfere with the execution of the work, and are maintained in such a manner as to ensure continuity of flow at all times in accordance with the Fulton County Erosion and Sediment Control Ordinance.

G. Unless otherwise permitted, ground water encountered within the limits of excavation shall be depressed to an elevation not less than twelve (12) inches below the bottom of such excavation.

1. This depression is to be performed before pipe laying or concrete work is started and shall be so maintained until concrete and joint materials have attained initial set.

H. Control drainage in the vicinity of excavation so the ground surface is properly pitched to prevent water running into the excavation.

I. In all cases, accumulated water in the trench shall be removed before placing bedding or haunching, laying pipe, placing concrete or backfilling.

J. Where dewatering is performed by pumping the water from a sump, crushed stone shall be used as the medium for conducting the water to the sump.

1. Sump depth shall be at least two feet below the bottom of the trench.
2. Pumping equipment shall be of sufficient quantity and/or capacity to maintain the water level in the sump two feet below the bottom of the trench.
3. Pumps shall be a type such that intermittent flows can be discharged.
4. A standby pump shall be required in the event the operating pump or pumps clog or otherwise stop operation.

K. Dewater by use of a well point system when pumping from sumps does not lower the water level two feet below the trench bottom.

1. Where soil conditions dictate, the Contractor shall construct well points cased in sand wicks.
2. The casing, 6 to 10 inches in diameter, shall be jetted into the ground, followed by the installation of the well point, filling casing with sand and withdrawing the casing.

L. Should sewage or any other odorous liquids be encountered during the work in the excavation, the Owner shall be immediately notified.

1. The Owner will then determine if actions by the Contractor have caused the source of the odorous liquids to leak and will promptly notify the appropriate regulatory agencies, if necessary.
2. In addition, the Owner will instruct the Contractor as to what actions, if any, the Contractor can and cannot perform prior to any directives which may be issued by the regulatory agencies.
3. Any sewage shall be pumped and hauled to a manhole, pump station, or water reclamation facility, as directed
4. Any other liquids will be properly disposed of as directed by the Construction Manager and/or any regulatory agencies having jurisdiction.

3.05. TRENCH FOUNDATION AND STABILIZATION

A. The bottom of the trench shall provide a foundation to support the pipe and its specified bedding. The trench bottom shall be graded to support the pipe and bedding uniformly throughout its length and width.

B. Where foundation conditions are such that proper bedding cannot be provided, the Contractor may be directed by the Construction Manager to provide foundation cushion, concrete cradles, or other special provisions as may be required for the proper support of the pipe.

C. If, after dewatering as specified above, the trench bottom is spongy, or if the trench bottom does not provide firm, stable footing and the material at the bottom of the trench will still not adequately support the pipe, the trench will be determined to be unsuitable and the Owner shall then authorize payment for trench stabilization.

D. Should the undisturbed material encountered at the trench bottom constitute, in the opinion of the Construction Manager, an unstable foundation for the pipe, the Contractor shall be required to remove such unstable material and fill the trench to the proper subgrade with crushed stone as directed by the Construction Manager.

E. Where the replacement of unsuitable material with crushed stone does not provide an adequate trench foundation, the trench bottom shall be excavated to a depth of at least two feet below the specified trench bottom.

1. Place filter fabric in the bottom of the trench and support the fabric along the trench walls until the trench stabilization, bedding, haunching and pipe have been placed at the proper grade.

2. The ends of the filter fabric shall be overlapped by one foot above the pipe.

F. Where trench stabilization is provided, the trench stabilization material shall be compacted to at least 90 percent of the maximum dry density, unless shown or specified otherwise.

3.06. BEDDING AND HAUNCHING

A. Prior to placement of bedding material, the trench bottom shall be free of any water, loose rocks, boulders or large dirt clods.

1. Bottoms of trenches in earth must be shaped or molded and compacted to the contour of the outside of the pipe, using bedding materials, as directed, or where indicated on the Drawings, to give full support to the lower segment of the pipe and so that the pipe is firmly supported in the excavation throughout its entire length.

2. This shall be performed in such a manner as to prevent any subsequent settlement of the pipe.

3. Boulders or loose rock which might bear against the pipe will not be permitted in the trench bottom, or in the initial backfill within twelve (12) inches above the top of the pipe.

4. Bottoms of excavations which are of loose granular soils shall be compacted by vibratory compactor prior to laying of pipe.

B. Bedding material shall be placed to provide uniform support along the bottom of the pipe and to place and maintain the pipe at the proper elevation.

1. The initial layer of bedding placed to receive the pipe shall be brought to the grade and dimensions indicated on the Drawings.

2. Bedding shall be carefully placed along the full width of the trench so that the pipe is true to line and grade of the pipe barrel.

a. As used herein “carefully placed” means material that has been spaded or shovel-sliced so that the material fills and supports the haunch area and encases pipe to the limits specified herein.

b. Bedding material shall be carried up the sides of the pipe to the heights shown for the various classes of bedding.

3. The pipe shall be placed and brought to grade by tamping the bedding material or by removal of the excess amount of the bedding material under the pipe.

4. Adjustment to grade line shall be made by scraping away or filling with bedding material.

a. Wedging or blocking up of pipe will not be permitted.

b. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade will not be permitted.

5. Each pipe section shall have a uniform bearing on the bedding for the length of the pipe, except immediately at the joint.

C. At each joint, bell holes shall be provided in all classes of bedding.

1. Excavate bell holes of ample depth and width to permit the joint to be assembled properly but small enough to ensure that support is provided throughout the length of pipe barrel to relieve the pipe bell of any load.

D. After the pipe section is properly placed, add the haunching material to the specified depth.

1. The haunching material shall be shoveled, sliced, tamped, vigorously chinked or otherwise consolidated to provide uniform support for the pipe barrel and to fill completely the voids under the pipe, including the bell hole.

2. Prior to placement of the haunching material, the bedding shall be clean and free of any water, loose rocks, boulders or dirt clods.

E. Bedding

1. Class “A” (Bedding Factor - 2.8): Excavate the bottom of the trench flat at a minimum depth as shown on the Drawings, below the bottom of the pipe

barrel. Lay pipe to line and grade on concrete block. Place concrete to the full width of the trench and to a height of one-fourth of the outside diameter of the pipe above the invert.

2. Class “B” (Bedding Factor - 1.9): Class ‘B’ Bedding shall be installed by first undercutting the trench an adequate amount to provide bedding underneath the pipe bell as indicated. The trench shall then be brought to grade with compacted #57 Stone Coarse Aggregate placed the full width of the trench, as excavated. Haunching material shall then be carefully placed by hand and compacted to provide full support under the pipe barrel up to Centerline. At a minimum, Class ‘B’ Bedding shall be used for PVC and HDPE pipes.

3. Class “C” (Bedding Factor - 1.5): Class ‘C’ Bedding shall be installed by first undercutting the trench an adequate amount to provide bedding underneath the pipe bell as indicated. The trench shall then be brought to grade with compacted #57 Stone Coarse Aggregate placed the full width of the trench, as excavated. Haunching material shall then be carefully placed by hand and compacted to provide full support under and up to a height of one-fourth the outside diameter of the pipe above the bottom of the pipe barrel. At a minimum, Class ‘C’ Bedding shall be used for DIP.

4. Type 5: Type 5 Bedding shall be installed by first undercutting the trench an adequate amount to provide bedding underneath the pipe bell as indicated. The trench shall then be brought to grade with compacted #57 Stone Coarse Aggregate placed the full width of the trench, as excavated before installing pipe. Haunching material shall then be carefully placed by hand and compacted to provide full support under and up to the top of the pipe barrel.

5. Groundwater Flow Dams may be required under certain conditions.

   a. If there is a large volume of groundwater which might follow the crushed stone bedding downhill and due to the elevations involved, might build adequate pressure to create problems, flow dams will be required.

   b. Flow dams consist of red clay bedding typically about three feet long and spaced about 100 feet along pipeline.

F. Excessive Width and Depth

1. If the trench is excavated to excess width, provide the bedding class with the next higher bedding factor.

2. Crushed stone haunching and initial backfill may be used in lieu of Class “A” bedding, where Class “A” bedding is necessitated by excessive trench width.

3. If the trench is excavated to excessive depth, provide crushed stone to place the bedding at the proper elevation or grade.

G. Compaction: Bedding and haunching materials under pipe and accessories shall be compacted to a minimum of 90 percent of the maximum dry density, unless shown or specified otherwise.

3.07. BACKFILLING – GENERAL

A. Backfilling shall include initial and final backfilling, re-grading of grounds, restoration of surface and sub-surface materials and structures, including resurfacing of paved areas damaged by the Contractor.

B. Backfilling shall not be performed in freezing weather (below 32°F) except by permission of the Construction Manager and shall not be performed with frozen material or upon frozen materials.

C. All backfilling shall be left with smooth, even surfaces, free of rock on the surface, properly graded and shall be maintained in this condition until final completion and acceptance of the Work.

D. Where directed by the Construction Manager, the backfill shall be mounded slightly above the adjacent ground to allow for settlement.

E. Except as otherwise specified or directed, all forms, bracing, and lumber shall be removed before backfilling.

3.08. BACKFILLING – INITIAL BACKFILL

A. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by subsequent backfill and ensure the uniform distribution of the loads over the top of the pipe.

B. Initial backfilling must be performed properly and before any filling is deposited in large quantities from a machine bucket or other vehicle.

C. Initial backfill material over PVC and HDPE pipes shall be free of rocks larger than two (2) inches in the largest dimension. Initial backfill material over DIP pipe shall be free of rocks larger than four (4) inches in the largest dimension.

D. During initial backfill, dumping from a bucket will not be allowed to fall from a height of more than one foot upon a pipe, and in all cases the bucket must be lowered so that the shock of the falling earth will not injure the pipe or structure.

E. Place initial backfill material carefully around the pipe in uniform layers to a depth of at least 18-inches above the pipe barrel.

1. Layer depths shall be a maximum of 6 inches for pipe 18 inches in diameter and smaller and a maximum of 12 inches for pipe larger than 18 inches in diameter.

F. Carefully and thoroughly consolidate initial backfill in trenches where pipe has been laid, by tamping simultaneously on both sides of the pipe to prevent side pressures.

1. Compact each layer thoroughly with suitable hand tools or tamping equipment.

2. This backfilling and compacting must be performed before any backfill material is deposited directly from a machine bucket, loaders, trucks, or other mechanical equipment.

3. When utilizing a machine bucket for backfilling, the bucket must be lowered into the trench to deposit the material in such a manner as to avoid the shock of falling earth which could injure or damage the pipe or structure.

4. Under no circumstances should the material be allowed to fall from the machine or loader bucket directly onto the pipe in the trench.

G. Initial backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless shown or specified otherwise.

H. Only after the initial backfill has been placed to a point 18 inches above the top of the pipe, may work proceed in placing the final backfill, which must be carefully placed and compacted by tamping.

3.09. BACKFILLING – FINAL BACKFILL

A. After initial backfill material has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers, compacting each layer thoroughly as follows:

1. In 6-inch layers, if using light power tamping equipment, such as a “jumping jack”.

2. In 12-inch layers, if using heavy tamping equipment, such as hammer with tamping feet.

3. In 24-inch layers, if using a hydra-hammer.

B. Backfill carefully to restore the ground surface to its original condition.

C. All precautions must be taken to avoid having any unincorporated material which may result in future settlement in these areas. Compaction shall be accomplished by approved mechanical tampers

D. The top 6 inches shall be topsoil obtained as specified in “Trench Excavation” of this Section.

E. Excavated material which is unsuitable for backfilling, and excess material, shall be disposed of, at no additional cost to the Owner, in a manner approved by the Construction Manager.

1. Surplus soil may be neatly distributed and spread over the site, if approved by the Construction Manager.

2. If such spreading is allowed, the site shall be left in a clean and sightly condition and shall not affect pre-construction drainage patterns.

3. Surplus rock from the trenching operations shall be removed from the site.

F. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.

G. Settlement: If trench settles, re-fill and grade the surface to conform to the adjacent surfaces.

H. Final backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless specified otherwise.

I. All backfilling shall be left with smooth, even surfaces, properly graded, and shall be maintained in such condition until final completion and acceptance of the work, notwithstanding applicable warranty periods.

J. Where directed by Construction Manager, the Contractor shall mound the backfill slightly above the adjacent ground to allow for settlement.

3.10. CONCRETE ENCASEMENT FOR PIPELINES

A. Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 6 inches clearance from the bell of the pipe.

B. Lay the pipe to line and grade on concrete blocks.

C. In lieu of bedding, haunching and initial backfill, place concrete to the full width of the trench and to a height of not less than 12-inches above the pipe bell. Do not backfill the trench for a period of at least 24 hours after concrete is placed.

3.11. ADDITIONAL MATERIAL

A. Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be as shown on the Drawings.

1. Utilize excess material excavated from the trench, if the material is suitable.
2. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide additional suitable fill material at no cost to the Owner.

B. When acceptable excess material is not available from other parts of the Project for backfill, required fills, embankments, etc., the Contractor shall obtain the necessary “borrow” material at locations off the site of the work.

C, If the Construction Manager determines the original excavated material is unsuitable for use as backfill, such as perishable matter, refuse, building materials, wire, brush, stumps, ashes, large stones, mulch, or other soft materials, the Contractor shall properly dispose of the objectionable materials, and shall furnish, haul, and place borrow material suitable for proper backfill.

D. Locating such acceptable “borrow” sites shall be the sole responsibility of the Contractor. All materials to be used as borrow shall be approved by the Construction Manager.

3.12. BACKFILL UNDER ROADS

A. Final backfill material under roadways and other paved areas shall be compacted to a density of not less than 95 percent of maximum dry density as determined by ASTM D698 – Standard Proctor. The top 12-inches shall be compacted to a minimum of 98 percent of the maximum dry density.

B. Final backfill material under non-paved areas within the road right-of-way shall be compacted to not less than 90 percent of maximum dry density as determined by ASTM D698.

C. Final backfill material in non-paved areas outside of road right-of-way shall be compacted to not less than 85 percent of maximum dry density as determined by ASTM D698 or as directed by the Construction Manager.

3.13. BACKFILL WITHIN GEORGIA DOT RIGHT-OF-WAY

A. Backfill within the Georgia DOT right-of-way shall meet the requirements stipulated in the “Utility Accommodation Policy and Standards”, published by the Georgia Department of Transportation.

3.14. BACKFILL ALONG RESTRAINED JOINT PIPE

A. Backfill along restrained joint pipe shall be compacted to a minimum 90 percent of the maximum dry density.

3.15. BACKFILLING STRUCTURES

A. Backfilling of structures shall proceed as various structures or parts of structures are completed.

1. The Contractor shall refill the space outside and around the wall with material excavated from the site and stored for this purpose.
2. Immediately adjacent to the structure, the backfill material shall be placed in eight inch layers and compacted to avoid future settlement.
3. This filling shall be carried to such height as will bring the finished grade to the required elevations.

3.16. FLOWABLE FILL

A. Where flowable fill is required, excavate the trench to provide a minimum of 6 inches clearance on either side of the pipe barrel.

B. Lay the pipe to line and grade on solid concrete blocks or bricks.

C. In lieu of bedding, haunching and initial backfill, place flowable fill to the full width and depth of the trench.

D. Flowable fill shall be protected from freezing for a period of 36 hours after placement.

1. Minimum temperature of flowable fill at point of delivery shall be 50 degrees F.

E. The Contractor shall provide steel plates over flowable fill in road locations.

3.17. COMPACTED GRANULAR MATERIAL

A. Where compacted granular material is required as initial and final backfill material, it shall be placed after bedding and haunching material specified elsewhere has been placed.

B. Compacted granular material shall be compacted to a minimum 95 percent of the maximum dry density.

3.18. TRENCH SURFACE FINISH

A. Trenches cut in pavement on public roads or in areas that will become under pavement in proposed public roads (such as typical subdivision developments) shall be compacted in accordance with Fulton County Standard Details as applicable.

1. Such compaction shall be verified by an independent soils laboratory. The number, depth and location of such compaction test shall be as required by the Construction Manager.

a. Compaction tests will generally be required at approximately 400 foot intervals in existing roads and 800 foot intervals in proposed roads.

b. Compaction tests shall be performed at the Contractors' expense.

2. Trenches located perpendicular within existing public roads shall require an 8 inch thick concrete base course poured over the compacted backfill.

a. The concrete base course shall extend the full width of the trench cut plus a minimum of 12 inches on either side of the trench.

b. The existing pavement shall be neatly sawed along both sides of the trench.

c. The concrete used shall be a minimum 3,000 PSI high early strength concrete.

d. Once the concrete base course has properly set, the concrete surface shall be cleaned and a minimum 1-½ inch thick bituminous concrete pavement (to match existing pavement), shall be laid matching the level of the adjacent pavement.

B. Trenches cut in driveways or private parking areas shall require a minimum 6 inch thick, fully compacted, graded aggregate base.

1. The existing pavement shall be neatly sawed along both sides of the ditch.

2. Material of the same type and thickness shall be laid matching the level of the adjacent drive surface.
3. In restoring concrete drives, the base course shall be wetted prior to pouring new concrete.
4. Concrete used shall be 3,000 PSI high early strength.

C. Trenches cut through curbs and sidewalks shall be restored in such a manner as to conform in size, line, grade and materials with that adjoining.

1. In restoring curbs and sidewalks, entire slabs or squares shall be removed and replaced.
2. The subsoil and foundation material shall be well compacted.
3. The sub-base shall be thoroughly rolled or tamped and shall be wet just before the concrete is placed, but shall show no pools of water.

D. Should settlements, cracks, or other indications of failure appear in adjoining pavements, drives, curbs, or sidewalks, the adjoining surfaces shall be removed to the extent necessary to secure firm, undisturbed bearing and shall be re-laid in a satisfactory manner.

E. Trenches cut in non-paved areas shall be thoroughly compacted to a level 4 inches below ground surface.

1. All easements shall be adequately re-grassed to prevent soil erosion.
2. Natural topsoil at least 4 inches thick and of a good condition and tillable structure shall be placed atop the compacted trench backfill.
    a. Topsoil shall be free of large stones, plant stumps, large roots, objectionable litter, or other substances potentially harmful to plant growth.
3. Grass seed shall be of a properly proportioned mixture approved for use in Zone Two, as detailed in the Georgia Department of Transportation Standard Specifications.
4. Whenever possible, replace existing grassed areas with grass of similar characteristics and appearance, meeting at a minimum, the specification requirements included herein.
5. All seeded areas shall be uniformly mulched immediately after seeding and within 10 days of construction work completion.
6. Sediment control measures must remain in place and be maintained until a comprehensive vegetative cover is established.

3.19. TESTING AND INSPECTION

A. The Owner may direct tests to be made to determine the density of the compacted material. Cost of the testing laboratory, fieldwork, and analysis shall be paid for by the Contractor.

B. When directed by the Owner, the Contractor shall arrange to have compaction tests conducted by an independent testing firm.

C. The soils testing laboratory is responsible for the following:

1. Compaction tests in accordance with Article 1.02 of this Section.
2. Field density tests for each two feet of lift, one test for each 1,000 feet of pipe installed or more frequently if ordered by the Construction Manager.
3. Inspecting and testing stripped site, subgrades and proposed fill materials.

D. The Contractor's duties relative to testing include:

1. Notifying laboratory of conditions requiring testing.
2. Coordinating with laboratory for field testing.
3. Paying costs for additional testing performed beyond the scope of that required and for re-testing where initial tests reveal non-conformance with specified requirements.
4. Providing excavation as necessary for laboratory personnel to conduct tests.

E. Inspection

1. Earthwork operations, acceptability of excavated materials for bedding or backfill, and placing and compaction of bedding and backfill is subject to inspection by the Construction Manager.

3.20 DISPOSAL OF MATERIAL

A. The Contractor shall be required to remove from the site of the work all earth in excess of that required to backfill the excavation or to create necessary fill.

B. This shall be performed immediately after the backfill is completed to the satisfaction of the Owner.

C. All material removed shall become the property of the Contractor and he shall make his own arrangements for its disposition.

D. All surplus material, shot rock, organics, clearing debris, stumps, and other such material deemed unfit for use as backfill, shall be disposed of by the Contractor, and shall be performed in such manner so as to give a minimum of inconvenience to the public.

E. Comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROL

PART 1 – GENERAL

1.01 SCOPE

A. The Work specified in this Section consists of providing and maintaining temporary and permanent erosion and sedimentation controls as shown on the Drawings. This Section also specifies the subsequent removal of temporary erosion and sedimentation controls.

B. Temporary and permanent erosion and sedimentation controls include grassing and mulching of disturbed areas and structural barriers at those locations which will ensure that erosion during construction will be maintained within acceptable limits.

C. Acceptable limits are as established by the Georgia Erosion and Sedimentation Control Act of 1975, as amended, Section 402 of the Federal Clean Water Act, and applicable codes, ordinances, rules, regulations and laws of Federal, State, local and municipal authorities having jurisdiction.

D. Land disturbance activity shall not commence until the Land Disturbance Permit has been issued.

1.02 SUBMITTALS

A. Submit product data in accordance with the requirements of Section 01 33 23 of these Specifications.

1.03 QUALITY ASSURANCE

A. The temporary and permanent erosion and sedimentation control measures shown on the Drawings are minimum suggested requirements. Any additional erosion and sedimentation control measures required by the Contractor's means, methods, techniques and sequence of operation shall be installed by the Contractor at no additional cost to the Owner.

B. Perform all work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated in these Specifications. Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.

C. Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the Georgia Erosion and Sedimentation Control Act of 1975 as amended (OCGA §12-7-1, et. seq.), local ordinances, other permits, local enforcing agency guidelines and these Specifications.

D. Basic principles:

1. Coordinate the land disturbance activities to fit the topography, soil types and conditions.
2. Minimize the disturbed area and the duration of exposure to erosive elements.
3. Provide temporary or permanent stabilization to disturbed areas immediately after rough grading is complete.
4. Safely convey run-off from the site to a stable outlet to prevent flooding and damage to downstream facilities resulting from increased runoff from the site.
5. Retain sediment on-site that was generated on-site.
6. Minimize encroachment upon watercourses.

E. Implementation:

1. The Contractor is solely responsible for the control of erosion within the Project site and the prevention of sedimentation from leaving the Project site or entering waterways.
2. The Contractor shall install temporary and permanent erosion and sedimentation controls which will ensure that runoff from the disturbed area of the Project site shall pass through a filter system before exiting the Project site.
3. The Contractor shall provide temporary and permanent erosion and sedimentation control measures to prevent silt and sediment from entering the waterways and designated wetland areas. The Contractor shall maintain an undisturbed vegetative buffer a minimum of 25 feet from the top of the bank.
4. The Contractor shall limit land disturbance activity to those areas shown on the Drawings.
5. The Contractor shall maintain erosion and sedimentation control measures within disturbed areas on the entire site until the final acceptance of the Project at no additional cost to the Owner.
6. Maintenance shall include mulching, re-seeding, clean-out of sediment barriers and sediment ponds, replacement of washed-out or undermined rip rap and erosion control materials, to the satisfaction of the Owner and Construction Manager.
7. All fines imposed for improper erosion and sedimentation control shall be paid by the Contractor.

PART 2 – PRODUCTS

2.01 SEDIMENT BARRIER

A. Silt fence:

1. Type NS silt fence shall meet the requirements of Section 171 of the Georgia Department of Transportation Standard Specifications, latest edition.

2. Type S Silt Fence is a combination of Type NS silt Fence with woven wire reinforcement. Type NS Silt Fence reinforcement shall meet the requirements of Section 171 of Georgia D.O.T. Specifications, latest edition.

3. Silt fence fabric shall be an approved product on the Georgia DOT Qualified Product List No. 36, latest edition.

B. Hay Bales: Hay bales shall be clean, seed-free cereal hay, rectangular in shape, and contain five cubic feet or more of material. Hay bales shall be bound with wire or nylon to securely contain the material.

1. Pine straw bales may be used in lieu of hay bales.

2. Bales shall be placed in a single row, lengthwise, on the contour and embedded in the soil to a depth of four (4) inches.

3. Bales must be securely anchored in place by stake or bars driven through the bales.

C. Concrete Blocks: Concrete blocks shall be hollow, non-load-bearing type.

2.02 CONSTRUCTION EXIT STONE

A. Use sound, tough, durable stone resistant to the action of air and water. Slabby or shaley pieces will not be acceptable.

B. Aggregate size shall be in accordance with the National Stone Association Size R-2 (1.5 to 3.5-inch stone) or Type 3 rip rap stone conforming to Section 805.01 of the Georgia Department of Transportation Standard Specifications.

2.03 RIP RAP

A. Stone Rip Rap: Use sound, tough, durable stones resistant to the action of air and unless noted otherwise, stone rip rap shall be Type 1.

1. Type 1 Rip Rap: Rip rap size and gradation shall conform to Section 805.01 of the Georgia Department of Transportation Standard Specification for Type 1 Stone Dumped Rip Rap.

2. Type 3 Rip Rap: Rip rap size and gradation shall conform to Section 805.01 of the Georgia Department of Transportation Standard Specifications for Type 3 Stone Dumped Rip Rap.

B. Sand Cement Bag Rip Rap: Sand cement bag rip rap shall conform to the Georgia Department of Transportation Standard Specifications, Section 603.

2.04 GABIONS

A. Gabions shall be constructed of heavy galvanized steel wire mesh with a zinc coating of triple hexagon weave. The mesh wire diameter for the galvanized gabions shall be 2.2 mm (0.0866") + 2 1/2%; the mesh edge wire shall be not less than 2.7 mm – 2 1/2%. The lacing wire for binding the netting units together shall be 2.2 mm (0.0866") + 2 1/2%.

B. Geotextiles when used behind gabion structures shall be in accordance with AASHTO M288-96 Section 7.5, “Permanent Erosion Control Requirements.”

2.05 PLASTIC FILTER FABRIC

A. Plastic filter fabric shall conform to the Georgia Department of Transportation Standard Specifications, Section 881, for filter fabrics.

B. Plastic filter fabric shall be an approved product on the Georgia Department of Transportation Qualified Product List No. 28, latest edition.

C. Seams - Fabric may be sewn together with thread of a material having the same chemical requirements as the material forming the fabric or shall be bonded by cementing or by heat. The strength of the seams shall be equal to that of the unaged fabric. Fabrics to be used under riprap are allowed to be bonded or sewn together forming sections not less than 6 feet wide.

2.06 GRASSING

A. Grassing materials shall meet the requirements of the Georgia Department of Transportation Standard Specifications, latest edition; as shown in the table:

Material	Section No.
Topsoil	893.01
Seed and Sod	890
Fertilizer	891.01
Agricultural Lime	882.02
Mulch	893.02
Inoculants	893.04

B. Seed species shall be provided as shown on the Drawings.

C. Mulch Binder: Mulch on slopes exceeding 3 (horizontal) to 1 (vertical) shall be held in place by the use of a mulch binder, as approved by the Construction Manager. The mulch binder shall be non-toxic to plant and animal life and shall be approved by the Construction Manager.

D. Water: Water shall be free of excess and harmful chemicals, organisms, and substances which may be harmful to plant growth or obnoxious to traffic. Salt or brackish water shall not be used. Water shall be furnished by the Contractor.

PART 3 – EXECUTION

3.01 GENERAL

A. The Contractor must utilize Best Management Practices to minimize siltation and erosion consistent with the Manual for Erosion and Sediment Control in Georgia.

B. Temporary and permanent erosion and sedimentation control measures shall prevent erosion and prevent sediment from exiting the site.

1. If, in the opinion of the Owner, Construction Manager or State inspector, the Contractor's temporary erosion and sedimentation control measures are inadequate, the Contractor shall provide additional maintenance for existing measures or additional devices to control erosion and sedimentation on the site at no additional cost to the Owner.

C. All erosion and sedimentation control devices and structures shall be inspected by the Contractor at least once a week and immediately after each rainfall occurrence. Any device or structure found to be damaged shall be repaired or replaced by the end of the day.

D. All erosion and sedimentation control measures and devices shall be constructed and maintained as indicated on the Drawings or specified herein until adequate permanent disturbed area stabilization has been provided and accepted by the Construction Manager.

E. Once adequate permanent stabilization has been provided and accepted by the Construction Manager, all temporary erosion and sedimentation control structures and devices shall be removed.

3.02 SEDIMENT CONTROL

A. Construction exit:

1. Construction exit(s) shall be placed as shown on the Drawings and as directed by the Construction Manager.

a. A construction exit shall be located at any point traffic will be leaving a disturbed area to a public right-of-way, street, alley, sidewalk or parking area.

b. The construction exit shall consist of a minimum of six (6) inch thick pad of aggregate as specified above and of the necessary length to accomplish the task for which it is intended.

2. Placement of Construction Exit Material: The ground surface upon which the construction exit material is to be placed shall be prepared to a smooth condition free from obstructions, depressions or debris.

a. Filter fabrics shall be required to keep the aggregate stone from becoming contaminated with subgrade soils and must be placed the full length and width of the entrance.

b. The plastic filter fabric shall be placed to provide a minimum number of overlaps and a minimum width of one foot of overlap at each joint.

c. The stone shall be placed with its top elevation conforming to the surrounding ground elevations. The stone shall be dropped from no more than a three feet height during construction.

3. Construction Exit Maintenance: The Contractor shall regularly maintain the exit with the top dressing of stone to prevent tracking or flow of soil onto public rights-of-way and paved surfaces as directed by the Construction Manager.

4. Construction Exit Removal: Construction exit(s) shall be removed and properly disposed of when the disturbed area has been properly stabilized, the tracking or flow of soil onto public rights-of-way or paved surfaces has ceased and as directed by the Construction Manager.

B. Sediment barriers:

1. Sediment barriers shall include, but are not necessarily limited to, silt fences, hay bales and any device which prevents sediment from exiting the disturbed area.

2. Silt fences and hay bales shall not be used in any flowing stream, creek or river.

3. Sediment barriers shall be installed as shown on the Drawings and as directed by the Construction Manager.

4. Sediment barriers shall be maintained to ensure the depth of impounded sediment is no more than one-half of the original height of the barrier or as directed by the Construction Manager.

5. Torn, damaged, destroyed or washed-out barriers shall be repaired, reinforced or replaced with new material and installed as shown on the Drawings and as directed by Construction Manager.

6. Accumulated sediment shall be removed from the barrier and the barrier replaced and stabilized on-site as directed by the Construction Manager.

7. Sediment barrier shall be removed once the disturbed area has been stabilized with a permanent vegetative cover and the sediment barrier is no longer required as directed by the Construction Manager.

8. All non-biodegradable parts of the barrier shall be disposed of properly.

9. The disturbed area created by barrier removal shall be permanently stabilized.

C. Sediment Boxes: All inlet grates shall be covered with sediment boxes during grading operations and shall remain so covered until all open areas are permanently stabilized against erosion.

D. Where construction dewatering pumps discharge, the water must be filtered to minimize stream siltation. As a minimum, filter fabrics or silting basins are required.

3.03 EROSION CONTROL

A. Rip rap

1. Rip rap shall be placed as shown on the Drawings and as directed by the Construction Manager.

   a. Rip rap shall be placed at all points where natural vegetation is disturbed on the banks of active streams.

   b. Compact backfill and place rip rap to prevent subsequent settlement and erosion.

   c. This requirement applies equally to construction alongside a stream as well as crossing a stream or drainage ditch.

2. When trenching across a stream or drainage ditch, place rip rap over the entire disturbed area upstream and downstream of the trench excavation.

   a. Place rip rap across creek bottom, across creek banks, and extend rip rap placement five feet beyond the top of each creek bank.

3. Preparation of Foundations: The ground surface upon which the rip rap is to be placed shall be brought to the correct lines and grades before placement is commenced.

   a. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers.

   b. Unless at creek banks or otherwise shown or specified, rip rap shall begin in a toe ditch constructed in original ground around the toe of the fill or the cut slope.

   c. The toe ditch shall be two feet deep in original ground, and the side next to the fill or cut shall have that same slope. After the rip rap is placed, the toe ditch shall be backfilled and the excess dirt spread neatly on the site.

4. Placement of Plastic Filter Fabric:

   a. Plastic filter fabric shall be placed under all rip rap unless shown or specified otherwise.

   b. Filter fabric shall not be placed under rip rap on stream or drainage ditch crossings.

   c. The surface to receive filter fabric shall be prepared to a smooth condition free from obstructions, depressions and debris.

   d. The filter fabric shall be installed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps.

   e. The fabric shall be placed to provide a minimum width of one foot of overlap at each joint. The fabric shall be placed so that the upstream strip overlaps the downstream strip.

   f. The fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within 3 inches of the centerline of the overlap.

   g. The fabric shall be placed loosely to avoid stretching and tearing during placement of the stone.

   h. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals, or other contaminants.

   i. Contaminated fabric or fabric damaged during installation or during placement of rip rap shall be removed and replaced with uncontaminated and undamaged fabric at no additional cost to the Owner.

5. Placement of Rip Rap: Rip rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric.

   a. Rip rap shall be placed with its top elevation conforming to the finished grade or the natural existing slope of the stream bank and stream bottom.

   b. The stone shall be dropped from no more than a three foot height during construction.

   c. Stone rip rap shall be placed to provide a uniform surface to the thickness shown on the Drawings.

   d. The thickness tolerance for the course shall be –3 inches and +6 inches.

B. Grassing:

1. Temporary Stabilization: Temporary stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site.

a. Temporary stabilization shall be provided to any area that will not receive permanent stabilization within the next 14 calendar days.

b. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

2. Permanent Stabilization:

a. Permanent stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Permanent stabilization shall be provided to all areas of land disturbance within seven calendar days of the completion of land disturbance for any area greater than 0.25 acre.

b. Where permanent stabilization cannot be immediately established because of an inappropriate season, the Contractor shall provide temporary stabilization.

c. The Contractor shall return to the site at the appropriate season to provide permanent stabilization in areas that received only temporary stabilization.

3. Grassing shall meet the requirements of Section 700 of the Georgia Department of Transportation Standard Specifications, latest edition, unless specified otherwise.

4. Seed rate, fertilization and other requirements shall be provided as shown on the Drawings.

3.04 CLEAN-UP

A. Dispose of all excess erosion and sedimentation control materials in a manner satisfactory to the Construction Manager.

B. Final clean-up shall be performed in accordance with the requirements of these Specifications and to the satisfaction of the Construction Manager.

END OF SECTION

SECTION 32 12 16

REMOVING AND REPLACING PAVEMENT

PART 1 – GENERAL

1.01 SUMMARY

A. The work to be performed under this Section shall consist of removing and replacing existing pavement, sidewalks and curbs in paved areas where necessary for construction of utilities and all other sewer appurtenances and structures.

B. Existing pavement, sidewalks and curbs shall be replaced to the current Fulton County standards or to match existing, whichever is more stringent.

1.02 SUBMITTALS

A. Certificates: Provide certificates stating that materials supplied comply with Specifications. Certificates shall be signed by the asphalt producer and the Contractor.

B. Traffic paint manufacturer's application instructions and a description and other data relative to the Contractor's application equipment and methods shall be submitted to the Construction Manager for approval.

1.03 CONDITIONS

A. Weather Limitations

1. Apply bituminous prime and tack coats only when the ambient temperature has been at least 55° F for 12 hours immediately prior to application.
2. Do not conduct paving operations when surface is wet or contains excess of moisture which would prevent uniform distribution and required penetration.
3. Construct asphaltic courses only when atmospheric temperature in the shade is above 40° F, when the underlying base is dry and when weather is not rainy.
4. Place base course when air temperature is above 35° F and rising.

B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

PART 2 – PRODUCTS

2.01 MATERIALS AND CONSTRUCTION

A. Graded Aggregate Base Course: Graded aggregate base course shall be of uniform quality throughout and shall meet the requirements of Section 815.01 of the Georgia Department of Transportation Standard Specifications.

B. Black Base: Black base course shall be of uniform quality throughout and shall conform to the requirements of Section 828 of the Georgia Department of Transportation Standard Specifications.

C. Binder Course: The binder course of all paved roadways shall conform to the requirements of Section 400, 12.5 mm Superpave of the Georgia Department of Transportation Standard Specifications.

D. Surface Course: The surface course for all pavement, including prime or tack coat when required by the Construction Manager, shall conform to the requirements of Section 400, 9.5 mm Superpave of the Georgia Department of Transportation Standard Specifications

E. Concrete: Provide concrete and reinforcing for concrete pavement or base courses in accordance with the requirements of the Georgia Department of Transportation Standard Specifications, Section 430. Concrete shall be of the strength classifications shown on the Drawings.

F. Special Surfaces: Where driveways or roadways constructed of specialty type surfaces such as brick or stone are disturbed or damaged, these driveways and roadways shall be restored utilizing similar, if not original, materials. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

2.02 TYPES OF PAVEMENTS

A. General:

1. All existing pavement removed, destroyed or damaged by construction shall be replaced with the same type and thickness of pavement as that existing prior to construction, unless otherwise directed by the Construction Manager.

2. Materials, equipment and construction methods used for paving work shall conform to the Georgia Department of Transportation specifications applicable to the particular type required for replacement, repair or new pavements.

B. Aggregate Base:

1. Aggregate base shall be constructed in accordance with the requirements of Section 310 of the Georgia Department of Transportation Standard Specifications.

2. The maximum thickness to be laid in a single course shall be 6 inches compacted. If the design thickness of the base is more than 6 inches, it

shall be constructed in two or more courses of approximate equal thickness.

3. After the material placed has been shaped to line, grade and cross-section, it shall be rolled until the course has been uniformly compacted to at least 100 percent of the maximum dry density when Group 2 aggregate is used, or to at least 98 percent of maximum dry density when Group 1 aggregate is used.

C. Concrete Pavement:

1. Concrete pavement or base courses shall be replaced with concrete.
2. The surface finish of the replaced concrete pavement shall conform to that of the existing pavement.
3. The surface of the replaced concrete base course shall be left rough.
4. The slab depth shall be equivalent to the existing concrete pavement or base course, but in no case less than 6-inches thick.
5. Transverse and longitudinal joints removed from concrete pavement shall be replaced at the same locations and to the same types and dimensions as those removed.
6. Concrete pavements or concrete base courses shall be reinforced.

D. Asphaltic Concrete Base, Binder and Surface Course:

1. Asphaltic concrete base, binder and surface course construction shall conform to Georgia Department of Transportation Standard Specifications, Section 400.
2. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared, is intact, firm, properly cured, dry and the tack coat has been applied.
3. Apply and compact the base in maximum layer thickness by asphalt spreader equipment of design and operation approved by the Construction Manager.
4. After compaction, the black base shall be smooth and true to established profiles and sections.
5. Apply and compact binder and the surface course in a manner approved by the Construction Manager.
6. Immediately correct any high, low or defective areas by cutting out the course, replacing with fresh hot mix, and immediately compacting to conform and thoroughly bond to the surrounding area.

E. Surface Treatment Pavement:

1. Bituminous penetration surface treatment pavement shall be replaced with a minimum thickness of 1 inch conforming to Section 424, Georgia Department of Transportation Standard Specifications.

F. Gravel Surfaces:

1. Existing gravel road, drive and parking area replacement shall meet the requirements of graded aggregate base course.

2. This surfacing may be authorized by the Construction Manager as a temporary surface for paved streets until replacement of hard surfaced pavement is authorized.

G. Temporary Measures:

1. During the time period between pavement removal and complete replacement of permanent pavement, maintain highways, streets and roadways by the use of steel running plates anchored to prevent movement.

2. The backfill above the pipe shall be compacted, as specified, up to the existing pavement surface to provide support for the steel running plates. All pavement shall be replaced within seven calendar days of its removal.

PART 3 – EXECUTION

3.01 LOCATIONS FOR PAVEMENT REPLACEMENT

A. Pavement shall be removed and replaced with similar type and thickness as the original pavement, for the entire length of pipe laying and up to required trench width as per details shown on the Drawings.

3.02 REMOVING PAVEMENT

A. General: Remove existing pavement as necessary for installing the pipe line and appurtenances.

B. Marking: Before removing any pavement, mark the pavement neatly paralleling pipe lines and existing street lines. Space the marks the width of the trench.

C. Breaking: Break asphalt pavement along the marks using pavement shearing equipment, jack hammers or other suitable tools. Break concrete pavement along the marks by scoring with a rotary saw and breaking below the score by the use of jack hammers or other suitable tools.

D. Machine Pulling: Do not pull pavement with machines until the pavement is completely broken and separated from pavement to remain.

E. Damage to Adjacent Pavement: Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.

F. Sidewalk: Remove and replace any sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.

G. Curbs: Tunnel under or remove and replace any curb disturbed by construction to the nearest undisturbed joint.

H. Cutting: Before removing any existing pavement, saw cut the pavement in full thickness.

3.03 REPLACING PAVEMENT

A. Preparation of Subgrade: Upon completion of backfilling and compaction of the backfill, arrange to have the compaction tested by an independent testing laboratory approved by the Construction Manager. After compaction testing has been satisfactorily completed, replace all pavements, sidewalks and curbs removed.

1. The existing street pavement or surface shall be removed along the lines of the work for the allowable width specified for the trench or structure.

2. After the installation of the pipelines and after the backfill has been compacted suitably, the additional width of pavement to be removed, as shown on the Drawings, shall be done immediately prior to replacing the pavement.

3. Trench backfill shall be compacted for the full depth of the trench as specified in Section 31 23 00 of these Specifications.

4. Temporary trench backfill along streets and driveways shall include 6 inches of crushed stone or cherty clay as a temporary surfacing of the trenches.

   a. This temporary surface shall be maintained carefully at grade and dust-free by the Contractor until the backfill of the trench has thoroughly compacted in the opinion of the Construction Manager and permission is granted to replace the street pavement.

5. When temporary crushed stone or chert surface is considered by the Construction Manager to be sufficient surface for gravel pavement, the surface shall be graded smooth and to an elevation that will make the final permanent surfacing level with the adjacent surfacing that was undisturbed.

B. Pavement Replacement

1. Prior to replacing pavement, make a final cut in concrete pavement 12 inches back from the edge of the damaged pavement with a concrete saw.

2. Remove asphalt pavement 12 inches back from the edge of the damaged pavement using pavement shearing equipment, jack hammers or other suitable tools.

   a. Pavement cuts shall be parallel or perpendicular to the road centerline as much as practical.

   b. On parallel installations the final cut shall be long and straight and consistent.

3. Replace all street and roadway pavement as shown on the Drawings. Replace driveways, sidewalks and curbs with the same material, to nearest existing undisturbed construction joint and to the same dimensions as those existing.

4. If the temporary crushed stone or chert surface is to be replaced, the top 6 inches shall be removed and the crushed stone surfacing for unpaved streets or the base for the bituminous surface shall be placed.

5. Following this preparation, the chert or crushed stone base shall be primed with a suitable bituminous material and surfaced with the proper type of bituminous surface treatment.

6. Where the paved surface is to be replaced with asphaltic concrete pavement, concrete pavement or with a concrete base and a surface course, the temporary chert or crushed stone surface and any necessary backfill material, additional existing paving and new excavation shall be removed to the depth and width shown on the Drawings.

    a. All edges of the existing pavement shall be cut to a straight, vertical edge.

    b. Care shall be used to get a smooth joint between the old and new pavement and to produce an even surface on the completed street.

    c. Concrete base slabs and crushed stone bases, if required, shall be placed and allowed to cure for three days before bituminous concrete surface courses are applied.

    d. Expansion joints, where applicable, shall be replaced in a manner equal to the original joint.

7. Where driveways or roadways, constructed of specialty type surfaces, such as brick or stone are disturbed or damaged, these driveways and roadways shall be restored utilizing similar materials.

    a. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition.

    b. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

C. Pavement Resurfacing:

1. Certain areas to be resurfaced are specified or noted on the Drawings.

    a. After all pipe line installations are complete and existing pavement has been removed and the trench route has been repaired, mill entire area to be resurfaced 1-1/2 inches, then apply tack coat and 1-1/2 inches of 9.5 mm Superpave surface course as specified.

    b. Where pavement to be resurfaced has been damaged with potholes, the Contractor shall remove all existing loose pavement material and fill the hole with black base, as specified, to the level of the existing pavement.

2. Resurfacing limits shall be perpendicular to the road centerline.

3. The limits of resurfacing shall be 10 feet beyond the edge of the pavement replacement on the main road being resurfaced, and to the point of tangency of the pavement on the side streets.

D. Pavement Striping:

1. Pavement striping removed or paved over shall be replaced with the same type, dimension and material as original unless directed otherwise by the Construction Manager.

3.04 SIDEWALK AND CURB REPLACEMENT

A. Construction

1. All concrete sidewalks and curbs shall be replaced with concrete.

2. The Contractor shall restore all curbs and combination curbs and gutters which have been removed or disturbed in the progress of the work. Curbing shall be made to conform accurately in size, line, grade and materials with the adjoining curb.

3. The Contractor shall restore all sidewalks which have been removed or disturbed in the progress of the work.

   a. Sidewalks shall be constructed to the same dimensions and materials as the adjoining sections.

   b. Where necessary to cut a sidewalk, entire sections shall be removed and replaced unless otherwise directed by the Construction Manager.

4. Preformed joints shall be 1/2 inch thick, conforming to the latest edition of AASHTO M59 for sidewalks and AASHTO M 123 for curbs.

5. Forms for sidewalks shall be of wood or metal, shall be straight and free from warp and shall be of sufficient strength, when in place, to hold the concrete true to line and grade without springing or distorting.

6. Forms for curbs shall be metal and of an approved section.

   a. They shall be straight and free from distortions, showing no vertical variation greater than 1/8 inch in 10 feet and no lateral variation greater than 1/4 inch in 10 feet from the true plain surface on the vertical face of the form.

   b. Forms shall be of the full depth of the structure and constructed such as to permit the inside forms to be securely fastened to the outside forms.

7. Wood forms may be used on sharp turns and for special sections as approved by the Construction Manager. Where wooden forms are used, they shall be free from warp and shall be the nominal depth of the structure.

8. All mortar and dirt shall be removed from forms and all forms shall be thoroughly oiled or wetted before any concrete is deposited.

B. When a section is removed, the existing sidewalk or curb shall be cut to a neat line, perpendicular to both the centerline and the surface of the concrete slab.

C. Existing concrete shall be cut along the nearest existing construction joints. If such joints do not exist, the cut shall be made at minimum distances shown on the Drawings.

D. Existing concrete sidewalks and curbs that have been cut and removed for construction purposes shall be replaced with the same width and surface as the portion removed.

E. Sidewalks shall have a minimum uniform thickness of 4-inches. The new work shall be neatly jointed to the existing concrete so that the surface of the new work shall form an even, unbroken plane with the existing surfaces.

F. The subgrade shall be formed by excavating to a depth equal to the thickness of the concrete, plus 2 inches.

1. Subgrade shall be of such width as to permit the proper installation and bracing of the forms.
2. Subgrades shall be compacted by hand tamping or rolling. Soft, yielding or unstable material shall be removed and backfilled with satisfactory material.
3. Place 2 inches of porous crushed stone under all sidewalks and curbs and compacted thoroughly, then finish to a smooth, unyielding surface at proper line, grade and cross section.

G. Joint for Curbs

1. Joints shall be constructed as indicated on the Drawings and as specified. Construct joints true to line with their faces perpendicular to the surface of the structure and within 1/4 inch of their designated position.
2. Thoroughly spade and compact the concrete at the faces of all joints filling all voids.
3. Install expansion joint materials at the point of curve at all street returns. Install expansion joint material behind the curb at abutment to sidewalks and adjacent structures.
4. Place contraction joints every 10 feet along the length of the curbs and gutters.
    a. Form contraction joints using steel templates or division plates which conform to the cross section of the structure.
    b. Leave the templates in place until the concrete has set sufficiently to hold its shape, but remove them while the forms are still in place.
    c. Contraction joint templates or plates shall not extend below the top of the steel reinforcement or they shall be notched to permit the reinforcement to be continuous through the joint.
    d. Contraction joints shall be a minimum of 1-1/2 inches deep.

H. Expansion joints shall be required to replace any removed expansion joints or in new construction wherever shown on the Drawings. Expansion joints shall be true and even, shall present a satisfactory appearance, and shall extend to within 1/2 inch of the top of finished concrete surface.

I. Finishing

1. Strike off the surface with a template and finish the surface with a wood float using heavy pressure, after which, contraction joints shall be made and the surface finished with a wood float or steel trowel.
2. Finish the face of the curbs at the top and bottom with an approved finishing tool of the radius indicated on the Drawings.
3. Finish edges with an approved finishing tool having a 1/4 inch radius.
4. Provide a final broom finish by lightly combing with a stiff broom after troweling is complete.
5. The finished surface shall not vary more than 1/8 inch in 10 feet from the established grade.

3.05 RESTORING DRIVEWAY PAVEMENTS

A. The Contractor shall repair or replace all driveway sections disturbed by the process of the work.

1. Driveways shall be constructed of the same materials and to the same thickness of the adjoining wearing surface.
2. In restoring driveways, the subsoil and foundation material shall be well compacted so as to prevent any future settlement or cracking of the driveway pavement.
3. Where necessary to cut a concrete driveway, the cuts shall be made with a masonry saw providing a smooth, straight line completely across the driveway.
4. Partial cut-outs, crooked cuts or cuts made by any methods other than masonry saw are not permitted. In general, where directed, concrete slab removal shall be made in entire pavement sections to the nearest existing expansion-joint.

B. Driveway and Sidewalk Ramp Openings

1. Provide driveway openings of the widths and at the locations indicated on the Drawings and as directed by the Construction Manager.
2. Provide sidewalk ramp openings as indicated on the Drawings in conformance with the applicable regulations and as directed by the Construction Manager.

C. Concrete shall be suitably protected from freezing and excessive heat. It shall be kept covered with burlap or other suitable material and kept wet until cured. Provide necessary barricades to protect the work. All damage caused by people,

vehicles, animals, rain, the Contractor's operations and the like shall be repaired by the Contractor, at no additional expense to the Owner.

3.06 MAINTENANCE

A. The Contractor shall maintain the surfaces of roadways built and pavements replaced until the acceptance of the Project.

1. Maintenance shall include replacement, scraping, reshaping, wetting and rerolling as necessary to prevent raveling of the road material, the preservation of reasonably smooth surfaces and the repair of damaged or unsatisfactory surfaces, to the satisfaction of the Construction Manager.

2. Maintenance shall include sprinkling as may be necessary to abate dust from the gravel surfaces.

3.07 SUPERVISION AND APPROVAL

A. Pavement restoration shall meet the requirements of the regulatory agency responsible for the pavement. Obtain agency approval of pavement restorations before requesting final payment.

B. Obtain the Construction Manager's approval of restoration of pavement, such as private roads and drives, that are not the responsibility of a regulatory agency.

C. Complete pavement restoration as soon as possible after backfilling.

D. Failure of Pavement: Should any pavement restoration or repairs fail or settle during the life of the Contract, including the bonded period, promptly restore or repair defects.

3.08 CLEANING

A. The Contractor shall remove all surplus excavation materials and debris from the street surfaces and rights-of-way and shall restore street, roadway or sidewalk surfacing to its original condition. The right-of-way shall be restored to its original condition.

END OF SECTION

SECTION 32 92 10

TREE REMOVAL AND PROTECTION

PART 1 – GENERAL

1.01 SCOPE

A. The work specified in this Section includes furnishing all labor, equipment and material required to locate, identify, verify condition and remove or protect existing trees as shown on the Drawings and/or as directed by the Construction Manager.

B. The Contractor shall install orange tree protection fencing (barrier) around each tree to be protected, as shown on the Drawings and as ordered by the Construction Manager.

C. No trees or vegetation shall be removed except as specifically exempted or approved by the Construction Manager.

1.02 REFERENCE

A. “Trenching and Tunneling near Trees,” by James R. Fazio. Published by the National Arbor Day Foundation.

B. “Tree Preservation Ordinance and Administrative Guide Lines,” Fulton County, latest edition.

1.03 QUALIFICATIONS

A. Contractor shall have on staff for the project at least one person with a minimum of 5 years’ experience as nurseryman in planting and protecting trees.

1.04 SUBMITTALS

A. Contractor shall walk the site with local City’s Arborist, to understand (in more detail than shown on the Drawings) the scope and requirements of tree protection for this Project.

B. Prepare a Tree Protection Work Plan describing how tree protection will be handled during installation of the water lines. The Work Plan shall include, but is not limited to:

1. Confirmation of identification of specimen trees (shown on the Drawings) and other trees to be protected.
2. Scope of general protection of trees within right-of-ways and along the sewer line trench alignment.
3. Determination of drip line limits of protected trees and approximate free bore lengths.

4. Scope of general protection of trees outside right-of-ways but in close proximity to work areas.
5. Extent of approved or required tree limb cutting and trimming to make space for work area.
6. Extent of approved or required tree root cutting, if necessary within trench area.
7. Confirmation of the type of protective fencing, other protective measures as required, and installation details.

C. Contractor shall submit five copies of the Tree Protection Work Plan to the Construction Manager for approval. Contractor shall not begin any field activity prior to approval of this Work Plan by the Construction Manager and City Arborist.

PART 2 – PRODUCTS

2.01 PRODUCTS

A. Protective Fencing

1. Orange Safety Fencing: Minimum 4 feet in width and shall be made of high density polyethylene resin, extruded and stretched to provide a highly visible bright orange, non-fading fence.
   a. The fabric shall remain flexible from -60° F to 200° F and shall be inert to most chemicals and acids.
   b. The fabric pattern may vary from diamond to circular with a minimum unit weight of 0.4 lbs. and a maximum opening size of 2 inches.
   c. The fabric shall have minimum tensile yield strength (horizontal) of 2,000 psi and ultimate tensile strength of 2,680 psi.
2. The fencing material shall be supported by steel pipe tee posts or U posts, that are minimum 5 ½ feet in height and spaced no more than 8 feet on centers. The fabric shall be secured to post by bands or wire ties.

B. Warning Signs: A weather proof warning sign shall be prominently displayed on each tree protection fence at 20-foot intervals. The sign shall be minimum 8.5-inches X 11-inches and clearly state in half inch tall letters: “Warning – Tree Protection Zone”.

C. Silt Fence (Type S): Silt fence shall be installed 2 feet from the outside of the tree protection fence where required or directed by the Construction Manager and City Arborist.

D. Trunk Protection: When directed by the City Arborist, the tree trunk protection shall be provided using either 2x4-inch or 2x6-inch planking or plastic strapping.

E. Tree Dressing: Dressing of any damaged areas shall be accomplished using any approved asphaltic tree wound paint immediately after damage occurs.

PART 3 – EXECUTION

3.01 EXECUTION

A. Protective Fencing:

1. All trees and shrubs in the proximity of the construction site shall be carefully checked for damage prior to initiation of any construction activity.
2. All individual trees, shrubs and natural areas scheduled for preservation shall be protected during construction with temporary fencing as indicated on the Drawings or directed by the City Arborist.
3. Protective fences shall be installed prior to the start of any site preparation work (clearing, grubbing or grading) and shall be maintained in functioning condition throughout all phases of the construction project.
4. Protective fence locations in close proximity to intersecting streets or drives shall adhere to the site distance requirements.

B. Protective fences shall be constructed around trees to be protected, at the locations (typically the outer limits of the Critical Root Zone) and with materials indicated on the Drawings to prevent the following:

1. Soil compaction in the root zone area resulting from vehicular traffic or storage of equipment or materials.
2. Root zone disturbances due to grade changes greater than 6-inch cut or fill or trenching not reviewed and authorized by the City Arborist or the Construction Manager.
3. Damage to exposed roots, trunks or limbs by mechanical equipment.
4. Other activities detrimental to trees such as chemical storage, concrete truck cleaning and fires.

C. Exceptions to the installation of protective fences at the tree drip lines may be permitted in the following cases:

1. Where there is to be an approved grade change, impermeable paving surface, tree well or other such site development, the fence shall be erected approximately 2 to 4 feet beyond the areas of disturbance.
2. When permeable paving is to be installed within a tree drip line, the fence shall be erected at the outer limits of the permeable paving area prior to any site grading so that this enclosed area is graded separately to minimize root damage.
3. When trees are located close to a proposed building or other construction activity, the fence shall be erected to allow 6 to 10 feet work space between

the fence and the structure and apply organic mulch to a depth of 4 to 6 inches in the unprotected root zone area.

4. When there are street-side pedestrian walkways, fences shall be constructed in a manner that does not obstruct safe passage.

5. When there are severe space constraints due to tract size or other special requirements, the Contractor shall contact the Arborist or the Construction Manager to discuss alternatives.

6. When any of the exceptions listed above will result in a fence being located closer than five (5) feet to a tree trunk, the Contractor shall also protect the trunk with strapped-on planking to a height of 8 feet or to the limits of lower branching in addition to the reduced fencing required.

D. Repair of Damage:

1. Tree roots scarred by equipment shall be cut cleanly and covered with topsoil.

2. When tree roots are pruned, a comparable portion of selected branches shall be cut from the tree on the opposite side.

3. Limb pruning shall be made at the branch collar. All limbs greater than 1-inch in diameter shall be precut in accordance with ANSI 300 pruning methods to prevent splitting.

4. All cut limbs shall be treated with an approved tree dressing. Tools shall be disinfected with alcohol or 5 ppm chlorine solution between repairs to trees to prevent the transmission of diseases from one tree to another.

5. All trees damaged during construction shall receive an application of fertilizer within the drip line at the rate of 4 pounds per caliper inch.

E. Cutting and Filling Around Trees:

1. When the depth of an excavation or embankment exceeds 6 inches of any tree with a diameter greater than 8 inches, a tree well shall be constructed to protect the tree.

F. Free Bore:

1. Where a pipe is to be installed within critical root zone (CRZ) and inside drip line area, installation of the pipe by free bore method is required to protect trees.

2. The length of free bore shall extend a minimum of five feet beyond drip line on both sides or as recommended length in the table provided on the Drawings, whichever is greater. The depth of free bore shall be such that there is a minimum of 4 feet of cover on top of pipe.

3. The location and procedures shall be approved by the Construction Manager and City Arborist.

G. Paving Around Trees:

1. Where paving within the drip line of any tree greater than a 6 inch diameter is necessary, a permeable pavement and aeration system must be installed except for street construction.

H. Tree Removal:

1. Trees which directly interfere with construction may only be removed if approval of the Construction Project Manager and City Arborist has been obtained.
2. When a tree or shrub is scheduled for removal, it shall be cut to a depth of 12 inches below the surrounding ground line.
3. After removal, soil shall be placed in the hole to a depth matching the existing grade.
4. The tree shall be cut into sections that can be managed, removed from the site and disposed of.
5. All work shall be conducted in such a manner as to protect all facilities, improvements and vegetation in the work area. All damage resulting from tree removal or pruning shall be repaired at the Contractor's own expense.

I. Final Cleanup:

1. All temporary tree and shrub preservation and protection measures shall be removed when the construction has been completed.

J. Roots larger than 2-inch diameter shall not be cut without written permission from the City Arborist.

END OF SECTION

SECTION 32 92 19

SEEDING

PART 1 – GENERAL

1.01 SCOPE

A. The work covered by this Section consists of furnishing all labor, equipment and material required to place topsoil, seed, commercial fertilizer, agricultural limestone and mulch material, including seedbed preparation, harrowing, compacting and other placement operations on graded earthen areas as described herein and/or shown on the Drawings.

B. In general, seeding operations shall be conducted on all newly graded earthen areas not covered by structures, pavement or sidewalks, all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces.

C. Areas disturbed by borrow activities shall also be seeded according to these Specifications.

D. The work shall include temporary seeding operations to stabilize earthen surfaces during construction or inclement weather and to minimize stream siltation and erosion.

E. Temporary seeding shall be performed at the times and locations as directed by the Construction Manager.

F. All work shall in accordance with the Manual for Erosion and Sediment Control in Georgia, latest edition.

1.02 QUALITY ASSURANCE

A. Prior to seeding operations, the Contractor shall furnish to the Construction Manager labels or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished.

B. Acceptance of the seed test reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this Section.

C. Prior to topsoil operations, the Contractor shall obtain representative samples and furnish soil test certificates including textural, pH, and organic analysis from the State University Agricultural Extension Services or other certified testing laboratory.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. All materials shall conform to the requirements and standards of this Section.

B. Wood-cellulose fiber mulch shall be manufactured by Weyerhaeuser Company or Conway Corporation.

2.02 TOPSOIL

A. Utilizing designated stockpiles or borrow areas on site, the Contractor shall place a minimum of 4-inches of topsoil over all graded earthen areas and over any other areas to be seeded.

1. Sources of topsoil shall be approved by the Construction Manager prior to disturbance.
2. Importing topsoil from offsite sources shall be at the discretion of the Construction Manager and shall be justification for additional compensation to the Contractor.
3. A change order properly authorized by the Owner shall be agreed upon prior to importing offsite topsoil. No additional compensation will be allowed for spreading of topsoil.

B. Topsoil shall be a friable loam containing a large amount of humus and shall be original surface soil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than 1/2-inch in diameter, lime, cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips or other undesirable material harmful or unnecessary to plant growth.

C. Topsoil shall be reasonably free from perennial weeds and shall not contain objectionable plant material, toxic amounts of either acid or alkaline elements or vegetable debris undesirable or harmful to plant life.

D. Topsoil shall be natural topsoil without admixture of subsoil material, and shall be classifiable as loam, silt loam, clay loam, sandy loam or a combination thereof. The pH shall range from 5.5 to 7.0.

E. Topsoil shall contain not less than five percent nor more than 20 percent, by weight, of organic matter as determined by loss on ignition of oven-dried samples to 65 degrees C.

2.03 SEED

A. Seed shall be delivered in new bags or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.

B. All seeds shall be from the last crop available at time of purchase and shall not be moldy, wet or otherwise damaged in transit or storage.

C. Seed shall bear the growers analysis testing to 98 percent for purity and 90 percent for germination. At the discretion of the Construction Manager, samples of seed may be taken for verification against the grower's analysis.

D. Species, rate of seeding, fertilization and other requirements are shown on Table 1.

2.04 FERTILIZER AND LIMING MATERIALS

A. Fertilizer and liming materials shall comply with applicable state, local and federal laws concerned with their production and use.

B. Commercial fertilizer shall be a ready mixed material equivalent to the grade or grades specified in Table 1. Container bags shall have the name and address of the manufacturer, the brand name, net weight and chemical composition.

C. Agricultural limestone shall be a pulverized dolomitic limestone having a calcium carbonate content of not less than 85 percent by weight. Agricultural limestone shall be crushed so that at least 85 percent of the material will pass a No. 10 mesh screen and 50 percent will pass a No. 40 mesh screen.

2.05 MULCH MATERIAL

A. All mulch materials shall be air dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.

B. Mulch shall be composed of wood cellulose fiber, straw or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch blowing equipment.

C. Straw mulch shall be partially decomposed stalks of wheat, rye, oats or other approved grain crops.

D. Stalks shall be the partially decomposed, shredded residue of corn, cane, sorghum or other approved standing field crops.

2.06 MULCH BINDER

A. Mulch on slopes exceeding 3 to 1 ratio shall be held in place by the use of an approved mulch binder. The mulch binder shall be non-toxic to plant life and shall be acceptable to the Construction Manager.

B. Emulsified asphalt binder shall be Grade SS-1, ASTM D 977. Cutback asphalt binder shall be Grade RC 70 or RC 250.

2.07 LEGUMES

A. All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen-fixing bacteria that is adapted to the particular seed involved.

2.08 WATER

A. Water shall be clean, clear water free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the Contractor.

PART 3 – EXECUTION

3.01 SECURING AND PLACING TOPSOIL

A. Topsoil shall be secured from areas from which topsoil has not been previously removed, either by erosion or mechanical methods. Topsoil shall not be removed to a depth in excess of the depth approved by the Construction Manager.

B. The area or areas from which topsoil is secured shall possess such uniformity of soil depth, color, texture, drainage and other characteristics as to offer assurance that, when removed, the product will be homogeneous in nature and will conform to the requirements of these Specifications.

C. All areas from which topsoil is to be secured, shall be cleaned of all sticks, boards, stones, cement, ashes, cinders, slag, concrete, bitumen or its residue and any other refuse which will hinder or prevent growth.

D. In securing topsoil from a designated pit or elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such material shall be removed from the topsoil or if required by the Construction Manager, the pit shall be abandoned.

E. Before placing or depositing topsoil upon any areas, all improvement within the area shall be completed, unless otherwise approved by the Construction

F. The areas in which topsoil is to be placed or incorporated shall be prepared before securing topsoil for use.

3.02 SEEDBED PREPARATION

A. Before fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line from unsightly variation, bumps, ridges and depressions and all detrimental material, roots and stones larger than 3-inches in any dimension shall be removed from the soil.

B. No earlier than 24 hours before the seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than 4-inches with a weighted disc, tiller, pulvimixer or other equipment, until the surface is smooth and in a condition acceptable to the Construction Manager.

C. If the prepared surface becomes eroded as a result of rain or for any other reasons, or becomes crusted before the seed is sown, the surface shall again be placed in a condition suitable for seeding.

D. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition, as determined by the Construction Manager.

3.03 FERTILIZATION AND LIMING

A. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded so as to achieve the application rates shown on Table 1.

B. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of 1-inch.

C. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed shall not remain in water containing fertilizer for more than 30 minutes when a hydraulic seeder is used.

D. Agricultural limestone shall be thoroughly mixed into the soil according to the rates shown on Drawings.

1. The specified rate of application of limestone may be reduced by the Construction Manager if pH tests indicate this to be desirable.
2. It is the responsibility of the Contractor to obtain such tests and submit the results to the Construction Manager for adjustment in rates.

E. It is the responsibility of the Contractor to make one application of a maintenance fertilizer according to the recommendations listed in Table 1.

3.04 SEEDING

A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition.

B. Seeding shall be performed during the dates shown in Table 1 unless otherwise approved by the Construction Manager. Seed mixtures may be sown together provided they are kept in a thoroughly mixed condition during the seeding operation.

C. Seed shall be uniformly sown by any approved mechanical method suitable for the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder or approved mechanical power drawn seed drills.

D. Hydro-seeding and hydro-mulching may be used on steep embankments, provided full coverage is obtained.

E. Care shall be taken to adjust the seeder for seeding at the proper rate before seeding operations are started and to maintain their adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.

F. Immediately after sowing, the seeds shall be covered and compacted to a depth of 1/8 to 3/8-inch by a cultipacker or suitable roller.

G. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculant in accordance with the manufacturer's mixing instructions.

3.05 MULCHING

A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding.

B. The mulch shall be applied evenly so as to permit sunlight to penetrate and the air to circulate and at the same time shade the ground, reduce erosion and conserve soil moisture.

1. Approximately 45 percent of the ground shall be visible through the mulch blanket.

C. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:

1. Wood Cellulose Fiber: 1,400 pounds/acre.
2. Straw: 4,000 pounds/acre.
3. Stalks: 4,000 pounds/acre.
4. These rates may be adjusted, at the discretion of the Construction Manager, depending on the texture and condition of the mulch material and the characteristics of the seeded area at no additional cost to the Owner.

D. Mulch on slopes greater than 3 to 1 ratio shall be held in place by the use of an approved mulch binder.

1. Binder shall be thoroughly mixed and applied with the mulch.
2. Emulsified asphalt or cutback asphalt shall be applied at the approximate rate of five gallons per 1,000 square feet as required to hold the mulch in place.

E. The Contractor shall cover structures, poles, fences and appurtenances if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.

F. Mulch and binder shall be applied by suitable blowing equipment at closely controlled application rates in a manner acceptable to the Construction Manager.

3.06 WATERING

A. The Contractor shall be responsible for maintaining the proper moisture content of the soil to insure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain an adequate water content in the soil.

B. Watering shall be accomplished by hoses, tank truck or sprinklers in such a way to prevent erosion, excessive runoff and over-watered spots.

3.07 MAINTENANCE

A. Upon completion of seeding operations, the Contractor shall clear the area of all equipment, debris and excess material and the premises shall be left in a neat and orderly condition.

B. The Contractor shall maintain all seeded areas without additional payment until final acceptance of the work by the Owner, and any regrading, refertilizing, reliming, reseeding or remulching shall be done at Contractor's own expense. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is accomplished.

C. Damage resulting from erosion, gulleys, washouts or other causes shall be repaired by filling with topsoil, compacting and repeating the seeding work at Contractor's expense.

TABLE 1

SEEDING REQUIREMENTS

Sowing Season	Species	Rates per 1,000 Square Feet		
		Seed	Fertilizer	Lime
3/15 - 8/14	Common Bermuda (hulled) (Giant Bermuda Seed, including NK-37 is not acceptable) Annual Ryegrass	2lbs. 2 lbs.	35 lbs. 6-12-12	25 lbs.
	Total	4 lbs.		
8/15 - 3/14	Common Bermuda (unhulled) Annual Ryegrass	2lbs. 2 lbs.	45 lbs. 6-12-12	25 lbs.
	Total	4 lbs.		

END OF SECTION

SECTION 32 92 23

SODDING

PART 1 – GENERAL

1.01 SCOPE

A. Sodding shall consist of establishing certain critical areas with sod as designated on the Drawings.

PART 2 – PRODUCTS

2.01 SOD

A. Sod shall consist of a live, dense, well-rooted growth of turf grass species as noted on the Drawings.

B. The sod shall be free from Johnson grass, nut grass and other obnoxious grasses and shall be of suitable character for the purpose intended and for the soil in which it is to be planted.

C. It shall be un-injured at the time of planting.

D. Sod shall be uniform in thickness, having not over 2-inches or less than 1-inch of soil.

E. Sod strips shall have a consistent width of 12 or 18-inches.

2.02 FERTILIZER

A. Fertilizer (10-10-10) used in connection with sodding, shall contain 10 percent nitrogen, 10 percent phosphoric acid and 10 percent potash. The fertilizer shall be furnished in standard containers with the name, weight and guaranteed analysis of the contents clearly marked.

B. The containers shall ensure proper protection in handling and transporting the fertilizer. All commercial fertilizer shall comply with local, State and Federal fertilizer laws.

C. Ammonium nitrate shall be a standard commercial product, shall conform to the requirements for other commercial fertilizers as specified above and shall have a minimum of 32-1/2 percent nitrogen.

2.03 LIME

A. Agricultural limestone shall be dolomitic and contain not less than 85 percent of calcium carbonate and magnesium carbonate combined, and shall be crushed so

that at least 85 percent will pass a No.10 mesh sieve and 50 percent will pass a No. 40 mesh screen.

2.04 WEATHER LIMITATIONS

A. Sod shall be planted only when the soil is moist and favorable to growth. No planting shall be done between October 1 and April 1 unless weather and soil conditions are considered favorable and permission is granted by the Construction Manager.

PART 3 – EXECUTION

3.01 SODDING

A. The area to be sodded shall be constructed to the lines and grades indicated on the Drawings or as directed by the Construction Manager, and the surface loosened to a depth of not less than 3-inches with a rake or other device.

B. If necessary, it shall be sprinkled until saturated at least 1-inch in depth and kept moist until the sod is place thereon.

C. Immediately before placing the sod, the fertilizer shall be uniformly applied at the rate of 12 pounds of Grade 10-10-10, or equivalent, per 1,000 square feet. Agricultural limestone shall be applied at the rate of 50 pounds per 1,000 square feet.

D. The entire area shall be thoroughly covered with sod. The sod shall be placed on the prepared surface with the edges in close contact and, as far as possible, with staggered joints.

E. The sod shall be maintained moist from time of removal until reset but shall be placed as soon as practicable after removal from place where growing.

F. Immediately after placing it shall be rolled with a light-weight roller or hand tamped to the satisfaction of the Construction Manager.

G. Sod on slopes steeper than 3 to 1 shall be held in place by wooden pins about 1-inch square and 6-inches long, driven through the sod into the soil until they are flush with the top of the sod.

3.02 WATERING AND MAINTENANCE

A. The sod shall be watered as directed by the Construction Manager for a period of two weeks after which ammonium nitrate shall be applied at the rate of three pounds per 1,000 square feet and the sod given a final watering.

B. The Contractor shall not allow any equipment or material to be placed on any planted area and shall erect suitable barricades and guards to prevent Contractor's equipment, labor or the public from traveling on or over any area planted with sod.

C. It shall be the obligation of the Contractor to secure a satisfactory growth of grass before final acceptance of the Project.

END OF SECTION

SECTION 33 01 30.71

PIPE BURSTING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes requirements to rehabilitate existing gravity sanitary sewers using a pipe bursting system.

B. The work also includes reconnection of existing sewer service house connections, connections to manholes, construction of drop manholes, television inspection of the polyethylene pipe and placing replacement pipelines into service in accordance with the Contract Documents.

C. Only pneumatically operated equipment with either front or rear expanders for the proper connection to the polyethylene pipe will be allowed for use.

1. Exception to this requirement will only be considered where a static burster unit is proposed for use on isolated segments of pipeline that are to be burst closely adjacent to building foundations or other sensitive structures and where pneumatic bursting might be detrimental.

2. The pneumatic burster must be used in conjunction with a constant tension hydraulic twin capstan winch of either 20, 10 or 5 tons, the size of the winch depends on the diameter of the pipe to be replaced.

3. In no case is the constant tension on the winch to exceed 20 tons.

D. Refer to Section 33 31 00, High Density Polyethylene (HDPE) Pipe and Fittings, for additional requirements.

1.02 DEFINITIONS

A. Pipe Bursting: Process of splitting or fracturing the host sewer main and forcing the fragments into the surrounding soil, for the purpose of inserting a replacement pipe of equal or larger diameter.

1. Accomplished by use of pneumatic, static or hydraulic bursting head, with pipe splitters as cutting wheels as needed.

2. Mole or bursting head is directionally guided by host sewer main and towed under tension by winch, chain or rod assembly.

3. Replacement pipe towed or jacked in immediately behind mole or bursting head.

B. Host Sewer Main: Existing pipeline subject to pipe bursting system, made of vitrified clay, asbestos cement, polyvinyl chloride (PVC), cast iron, ductile iron, concrete, steel or lined pipe.

C. Replacement Pipe: Pipe inserted into host sewer main by pipe bursting system.

D. Continuous Pipe: Pipe, such as High Density Polyethylene (HDPE) pipe, with welded joints, assembled and inserted to form continuous section between access pits.

E. Sectional Pipe: Pipe, such as HDPE pipe, vitrified clay pipe (VCP), polymer pipe, or PVC pipe assembled using leak proof joints and inserted into host sewer main in sections.

F. Renew Lateral: Replace service lateral in public space or easement by pipe bursting, or if necessary by excavation and replacement.

1.03 REFERENCES

A. This section contains references to the following documents.

1. They are a part of this section to the extent referenced in this specification. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.

2. In the event of a conflict between the requirements of this section and those of the referenced documents, the requirements of this specification shall prevail.

3. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the time of construction.

4. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

5. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI/AWWA C906	*Polyethylene (PE) Pressure Pipe and Fittings, 4 in. through 65 in. (100 mm through 1,650 mm), for Waterworks*
ASTM C923	*Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals*
AWWA M55	*PE Pipe–Design and Installation*

Reference	Title
ASTM D2321	*Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications*
ASTM D1248	*Polyethylene Plastics Molding and Extrusion Materials*
ASTM D3035	*Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter*
ASTM D3261	*Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing*
ASTM D3350	*Standard Specification for Polyethylene Plastics Pipe and Fittings Materials*
ASTM D4218	*Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique*
ASTM F585	*Standard Guide for Insertion of Flexible Polyethylene Pipe Into Existing Sewers*
ASTM F714	*Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter*
ASTM F1055	*Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing*
ASTM F1290	*Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings*
ASTM F1417	*Standard Practice for Installation Acceptance of Plastic Non-Pressure Sewer Lines Using Low-Pressure Air*
ASTM F2164	*Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure*
ASTM F2206	*Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE)*
ASTM F2620	*Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings*
ASTM F2786	*Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Gaseous Testing Media Under Pressure (Pneumatic Leak Testing)*
PPI TR-4	*PPI Listing of Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe*

1.04 QUALITY ASSURANCE

A. The Contractor shall be certified by the pipe bursting system patent owner, Britishgas- PLC (BG-PLC}, U.S. Patent 4738565, that such a company is a fully trained and licensed user of the pipe bursting system.

B. Contractor or pipe bursting subcontractor shall have:

1. Minimum experience of 150,000 L.F. of pipe bursting existing gravity sanitary sewer pipe and replacing with polyethylene pipe within the last three years, AND

2. Minimum experience of 10,000 L.F. of pipe bursting replacement experience with polyethylene pipe two sizes greater than the host pipe, such as 10-inch to 15-inch diameter, 12-inch to 18-inch diameter, etc., in the last three years.

C. Polyethylene pipe jointing shall be performed by personnel trained in the use of butt-fusion equipment and recommended methods for replacement pipe connections.

1. Personnel directly involved with installing the replacement pipe shall receive training in the proper methods for handling and installing the polyethylene pipe

2. Training shall be performed by a qualified representative.

D. Contractor shall hold the County, the Construction Manager and the Engineer harmless in any legal action resulting from patent infringements.

1.05 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section, the Contractor shall comply with the latest edition of the Standard Specifications for Fulton County Public works Construction together with the latest adopted editions of the Regional and Fulton County Supplement Amendments, especially concerning the reconstruction of manholes and cleanouts.

B. Except as otherwise indicated, the current editions of the following apply to the work of this Section:

1. ASTM D 1248 Polyethylene Plastics Molding and Extrusion Materials.

1.06 REGULATORY REQUIREMENTS

A. The work of this Section shall comply with the current versions, with revisions, of OSHA 29 CFR1910.146 (permit-required confined-space regulations).

B. All work and testing shall comply with the applicable Federal codes, including:

1. Federal Occupational Safety and Health Act of 1970

2. Construction Safety Act of 1969, as amended

3. Applicable state and local codes and standards

4. To the extent applicable with the requirements of the Underwriter's Laboratories, Inc. and the National Electric Code.

C. The Contractor shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.

D. No confined space entry will be permitted without the development and implementation of a confined space entry plan.

1. Plan shall be in accordance with OSHA standards.
2. Personnel involved shall have current training certificates.
3. Entry permit is required prior to entry.

1.07 RESPONSIBILITY FOR OVERFLOWS OR SPILLS

A. It shall be the responsibility of the Contractor to schedule and perform his work in a manner that does not cause or contribute to incidence of overflows or spills of sewage from the sewer system.

B. In the event that the Contractor's work activities contribute to overflows or spills, the Contractor shall immediately take appropriate action to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill, and notify the Construction Manager in a timely manner.

C. Contractor will indemnify and hold harmless the County for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering and administrative expenses of the County in defending such fines and claims.

1.08 SUBMITTALS

A. Submit the following in accordance with the requirements of Section 01 33 23 of these Specifications.

1. Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of replacement pipe and fittings. Include manufacturer's recommendations for handling, storage, joint welding and repair of pipe and fittings damaged.
2. Methodology for construction and restoration of existing sewer service connections.
3. Detail drawings and written descriptions of the entire construction procedure to install pipe, bypass sewerage flow and reconnection of sewer service connections, restoration of manhole base and provision for facilitating watertight junction of replacement pipe to existing and reconstructed manholes.
4. Certification of workmen trained for HDPE pipe fusion and installation..
5. Pre and post upgrade CCTV inspection reports and videos. Post upgrade reports and videos shall be made after pipe installation and re-connection of all laterals and immediately prior to the commissioning stage.
6. Written certification that the Contractor is an approved BG-PLC licensee of the pneumatic bursting system from T.T. Technologies or approved equal.

B. Schedules

1. An initial schedule shall be submitted at the preconstruction meeting by the Contractor. The schedule submitted at the preconstruction meeting and subsequent (quarterly meeting) schedule submitted during the course of the project shall show at a minimum:
    a. Each site operation requiring the use of separate crew of equipment and/or labor as a separate activity.
    b. The assumed limitations upon the sequence of activities and the anticipated start and completion time for the activities in weeks, numbered from the date of the notice to proceed of the project
    c. The number, nature and size of the plant and/or labor teams which it is anticipated shall be used on each activity
    d. A description of the proposed methods of construction as well as the nature and extent of temporary works
    e. The critical path of activities required to complete the whole of the work.
    f. List of all subcontractors including the identification of the task and number of personnel.
2. After the initial schedule is submitted, and the end of each week until contact completion has been reached, the Contractor shall submit a report in writing comprising:
    a. A list of those activities shown on the current schedule which were begun during the week stating their remaining duration's and their anticipated completion times.
    b. A list of those activities begun previously upon which work continued during the week and their anticipated completion times.
    c. A list of those activities begun previously but upon which no work was carried out during week stating their remaining duration's in weeks and their anticipated completion times.
    d. A list of activities completed during the week.
    e. If the anticipated completion time of any activity reported is later than that previously reported, or where not previously reported later than the completion time shown on the current schedule, the circumstances which in the opinion of the Contractor have caused the anticipated delay shall be stated.
        1) Any other matters not previously reported which in the opinion of the Contractor may cause delay to the current schedule shall be described.
        2) The current schedule is the revised schedule last produced and submitted to the Construction Manager or where no revised schedule has been submitted the latest revision of the initial schedule submitted.

C. The following information shall be submitted by pipe and fitting suppliers:

1. Name of the pipe manufacturer and a list of the piping and quantities to be provided by manufacturer.
2. Name(s) of fitting manufacturer(s) and lists of fittings and quantities to be provided by manufacturer.
3. Pipe and fitting product data indicating conformance with this Specification, applicable standards, and warranty provisions, including written documentation regarding any intended variance from this specification and applicable standards.
4. At the time of shipment, the supplier shall provide certified documentation of pipe and fitting conformance with this Specification and applicable pipe and fitting standards specified herein.

D. The following information shall be submitted by Fusion Providers.

1. Documentation that each Fusion Technician has met requirements for joining proficiency for each type of fusion joint performed by the Fusion Technician under this specification.
2. Documentation of conformance with this Specification and applicable standards, including written documentation regarding any intended variance from this Specification and applicable standards.
    a. This will include fusion joint warranty information and recommended project specific fusion parameters, including criteria logged and recorded by data logger.

E. The following AS-RECORDED DATA is required from the Contractor and/or Fusion Provider:

1. Fusion reports for each fusion joint performed on the project, including joints that were rejected.
2. Submittals of the Fusion Technician’s joint reports are required as requested by the Owner or Construction Manager.
3. Specific requirements of the Fusion Technician’s joint report shall include:
    a. Pipe or fitting size and DR or pressure class rating.
    b. Fusion equipment size and identification.
    c. Fusion Technician Identification.
    d. Job Identification Number.
    e. Fusion Number.
    f. Fusion joining parameters.
    g. Ambient Temperature.

PART 2 - PRODUCTS

2.01 PIPE BURSTING SYSTEMS

A. Pipe Insertion Method (PIM).

1. TT Technology method.
2. Tenbusch method.
3. TRS System method.
4. TTS300 methods.
5. XPANDIT method.
6. Vermeer Hammerhead mole method.
7. Nowak Pipe Reaming InneReam method.
8. Or approved equal.

2.02 MATERIALS

A. General

1. Replacement pipe shall be High Density Polyethylene (HDPE) pipe.
   a. HDPE pipe shall conform to all additional and applicable requirements specified in Section 33 31 00, HDPE Pipe and Fittings, of these Specifications.
2. Same for mainline and lateral.
3. Minimum life span: 50 years.

B. Polyethylene Plastic Pipe shall be high density solid wall polyethylene pipe and meet the applicable requirements of ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter, ASTM D1248 and ASTM D3035.

1. Sizes of the insertions to be used shall be such to renew the sewer to greater flow capacity.
   a. Size of pipe shall meet Ductile Iron Pipe Size in accordance with PE4710.
2. All pipes shall be made of virgin material. No reworked material shall be used except that obtained from the manufacturer's own production of the same formulation.
3. The pipe shall be homogenous throughout and shall be free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters, or other deleterious faults.
4. Dimensions and Ratios: The minimum wall thickness of the polyethylene pipe shall be DR 17 throughout.
5. Material color shall be black with a green stripe. Interior of pipe shall have a light reflective color to allow easier/better viewing for television

inspection.

6. Manufacturer
    a. Chevron Phillips Chemical Driscopipe
    b. WL Plastics
    c. Northern Pipe Products
    d. JM Eagle
    e. Or approved equal.

2.03 DELIVERY, STORAGE, AND HAULING

A. Transportation, handling, and storage of the polyethylene pipe and fittings shall be as recommended by manufacturer.

B. If replacement pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Construction Manager at the Contractor's expense, before proceeding further.

C. Deliver, store and handle other materials as required to prevent damage.

2.04 TESTING

A. Contractor shall furnish samples and material tests for compliance with this Specification from an independent laboratory to verify the required physical properties and characteristics of supplied materials in accordance with the applicable ASTM Specification.

1. A certificate shall be furnished by the manufacturer, upon request, for all material furnished under this specification.
2. Polyethylene plastic pipe and fittings that do not meet any of the requirements of this Specification will be rejected.
3. The Owner will pay for tests on pipe material which meets Specification requirements. Contractor shall pay for failed tests and re-testing of failed materials.

B. Circularity Tests

1. Where required by the Construction Manager, pipes may be tested at ground surface for circularity before installation and welding commences.
2. Circularity will be checked by pulling a closed cylindrical mandrel through the polyethylene pipe.
3. The mandrel’s outside dimension shall be sized to permit no more than 5.0 percent deflection.
4. The percent deflection shall be established from the base inside diameter of the pipe.

a. If the internal beading of the fused joints for the pipe is not required to be removed, the mandrel shall account for this clearance as well.

5. The mandrel shall be approved by the Construction Manager prior to use.

6. The mandrel shall be at least three times the diameter of the pipe in length and not greater than inside diameter of pipe minus 2 millimeters.

7. Lines that permit safe entry may allow other deflection test options, such as direct measurements.

8. Pipes will be rejected which have greater than 5% deformation due to thermal softening.

2.05 EQUIPMENT

A. The pipe bursting tool shall be designed and manufactured to force its way through existing pipe materials by fragmenting the pipe and compressing the old pipe sections into the surrounding soil as it progresses.

B. The bursting unit shall be pneumatic and shall generate sufficient force to burst and compact the existing pipe line. See manufacturer's specifications for what size tool should be used in what diameter of pipe, as well as parameters of what size tool for percentage of upsize allowed.

C. The pipe bursting tool shall be pulled through the sewer by a winch located at the upstream manhole. The bursting unit shall pull the polyethylene pipe with it as it moves forward. The bursting head shall incorporate a shield/expander to prevent collapse of the hole ahead of the polyethylene pipe insertion. The pipe bursting unit shall be remotely controlled.

D. The pipe bursting tool shall be pneumatic unless static is specified. The bursting action of the tool shall increase the external dimensions sufficiently, causing breakage of the pipe at the same time expanding the surrounding ground. This action will not only break the pipe but also create the void into which the burster can be winched and enables forward progress to be made. At the same time the polyethylene pipe, directly attached to the sleeve on the rear of the burster, shall also move forward.

E. The burster shall have its own forward momentum while being assisted by winching. A hydraulic winch shall give the burster friction by which it can be move forward. To form a complete operating system, the burster must be matched to a constant tension hydraulic winching system.

2.06 WINCH UNIT

A. A winch shall be attached to the front of the bursting unit. The winch shall provide a constant tension to the burster in order that it may operate in an efficient manner. The winch shall ensure directional stability in keeping the unit on line.

B. The winch shall be of the constant tension type but shall be fitted with a direct reading load gauge to measure the winching load which must automatically be

maintained at a constant tension at a set tonnage reading. The winch, which shall be hydraulically operated to provide the constant tension throughout the bursting operation, shall supply sufficient cable in one continuous length so that the pull may be continuous between approved winching points.

C. The winch, cable and cable drum must be provided with safety cage and supports so that it may be operated safely without injury to persons or property.

D. The Contractor shall provide a system of guide pulleys and bracing at each manhole to minimize cable contact with the existing sewer between manholes.

E. The supports to the trench shoring in the insertion pit shall remain completely separate from the winch boom support system and shall be so designed that neither the pipe nor the winch cable will be in contact with them.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. All materials shall be installed in accordance with manufacturer's written instructions and recommendations.

B. All work shall be completed by workmen skilled in their trade.

C. All reconstruction of existing gravity sewer mains using an HDPE product and installer shall be performed in strict accordance with this Specification and the latest revision of ASTM F585.

D. Where discrepancies exist, or any latitude is either inferred or interpreted between this Specification and ASTM product and process standards, this Specification shall govern.

3.02 PREPARATION

A. The following installation procedures shall be adhered to unless otherwise approved by the Construction Manager.

1. Carry out all operations in accordance with all Federal, State, and local safety laws, regulations, standards, policies and procedures including those promulgated by OSHA and those recommended by the manufacturer.

a. Particular attention is drawn to those safety requirements involving entering confined spaces (follow OSHA requirements).

1) The Contractor shall take additional precautions to secure the work area and insure the safety of everyone in or around the curing apparatus.

2) Before utilizing this method, the Contractor shall submit a copy of the Contractor's standard operating procedures addressing safety issues for this methodology to the

Construction Manager.

2. The Contractor shall bypass wastewater around the sewer segment or sewer segments designated for pipe bursting rehabilitation.
   a. Service connection effluent may be plugged only after proper notification to the affected properties.
   b. Individual's sewer service shall not be interrupted for more than 8 hours.
      1) If proposal is to interrupt service for more than 8 hours alternative means of providing service during construction will be required.
3. If a road/lane must be closed to traffic, the Contractor shall furnish a detailed traffic control plan and all labor and equipment necessary.
   a. No separate payment will be made for traffic control.
   b. It shall be an incidental part for pipe bursting rehabilitation.

3.03 PRE-INSTALLATION PROCEDURE

A. Complete the following activities unless otherwise approved by the Construction Manager.

1. Perform operations in accordance with OSHA Standards.
2. Before Work commences:
   a. Required pre-installation submittals shall be approved by Construction Manager, including:
      1) Traffic management plan/measures.
      2) Safe pedestrian passage.
      3) Provision of vehicular access to property.
      4) Bypass/diversion pumping.
      5) Emergency measures/contingent plans.
   b. Submit an Installation Access Plan including:
      1) Access manhole location(s).
      2) Site plan sketch showing dimensions of access within work limits and utilities.
      3) Approximate installation rate (ft/day).
      4) Appropriate excavation/backfill/resurfacing procedures including permits according to Georgia Department of Transportation and governing agency standards.

B Installation Responsibilities.

1. It shall be the responsibility of the Contractor to field locate and designate all access points, open and make accessible for the work based on the Contract Drawings.

2. The Contractor shall arrange for access to water hydrants for cleaning, wash downs and other work related items requiring water.

3.04 PRE-BURSTING CLEANING

A. Prior to entering access areas, such as manholes, an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen must be undertaken in accordance with local, state or federal safety regulations.

B. Cleaning of Host Pipeline

1. Sewers shall be cleaned of all biological growth, debris, roots and other materials that would contaminate the soil and/or inhibit proper pipe bursting operations.

a Pipeline shall be cleaned with hydraulically powered equipment, high velocity jet cleaners or mechanically powered equipment.

b Heavy cleaning of sewers shall be performed if roots are present which require the use of mechanical brushes or dragging devices or, if in the judgment of the Construction Manager, the pipe is more than 25% full of debris.

c The pipe shall be cleaned to the satisfaction of the Construction Manager.

d See NASSCO Recommended Specifications for Sewer Collection System Rehabilitation as required for the HDPE lining operation.

2. Utilizing high-pressure jet cleaning equipment, several passes may be need to ensure that all biological growth and debris are removed from the pipe to the satisfaction of the Construction Manager.

3. Debris Disposal

a All debris cleaned from the host pipe shall be removed and disposed of at a dumpsite designated by the Owner at no additional cost to the Owner.

b Debris shall not be allowed to wash into any other pipe segment either upstream or downstream from the pipe segment being cleaned.

c Debris removed from sewer during cleaning shall be transported in watertight containers and disposed of in accordance with local, State and Federal Regulations.

4. Provision and Usage of Water

a. The Owner will make available all water required to perform this work.

b. The Owner will provide a fire hydrant meter at no cost to the Contractor beyond the normal security deposit for use on the Project.

c. Contractor shall coordinate connection and usage limits and withdrawal locations with the Owner prior to construction.

d. The Contractor shall pay for all the water used based on the meter readings.

C. Existing Dimensions

1. After cleaning, the Contractor shall measure the I.D. of the host pipe at at least two locations.

2. Prior starting the pipe bursting operation, the Contractor shall:

a. Verify the internal dimensions of the existing sewer mains to insure that the bursting equipment utilized will be of appropriate dimension.

b. CCTV inspect and record ensuring the host pipe is free of debris and biological growth.

3.05 PRE-BURSTING VIDEO INSPECTION

A. Pipelines shall be inspected via CCTV in conformance with the Fulton County Manual for Internal Sewer Condition Assessment.

B. Prior to the pipe bursting, but not more than 48 hours prior to such, the section of sewer designated for bursting shall be televised its full length using a remote television camera specifically designed for that purpose.

C. Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by closed-circuit television.

D. Utilizing a color video inspection system with data recording capabilities, the entire pipe section to be bursted shall be recorded in a digital format and two (2) copies produced.

1. The interior of the pipe shall be carefully inspected to determine the location of any conditions, which may prevent the proper bursting and installation of the HDPE replacement pipe and it shall be noted so that these conditions can be corrected.

2. Electronic files, including a suitable log, shall be submitted to the Construction Manager.

3. Logs shall include date, line size, length, manhole numbers, project number, direction of camera travel, direction of flow and all observed defects or comments.

4. For each service connection the log shall include:

a. The distance from manhole.

b. Its radial location (e.g. 9:00 or 2:00 o'clock).

c. Street address or parcel identification.

d. Distance from mainline to cleanout.

5. Videos between manhole segments shall be continuous and no breaks or "blink-outs" in the video shall be observed. The videos shall be in digital flash drive format.

6. The full cross-sectional area of the pipe shall be visible during video inspection except where misalignment of the sewer that has resulted in standing water in bellies or sags

7. The pre-bursting video files shall be turned over to the Construction Manager prior to pipe bursting.

E. The television camera used for this purpose shall be operative in one hundred percent moisture conditions.

1. Lighting for the camera shall be sufficient to yield a clear picture of the entire periphery of the pipe.

2. The camera, television monitor and other components of the video system shall be capable of producing a five hundred line resolution picture.

3. The camera's rate of travel shall not exceed 20 feet per minute.

4. At each service connection, the camera shall come to a complete stop and the service shall be panned so that the entire cross sectional area of the service can be inspected.

5. The footage meter count shall be clearly visible.

6. If for any reason the camera becomes disabled inside the sewer and cannot further proceed, the Contractor will be responsible for retrieving the camera at no additional cost to the Owner.

F. Identification and Pre-measurement of Lateral Connections

1. A 360-degree Pan-and-Tilt view camera shall be used to inspect the pipe.

2. At each connection the operator will stop and turn the camera lens toward the lateral thereby inspecting the first 8 to 12 inches of the lateral connection.

3. The Contractor shall be responsible for determining if the connection is active or inactive.

4. For each service connection determined by the Contractor to be active, the Contractor shall determine the condition of the service connection to the host pipe, make his recommendation for lateral connection repair and record both items in his log.

G. CCTV inspection additional requirements shall include the following:

1. Preconstruction video recordings shall be available for viewing by the Construction Manager before construction begins and throughout the project.
2. Video recordings shall be submitted to the Owner via a flash drive and shall remain property of the Owner. Contractor may retain the duplicate copy for his use.
3. All flows tributary to the reach of sewer being inspected are to be completely by-passed around the reach during pre-construction inspection if necessary and required by the Owner.
4. Should any portion of the inspection video be of inadequate quality or coverage, as determined by the Construction Manager, the Contractor shall have the portion re-inspected and video recorded at no additional expense to the Owner.

H. Line Obstructions

1. The host sewer pipe shall be clear of obstructions such as solids, dropped joints, protruding service connections, crushed or collapsed pipe, and reductions in the cross-sectional area of more than 40% that may hinder or prevent the pipe bursting procedures.
2. When service connections protrude into existing pipe more than ½ inch, as measured from inside pipe wall, remove protruding portion of service connection to within ½ inch of inside pipe wall.
3. If pre-installation inspection reveals an obstruction such as a dropped joint, or a collapse that will prevent the bursting process and that cannot be removed by conventional sewer cleaning or pipe or root cutting equipment, the Contractor may be required to make a point repair excavation to uncover and remove or repair the obstruction.
4. Such excavation shall be approved in writing by the Construction Manager prior to the commencement of the work and will be considered as a separate pay item.
5. The Contractor shall remove, grind or take other precautions necessary to address sharp edges or protrusions that could tear the protective sheets or films.
6. For pipes where sags exist in the pipe segment:
    a. Water in the sag is to be removed to avoid trapping water between the replacement pipe and the surrounding soil resulting in contamination of the same.

3.06 EXISTING FLOW

A. The Contractor shall be responsible for maintaining continuous sanitary sewer service to each and every property connected to the segment of sewer subject to sliplining operations.

B. The Contractor shall provide bypass pumping during the pipe bursting/replacement process, if necessary.

1. The pumps and bypass lines shall be of adequate capacity and size to handle all flows including peak wet weather flow.

C. All costs for bypass pumping, tanking and all other private service flow management required during installation of the replacement pipe shall be included in the cost for pipe replacement by pipe bursting.

D. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, disinfection, repair, property damage as well as all resultant costs and claims.

E. When it is necessary to shut down a private sewer service line, notify the Construction Manager at least 1 week in advance to shut down. Notify building occupants regarding service lateral disconnection by placing a door hanger approved by the Construction Manager.

1. Place door hangers minimum 48 hours prior to shut down.

F. When service lateral need to be disconnected from main for more than 8 hours, lateral shall be positively drained or pump down.

1. Monitor status of flow and storage.
2. Pump lateral more frequently where flows exceed storage capacity of lateral or Contractor provided temporary storage.

G. If service lateral cannot be positively drained or pumped down or disconnection of service is anticipated being 8 hours or longer,

1. Contractor shall provide temporary living accommodations for resident at no additional cost to Owner or resident.
2. Temporary living quarters accommodations shall be approved by Construction Manager and coordinated through resident and Owner's Customer Support Representative.
3. Alternatively, Contractor may supply a temporary bypass pumping system to keep the lateral operational.

H. Notify building occupants when work is complete and uninterrupted service restored.

I. Commercial sewer services shall be maintained at all times while the business is open.

1. No sewage from the services or main line shall be discharged on theground or in waterways.
2. Holding pits or tanks are not allowed unless permitted by Federal,State, and local authorities having jurisdiction.

3.07 BY-PASS PUMPING

A. The contractor shall provide all sewage bypass as necessary for the proper pipe bursting/replacement work.

B. Sewage flow shall be pumped around segments during the bursting replacement operation and lateral service reinstatement.

1 The flow shall be intercepted at the upstream end of the segment and shall be pumped through temporary piping of adequate size. The flow shall be discharged into a manhole on the downstream side of the segment, thus by-passing the sewer segment(s) under construction.

2. Pumping equipment shall have the capacity to convey 100% of peak flows around the construction area.

3. A standby pump of the same capacity shall be required on site.

4. Open channels or trenches shall not be used to convey flow.

5. Bypassing or spilling wastewater onto the ground, into the trench, or into adjacent waters is prohibited.

C. The Contractor shall be required to contact all residential and commercial customers whose service lines connect to the sewer main being bypassed and inform them that they will be temporarily out of service.

D. The Contractor shall notify all property owners who discharge sewage directly into the sewer main being rehabilitated at least 48 hours in advance, giving the date, starting and estimated completion time for the work being conducted and any anticipated impact to the property owner.

1. The Contractor shall also advise those customers against water usage until the mainline is back in service.

2. After completing the necessary work on the main line to allow its reuse, the Contractor shall advise those customers that the sewer main is back in service.

3. The Contractor shall maintain a high degree of professionalism, both in workmanship and appearance, at all times.

E. Temporary Blocking and Back-Ups of Sewers and Sewage

1. Contractor shall be responsible to limit the extent and duration of such blockages and back-ups so that overflows and spillage onto public or private property and into storm sewers, waterways and streets does not occur.

a. In the event that such spillage or overflow does occur during the course, or as a result, of the Work, the Contractor performing the Work shall immediately eliminate the spillage or overflow and, as necessary, remove the blockage and eliminate the back-up.

b. Upon elimination of the spillage or overflow, the Contractor shall clean up and disinfect the area.

c. Work to stop or contain such event is to be deemed EMERGENCY in nature and sufficient justification for total mobilization of resources, the use of overtime or double time and any other reasonable measures to assure correction of the problem without delay.

d. Damages arising from blockages, back-ups, spillage or overflows of sewage during the course of the Work or because of the Work, shall be the sole responsibility of the Contractor.

e. The Contractor shall be responsible for paying all fines imposed for overflows or spills during construction.

2. Should a condition arise that the Contractor cannot restore service within 8 hours of service interruption, the Contractor shall make provisions for pumping all flows within the service interruption area at no cost to the Owner.

3.08 CONSTRUCTION METHOD

A. Equipment used to perform the work shall be located away from buildings in order to minimize noise impact which under all circumstances shall be less than 70 dB unless otherwise allowed by the Construction Manager due to circumstances beyond the control of the Contractor or pipe bursting subcontractor.

1. A silent engine compartment with the winch shall be provided to reduce machine noise.

B The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the polyethylene pipe from damage during installation.

C. Lubrication may be used as recommended by the manufacturer. Under no circumstances shall the pipe be stressed beyond its elastic limit. The winch line must be centered in the existing pipe to be bursted with an adjustable boom.

D. The installed polyethylene pipe shall be allowed to relax and cool following installation in accordance with the manufacturer's recommended time, but not less than four (4) hours, prior to any reconnection of service lines, scaling of the annulus or backfilling of the insertion pit.

E. Sufficient excess length of replacement pipe, but not less than four (4) inches, shall be allowed to protrude into the manhole to provide for further length reduction. End restraint of pipe ends shall be achieved by means of Central Plastics Electrofusion couplings.

F. The Electrofusion couplings shall be slipped over pipe ends against manhole wall and fused in place. Installation of all electrofusion couplings shall be carried out in accordance with the manufacturers recommended procedures.

G. Following the relaxation period, the annular space may be sealed. Sealing shall be made with materials approved by the Construction Manager and/or his

representative and shall extend a minimum of eight (8) inches into the manhole wall in such a manner as to form a smooth, uniform, watertight joint. The terminating pipe ends in manholes shall be connected by Central Plastics Electrofusion couplings to eliminate ground water infiltration. Electrofusion couplings shall be installed in accordance with the manufacturers recommended procedures.

3.09 PIPE JOINING

A. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint in strict accordance with the manufacturer's instructions and ASTM F2620.

B. Threaded or solvent-cement joints and connections are not permitted.

C. All equipment and procedures used shall be used in strict compliance with the manufacturer's instructions and recommendations.

D. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.

E. The butt-fused joint shall be true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure.

F. The joint shall be allowed adequate cooling time before removal of pressure. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe.

G. All joints shall be subject to acceptance by the Construction Manager and/or his representative prior to insertion.

1. All defective joints shall be cut out and replaced at no cost to the County.
2. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site.
3. Where authorized by the Construction Manager, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above.
4. Any joint more than 1/8-inch high shall be trimmed to be smooth with the pipe prior to installation.

H. Any section of the pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the Construction Manager and/or his representative shall be discarded and not used.

I. Terminal sections of pipe that are joined within the insertion pit shall be connected with Central Plastics Electrofusion Couplings or connectors with tensile strength equivalent to that of the pipe being joined.

J. When transitioning from polyethylene pipe to ductile iron pipe, pipes shall be joined with a transition sleeve as recommended by the pipe manufacturer. Transition sleeves shall be approved by the Construction Manager.

K. See Section 33 31 00 for additional HDPE pipe installation requirements.

3.10 SERVICE CONNECTIONS

A. All existing live service connections shall be precisely located longitudinally and radially and logged for subsequent reinstatement following installation of the replacement pipe. The complete list of service laterals, included relevant footage and diameter of lateral, shall be submitted, prior to pipe lining, to the Construction Manager for information.

B. Use CCTV to field locate existing service connections.

C. Once begun, pipe bursting and replacement pipe insertion shall be continuous and without interruption from one manhole to another, except as approved by the Construction Manager.

D. Upon completion of insertion of the replacement pipe, the Contractor shall complete the reconnection of all service laterals. Reconnection of the laterals on the segment must be completed within 8 hours of the start of service interruption to minimize any inconvenience to customers.

E. The Contractor shall reinstate all live junctions immediately after installation of the replacement pipe by excavation and point repair.

F. Confirm the number of service connections to be reinstated and complete work to bring them back on line.

1. All service lateral reinstatements shall be wire brushed to eliminate burrs and snags.

G. Existing sewer service laterals shall be internally reinstated to 100% of their pre-lining flow diameter.

1. The finished opening shall be smooth with no ragged edges and shall prevent clogging or blockages.

H. Do not reconnect services from abandoned or vacant lots, unless otherwise directed by the Construction Manager.

I. Show distance from nearest downstream manhole to reconnected service on record drawings.

J. The preferred method of saddle connection to the main line shall be either by use of an Inserter Tee by Fowler Manufacturing, Oregon, or by fusion of saddle connection with one of the following approved systems:

1. Electrofusion saddles as manufactured by Central Plastics

2. Conventional Fusion saddles as manufactured by Central Plastics, Phillips Driscopipe, or Plexco

3. Saddle material shall be compatible with that of the main pipe.

K. Service connection openings shall be reinstated to 95 – 100% of their diameter and free from rough edges or protrusions.

L. The cost for correcting deficiencies discovered shall be the responsibility of the Contractor.

3.11 POST INSTALLATION

A. HDPE pipe installation shall be free from visual defects and other deformities.

1. Defects and deformities may, at discretion of the Construction Manager, be cause for rejection of entire replacement pipe.

2. Contractor shall correct failed and/or defective replacement pipes.

a. Identified from post installation television inspection.

b. Test reports for structural values.

3. Method of repair, which may require field or workshop demonstration, shall be approved by the Construction Manager prior to commencement of work.

4. Remove and replace pipe identified with defects or deformities that cannot be repaired to the satisfaction of the Construction Manager and/or the manufacturer.

B. Both ends of the replacement pipe shall be cut smoothly 2 inches from the inlet and outlet points in the manhole.

1. Seal with an epoxy or resin mixture compatible with the replacement pipe to provide a watertight seal.

2. Sealing material and installation method shall be submitted and approved by the Construction Manager prior to start of construction.

a. Pipe manufacturer shall also be consulted for appropriate sealing material and installation method.

3. Hydraulic cements and quick-set cement products are not acceptable.

C. Where replacement pipes of any type are installed in two or more continuous manholesegments, the replacement pipe invert through the intermediate manholes shall be left intact.

1. Final finishing of the installation in those intermediate manholes shall require removal of the top of the exposed replacement pipe.

2. Neat trimming of the pipe edge where it touches the lip of themanhole bench.

3. Sealing between the replacement pipe and pre-existing manhole channel.

D. Portions of any piece of pipe material removed during installation shall be available for inspection and retention by the Construction Manager.

E. All manhole drop connections will be reviewed on an individual basis.

1. Reinstate openings for all drop assemblies after relining mainline sewer.

2. Everywhere possible, outside drop assemblies shall be lined with a liner compatible with the mainline replacement pipe, for the full length of the drop assembly and bend.

3. Drop assemblies inside of manholes are not required to be relined, unless directed by the Construction Manager.

F. Each pipe segment lined shall be CCTV inspected as soon as practical after processing.

1. Segments not fully conforming to these Specifications must be immediately brought to the Construction Manager attention with a proposed method of correction without cost to the Owner.

G. Manholes

1. Replacement: When a manhole is replaced, the replacement manhole shall be equipped with a boot connection. The boot will allow a secure connection to HDPE pipe.

2. Sealing Polyethylene Pipe in existing Manhole:

a. The annular space between the polyethylene replacement pipe and the existing sewer line shall be sealed where the replacement pipe enters or exits manholes.

b. The pipe shall be allowed to relax and come to thermal equilibrium for a period of 24 hours before sealing.

c. Seal the upstream manhole pipe connection, connect services to the replacement pipe, and then seal the downstream manhole connection. Acceptable materials are urethane foam, oakum or low shrink grout.

d. Foam sealant shall not protrude into the manhole and shall be finished over with a quick-set, non- shrink cement grout.

3.12 POST-INSTALLATION CCTV INSPECTION

A. Following installation of replacement pipelines between manholes where bursting has occurred, CCTV inspection shall be carried out in accordance with the requirements of the Fulton County Manual for Internal Sewer Condition Assessment.

B. The finished lining shall be free of defects that would affect long term strength or hydraulic performance.

C. The finished video shall be continuous over the entire length of the sewer between

two manholes and shall be completely free from visual defects.

D. The audio/video recording shall be prepared in the presence of the County's Inspector and provide the following:

1. An audio description to what is being viewed.
2. A continuous running footage indicator between manholes.

E. Prior to Final Acceptance the County shall be provided with one copy of the TV inspection report and video on flash drive showing the entire length of gravity sewer being tested.

1. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type of joint, roundness and distance between manholes.
2. Any pipe found to be cracked, leaking, misaligned, bellied or otherwise defective shall be removed and replaced.

F. Should any portion of the inspection video be of inadequate quality or coverage, as determined by the Construction Manager, the Contractor will have that portion re-inspected and videoed at no additional expense to the County.

3.13 TESTING

A. Leakage Testing For Non-Pressure Piping

1. Non-pressure piping such as sewers shall be tested for excessive leakage in accordance with ASTM F1417.
2. Joint leakage and any defective materials and/or workmanship shall be repaired or replaced by the Contractor at no additional cost to the Owner.

B. Hydrostatic Leakage Testing For Pressure Piping

1. Hydrostatic leakage testing shall comply with ASTM F2164. Joint leakage and any defective materials and/or workmanship shall be repaired or replaced by the Contractor at no additional cost to the Owner.
2. Pneumatic (compressed air) leakage testing of PE4710 pressure piping is prohibited.

3.14 FINAL ACCEPTANCE

A. After installation of the replacement pipe, the Contractor shall, at the option of the Owner’s Representative, either TV inspect the sewer line or conduct a low pressure test on the replacement pipe.

3.15 CLEAN-UP/RESTORATION

A. After the HDPE replacement pipe installation work has been completed and all testing accepted by the Construction Manager, the Contractor shall clean up the work area.

1. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.

a. The debris and liquids shall be disposed of properly in accordance with all applicable laws.

b. The local municipality may furnish a letter to the landfill stating the Contractor is authorized to dispose of the non-hazardous materials.

c. Debris and liquids type and quantities are to be tracked in the daily Contractor diary.

d. Hauling and disposal costs will be borne by the Contractor.

B. All surfaces which have been disturbed by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of the Contractor's operations.

C. Suitable materials and methods, acceptable to the Owner, shall be used for such restoration.

D. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

E. The cost for correcting damage resulting from the Contractor's actions shall be the responsibility of the Contractor.

F. Refer to Section 33 30 00, Sewer and Accessories, for additional requirements.

3.16 WARRANTY

A. Material Warranty:

1. A written guarantee of 10 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the replacement pipe material.

a. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.

B. Workmanship Warranty

1. The Contractor shall guarantee his work for a warranty period of 3 years from the date of final acceptance and shall cover the cost of repairing and/or replacing the installed replacement pipes and any freight to project site should the installed replacement pipe have any defects in material or workmanship.

2. In addition to the standard pipe warranty, the fusing contractor shall provide

in writing a three-year warranty from the date of installation acceptance covering defects in fusion joining workmanship that requires remaking defective butt fusion, saddle fusion or electrofusion joints. The warranty shall also include freight to project site, formation, installation and pressure testing.

3. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the Contractor and/or the fusion installer of warranty responsibility for the full warranty term.

C. Deficiencies related to material and workmanship shall be repaired by Contractor to the satisfaction of the Construction Manager.

D. No bell clamps or wrap around corsets are allowed as a means of repair on new pipelines.

E. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

F. If required, Contractor and replacement pipe manufacturer representatives may participate in inspections to determine such deficiencies.

G. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract.

H. The Contractor shall be responsible for repairs to any trench settlements caused by leaking pipe, fittings, etc. He shall promptly furnish and place fill to original grade.

I. Should any leaks or trench settlement occur under the new pavement, the Contractor will be held responsible for the cost of all pavement repairs, including pavement replacement.

J. Within the guarantee period, where no loss of customer service or property damage is involved, the Contractor shall begin work on requested repairs or corrective measures with 24 hours following notification by Owner.

K. If property damage or loss of customer service is involved, the Contractor shall begin work with four (4) hours of notification by Owner.

L. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

END OF SECTION

SECTION 33 01 30.72

HDPE SLIPLINING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Sliplining of existing gravity sanitary sewers.
2. Reconnection of existing service connections.
3. CCTV inspection

B. Refer to Section 33 31 00, High Density Polyethylene (HDPE) Pipe and Fittings, for additional requirements.

1.02 DEFINITIONS

A. Sliplining: Sewer rehabilitation by which the lining unit pulls a new polyethylene pipe through an existing pipe.

1.03 SUBMITTALS

A. Submit the following in accordance with the requirements of Section 01 33 23 of these Specifications:

1. Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendations for handling, storage, joint welding and repair of pipe and fittings damaged.
2. Methodology for construction and restoration of existing sewer service connections.
3. Detail drawings and written descriptions of the entire construction procedure to install pipe, bypass sewerage flow and reconnection of sewer service connections, restoration of manhole base and provision for facilitating watertight junction of new pipe to existing and reconstructed manholes.
4. Certification of workmen trained for HDPE pipe fusion and installation.
5. Pre and post upgrade CCTV inspection reports and videotapes. Post upgrade reports and videos shall be made after pipe installation and re-connection of all laterals and immediately prior to the commissioning stage

B. The following information shall be submitted by pipe and fitting suppliers:

1. Name of the pipe manufacturer and a list of the piping and quantities to be provided by manufacturer.
2. Name(s) of fitting manufacturer(s) and lists of fittings and quantities to be provided by manufacturer.
3. Pipe and fitting product data indicating conformance with this Specification, applicable standards, and warranty provisions, including written documentation regarding any intended variance from this specification and applicable standards.
4. At the time of shipment, the supplier shall provide certified documentation of pipe and fitting conformance with this Specification and applicable pipe and fitting standards specified herein.

C. The following information shall be submitted by Fusion Providers.

1. Documentation that each Fusion Technician has met requirements for joining proficiency for each type of fusion joint performed by the Fusion Technician under this specification.
2. Documentation of conformance with this Specification and applicable standards, including written documentation regarding any intended variance from this Specification and applicable standards.
    a. This will include fusion joint warranty information and recommended project specific fusion parameters, including criteria logged and recorded by data logger.

D. The following AS-RECORDED DATA is required from the Contractor and/or Fusion Provider:

1. Fusion reports for each fusion joint performed on the project, including joints that were rejected.
2. Submittals of the Fusion Technician’s joint reports are required as requested by the Owner or Construction Manager.
3. Specific requirements of the Fusion Technician’s joint report shall include:
    a. Pipe or fitting size and DR or pressure class rating.
    b. Fusion equipment size and identification.
    c. Fusion Technician Identification.
    d. Job Identification Number.
    e. Fusion Number.
    f. Fusion joining parameters.
    g. Ambient Temperature.

1.04 QUALIFICATIONS

A. The Contractor shall be certified as a fully trained and licensed user of the pipe lining system.

B. Polyethylene pipe jointing shall be performed by personnel trained in the use of butt-fusion equipment and recommended methods for new pipe connections. Personnel directly involved with installing the new pipe shall receive training in the proper methods for handling and installing the polyethylene pipe. Training shall be performed by a qualified representative.

C. Contractor shall hold the County and Engineer harmless in any legal action resulting from patent infringements.

D. Contractor or sliplining subcontractor shall have:

1. Minimum experience of 150,000 L.F. of sliplining existing gravity sanitary sewer pipe and replacing with polyethylene pipe within the last three years.

1.05 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section, the Contractor shall comply with the latest edition of the Standard Specifications for Fulton County together with the latest adopted editions of the Regional and Fulton County Supplement Amendments, especially concerning the reconstruction of manholes and cleanouts.

1.06 QUALITY ASSURANCE

A. References

1. This Section contains references to the following documents. They are a part of this section to the extent referenced in this specification.
2. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.
3. In the event of a conflict between the requirements of this section and those of the referenced documents, the requirements of this specification shall prevail.
4. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the time of construction.
5. This document references American Society for Testing and Materials (ASTM) standard specifications, which are made a part hereof by such reference and shall be the latest edition and revision.
6. It is incumbent upon the Contractor to have a working familiarity with the following ASTM Standards:
   a. ASTM D2321, Practice for Underground Installation of Flexible Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
   b. ASTM D3035, Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter

c. ASTM D 3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

d. ASTM F585 Practice for Insertion of Flexible Polyethylene Pipe into Existing Sewers

e. ASTM F714, Specification for Polyethylene (PE) plastic pipe (SDR-PR) Based on Outside Diameter

f. ASTM F 1417 Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

g. PPI Handbook of Polyethylene Pipe

1.07 REGULATORY REQUIREMENTS

A. The work of this Section shall comply with the current versions, with revisions, of OSHA 29 CFR 1910.146 (permit-required confined-space regulations).

B. All work and testing shall comply with the applicable Federal codes, including:

1. Federal Occupational Safety and Health Act of 1970
2. Construction Safety Act of 1969, as amended
3. Applicable state and local codes and standards
4. To the extent applicable, requirements of the Underwriter's Laboratories, Inc. and the National Electric Code.

C. The Contractor shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.

D. No confined space entry will be permitted without the development and implementation of a confined space entry plan.

1. Plan shall be in accordance with OSHA standards.
2. Personnel involved shall have current training certificates.
3. Entry permit is required prior to entry.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Transportation, handling, and storage of the polyethylene pipe and fittings shall be as recommended by manufacturer.

B. If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Construction Manager at the Contractor's expense, before proceeding further.

C. Deliver, store and handle other materials as required to prevent damage.

1.09 RESPONSIBILITY FOR OVERFLOWS OR SPILLS

A. It shall be the responsibility of the Contractor to schedule and perform his work in a manner that does not cause or contribute to incidence of overflows or spills of sewage from the sewer system.

B. In the event that the Contractor's work activities contribute to overflows or spills, the Contractor shall immediately take appropriate action to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill, and notify the Owner and Construction Manager in a timely manner.

C. Contractor will indemnify and hold harmless the County for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering and administrative expenses of the County in defending such fines and claims.

PART 2 – PRODUCTS

2.01 POLYETHYLENE PIPE AND FITTINGS

A. General

1. Subject to compliance with requirements, approved products provided shall be as follows:
   a. Chevron Phillips Chemical Driscoplex 4600/4700 Series HDPE Sewer Piping
   b. Or approved equal.
2. Sizes of the insertions to be used shall be such to renew the sewer to greater flow capacity.
3. All pipes shall be made of virgin material. No reworked material shall be used except that obtained from the manufacturer's own production of the same formulation.
4. The pipe shall be homogenous throughout and shall be free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters, or other deleterious faults.

B. HDPE Sewer Pipe

1. Polyethylene pipe shall be manufactured in accordance with AWWA C901-96 for sizes 1¼-inch thru 3-inch IPS diameters and to the requirements of ASTM D3035.
   a. Size of pipe shall meet Ductile Iron Pipe Size in accordance with PE4710.

2. Pipe 4-inch IPS and DIPS sizes 4 inches and above shall be manufactured to the requirements of ASTM F714 and AWWA C906-15.

3. Black PE materials used for the manufacture of polyethylene pipe shall be PE 4710 high density polyethylene meeting ASTM D3350 cell classification 445574C and shall be listed in the name of the pipe and fitting manufacturer in PPI TR-4 with a standard grade HDB rating of 1600 psi at 73°F.

4. Gray PE material, when used, shall be the same except for meeting ASTM D3350 cell classification 445574E.

5. Interior of pipe shall have a light reflective color to allow easier/better viewing for television inspection.

C. HDPE Fittings

1. Molded Fittings

a. Molded fittings shall be manufactured and tested in accordance with ASTM D3261 and so marked.

b. Fittings shall be tested in accordance with AWWA C906.

2. Fabricated Fittings

a. Fabricated fittings shall be manufactured and tested in accordance with ASTM F2206 and so marked.

b. Fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock or molded fittings.

c. Fittings shall be rated for internal pressure service at least equal to the full service pressure rating of the mating pipe.

d. Fittings shall be tested in accordance with AWWA C906.

3. Electrofusion Fittings

a. Electrofusion fittings shall be manufactured and tested in accordance with ASTM F1055 and so marked.

b. Saddles fittings for connecting laterals to the slipliner pipe shall be electrofusion or strap-on sewer saddles. Strap-on sewer saddles shall be used only where it is not possible to use electrofusion saddles. The saddles shall be equipped for joining with a casketed hub, or plain outlet for mechanical couplings or electrofusion couplings joining.

2.02 DIMENSIONS AND RATIOS:

A. The minimum wall thickness of the polyethylene pipe shall be DR 17 throughout.

2.03 TESTING

A. Contractor shall furnish samples and material tests for compliance with this Specification from an independent laboratory to verify the required physical

properties and characteristics of supplied materials in accordance with the applicable ASTM Specification.

1. A certificate shall be furnished by the manufacturer, upon request, for all material furnished under this Specification.
2. Polyethylene plastic pipe and fittings that do not meet any of the requirements of this specification will be rejected.
3. The Owner shall pay for tests on pipe material which meets specification requirements. Contractor shall pay for failed tests and re-testing of failed materials

B. Circularity Tests

1. Where required by the Construction Manager, pipes may be tested at ground surface for circularity before installation and welding commences.
2. Circularity will be checked by pulling a closed cylindrical mandrel through the polyethylene pipe.
3. The mandrel's outside dimension shall be sized to permit no more than 5.0 percent deflection.
4. The percent deflection shall be established from the base inside diameter of the pipe.
    a. If the internal beading of the fused joints for the pipe is not required to be removed, the mandrel shall account for this clearance as well.
5. The mandrel shall be approved by the Construction Manager prior to use.
6. The mandrel shall be at least three times the diameter of the pipe in length and not greater than inside diameter of pipe minus 2 millimeters.
7. Lines that permit safe entry may allow other deflection test options, such as direct measurements.
8. Pipes will be rejected which have greater than 5% deformation due to thermal softening.

2.04 Winch Unit

A. The winch shall be of the constant tension type but shall be fitted with a direct reading load gauge to measure the winching load which must automatically be maintained at a constant tension at a set tonnage reading.

B. The winch, which shall be hydraulically operated to provide the constant tension throughout the lining operation, shall supply sufficient cable in one continuous length so that the pull may be continuous between approved winching points.

C. The winch, cable and cable drum must be provided with safety cage and supports so that it may be operated safely without injury to persons or property.

D. The Contractor shall provide a system of guide pulleys and bracing at each manhole to minimize cable contact with the existing sewer between manholes.

E. The supports to the trench shoring in the insertion pit shall remain completely separate from the winch boom support system and shall be so designed that neither the pipe nor the winch cable shall be in contact with them.

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS

A. All materials shall be installed in accordance with manufacturer's written instructions and recommendations.

B. All work shall be completed by workmen skilled in their trade.

C. All reconstruction of existing gravity sewer mains using an HDPE product and installer shall be performed in strict accordance with this Specification and the latest revision of ASTM F585.

D. Where discrepancies exist, or any latitude is either inferred or interpreted between this Specification and ASTM product and process standards, this Specification shall govern.

3.02 PREPARATION

A. The following installation procedures shall be adhered to unless otherwise approved by the Construction Manager.

1. Carry out all operations in accordance with all Federal, State, and local safety laws, regulations, standards, policies and procedures including those promulgated by OSHA and those recommended by the manufacturer.
    a. Particular attention is drawn to those safety requirements involving entering confined spaces (follow OSHA requirements).
        1) The Contractor shall take additional precautions to secure the work area and insure the safety of everyone in or around the curing apparatus.
        2) Before utilizing this method, the Contractor shall submit a copy of the Contractor's standard operating procedures addressing safety issues for this methodology to the Construction Manager.
2. The Contractor shall bypass wastewater around the sewer segment or sewer segments designated for lining.
    a. Service connection effluent may be plugged only after proper notification to the affected properties.
    b. Individual's sewer service shall not be interrupted for more than 8 hours.
        1) If proposal is to interrupt service for more than 8 hours alternative means of providing service during construction

will be required.

3. Do not install slipliner if ground water temperatures and/or ambient temperatures are excessive for the manufacturer's recommended installation procedures.

4. Where practicable, slipliners may be installed in continuous runs through manholes:

   a. Where there are two or more continuous sewer segments.

   b. Or to connect several short segments with a continuous lining.

5. If a road/lane must be closed to traffic, the Contractor shall furnish a detailed traffic control plan and all labor and equipment necessary.

   a. No separate payment will be made for traffic control.

   b. It shall be an incidental part for the sliplining system installation.

3.03 PRE-INSTALLATION PROCEDURE

A. Complete the following activities unless otherwise approved by the Construction Manager.

1. Perform operations in accordance with OSHA Standards.

2. Before Work commences:

   a. Required pre-installation submittals shall be approved by Construction Manager, including:

      1) Traffic management plan/measures.

      2) Safe pedestrian passage.

      3) Provision of vehicular access to property.

      4) Bypass/diversion pumping.

      5) Emergency measures/contingent plans.

   b. Submit an Installation Access Plan including:

      1) Access manhole location(s).

      2) Site plan sketch showing dimensions of access within work limits and utilities.

      3) Approximate installation rate (ft/day).

      4) Appropriate excavation/backfill/resurfacing procedures including permits according to Georgia Department of Transportation and governing agency standards.

B Installation Responsibilities.

1. It shall be the responsibility of the Contractor to field locate and designate all access points, open and make accessible for the work based on the Contract Drawings.

2. The Contractor shall arrange for access to water hydrants for cleaning and other work related items requiring water.

3.04 PRE-INSERTION CLEANING

A. Prior to entering access areas, such as manholes, an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen must be undertaken in accordance with local, state or federal safety regulations.

B. Cleaning of Host Pipeline

1. Sewers shall be cleaned of all debris, roots and other materials that would inhibit proper insertion of slipliner pipe.

a Pipeline shall be cleaned with hydraulically powered equipment, high velocity jet cleaners or mechanically powered equipment.

b Heavy cleaning of sewers shall be performed if roots are present which require the use of mechanical brushes or dragging devices or, if in the judgment of the Construction Manager, the pipe is more than 25% full of debris.

c The pipe shall be cleaned to the satisfaction of the Construction Manager.

d See NASSCO Recommended Specifications for Sewer Collection System Rehabilitation as required for the HDPE lining operation.

2. Utilizing high-pressure jet cleaning equipment, several passes may need to be completed to assure that all debris is removed from the pipe to the satisfaction of the Construction Manager.

3. Debris Disposal

a All debris cleaned from the pipe shall be removed and disposed of at a dumpsite designated by the Owner at no additional cost to the Owner.

b Debris shall not be allowed to wash into any other pipe segment either upstream or downstream from the pipe segment being cleaned.

c Debris removed from sewer during cleaning shall be transported in watertight containers and disposed of in accordance with local, State, and Federal Regulations.

4. Provision and Usage of Water

a. The Owner shall make available all water required to perform this work.

b. The Owner shall provide a fire hydrant meter at no cost to the Contractor beyond the normal security deposit for use on the Project.

c. Contractor shall coordinate connection and usage limits and withdrawal locations with the Owner prior to construction.

d. The Contractor shall pay for all the water used based on the meter readings.

C. Existing Dimensions

1. After cleaning, the Contractor shall measure the I.D. of the host pipe at the two (2) locations.

2. Prior to ordering of the liner pipes, the Contractor shall:

a. Verify the internal dimensions of the existing sewer mains to insure that the lining utilized will be of appropriate dimension.

b. CCTV inspect and record ensuring the host pipe is free of debris and stable enough to line.

3.05 PRE-INSTALLATION VIDEO INSPECTION

A. Pipelines shall be inspected via CCTV in conformance with the Fulton County Manual for Internal Sewer Condition Assessment.

B. Prior to installation of the HDPE pipe, but not more than 48-hours prior to such installation, the section of sewer designated for sliplining shall be televised its full length using a remote television camera specifically designed for that purpose.

C. Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by closed-circuit television.

D. Utilizing a color video inspection system with data recording capabilities, the entire pipe section to be lined shall be recorded in a digital format and two (2) copies produced.

1. The interior of the pipe shall be carefully inspected to determine the location of any conditions, which may prevent the proper installation of the HDPE pipe by sliplining and it shall be noted so that these conditions can be corrected.

2. Electronic files, including a suitable log, shall be submitted to the Construction Manager.

3. Logs shall include date, line size, length, manhole numbers, project number, direction of camera travel, direction of flow and all observed defects or comments.

4. For each service connection the log shall include:

a. The distance from manhole.

b. Its radial location (e.g. 9:00 or 2:00 o'clock).

c. Street address or parcel identification.

d. Distance from mainline to cleanout.

5. Videos between manhole segments shall be continuous and no breaks or "blink-outs" in the video shall be observed. The videos shall be in digital flash drive format.

6. The full cross-sectional area of the pipe shall be visible during video inspection except where misalignment of the sewer that may result in standing water in bellies or sags

7. The pre-installation video files shall be turned over to the Construction Manager prior to pipe lining.

E. The television camera used for this purpose shall be operative in one hundred percent moisture conditions.

1. Lighting for the camera shall be sufficient to yield a clear picture of the entire periphery of the pipe.

2. The camera, television monitor and other components of the video system shall be capable of producing a five hundred line resolution picture.

3. The camera's rate of travel shall not exceed 20 feet per minute.

4. At each service connection, the camera shall come to a complete stop and the service shall be panned so that the entire cross sectional area of the service can be inspected.

5. The footage meter count shall be clearly visible.

6. If for any reason the camera becomes disabled inside the sewer and cannot further proceed, the Contractor will be responsible for retrieving the camera at no additional cost to the Owner.

F. Identification and Pre-measurement of Lateral Connections

1. A 360-degree Pan-and-Tilt view camera shall be used to inspect the pipe.

2. At each connection the operator will stop and turn the camera lens toward the lateral thereby inspecting the first 8 to 12 inches of the lateral connection.

3. The Contractor shall be responsible for determining if the connection is active or inactive.

4. For each service connection determined by the Contractor to be active, the Contractor shall determine the condition of the service connection to the host pipe, make his recommendation for lateral connection repair and record both items in his log.

G. CCTV inspection additional requirements shall include the following:

1. Preconstruction video recordings shall be available for viewing by the Construction Manager before construction begins and throughout the project.

2. Video recordings shall be submitted to the Owner via a flash drive and shall remain property of the Owner. Contractor may retain the duplicate copy for his use.

3. All flows tributary to the reach of sewer being inspected are to be completely by-passed around the reach during pre-construction inspection if necessary and required by the Owner.

4. Should any portion of the inspection video be of inadequate quality or coverage, as determined by the Construction Manager, the Contractor shall have the portion re-inspected and video recorded at no additional expense to the Owner.

H. Line Obstructions

1. The host sewer pipe shall be clear of obstructions such as solids, dropped joints, protruding service connections, crushed or collapsed pipe, and reductions in the cross-sectional area of more than 40% that may hinder or prevent the installation of the slipling system.

2. When service connections protrude into existing pipe more than ½ inch, as measured from inside pipe wall, remove protruding portion of service connection to within ½ inch of inside pipe wall.

3. If pre-installation inspection reveals an obstruction such as a dropped joint, or a collapse that will prevent the lining installation process and that cannot be removed by conventional sewer cleaning or pipe or root cutting equipment, the Contractor may be required to make a point repair excavation to uncover and remove or repair the obstruction.

4. Such excavation shall be approved in writing by the Construction Manager prior to the commencement of the work and will be considered as a separate pay item.

5. The Contractor shall remove, grind or take other precautions necessary to address sharp edges or protrusions that could tear the slipliner pipe or the protective sheets or films.

6. For pipes where sags exist in the pipe segment:

a. Water in the sag is to be removed to avoid trapping water between the slipliner pipe and the host pipe.

3.06 EXISTING FLOW

A. The Contractor shall be responsible for maintaining continuous sanitary sewer service to each and every property connected to the segment of sewer subject to sliplining operations.

B. The Contractor shall provide bypass pumping during the pipe lining/replacement process, if necessary.

1. The pumps and bypass lines shall be of adequate capacity and size to handle all flows including peak wet weather flow.

C. All costs for bypass pumping, tanking and all other private service flow management required during installation of the sliplining system shall be included in the cost for pipe replacement by sliplining.

D. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, disinfection, repair, property damage as well as all resultant costs and claims.

E. When it is necessary to shut down a private sewer service line, notify the Construction Manager at least 1 week in advance to shut down. Notify building occupants regarding service lateral disconnection by placing a door hanger approved by the Construction Manager.

1. Place door hangers minimum 48 hours prior to shut down.

F. When service lateral need to be disconnected from main for more than 8 hours, lateral shall be positively drained or pump down.

1. Monitor status of flow and storage.
2. Pump lateral more frequently where flows exceed storage capacity of lateral or Contractor provided temporary storage.

G. If service lateral cannot be positively drained or pumped down or disconnection of service is anticipated being 8 hours or longer,

1. Contractor shall provide temporary living accommodations for resident at no additional cost to Owner or resident.
2. Temporary living quarters accommodations shall be approved by Construction Manager and coordinated through resident and Owner's Customer Support Representative.
3. Alternatively, Contractor may supply a temporary bypass pumping system to keep the lateral operational.

H. Notify building occupants when work is complete and uninterrupted service restored.

I. Commercial sewer services shall be maintained at all times while the business is open.

1. No sewage from the services or main line shall be discharged on theground or in waterways.
2. Holding pits or tanks are not allowed unless permitted by Federal,State, and local authorities having jurisdiction.

3.07 BY-PASS PUMPING

A. The contractor shall provide all sewage bypass as necessary for the proper installation of sliplining system.

B. Sewage flow shall be pumped around segments during the insertion of the line pipe, the televising of sewers and lateral service reinstatement.

1 The flow shall be intercepted at the upstream end of the segment and shall be pumped through temporary piping of adequate size. The flow shall be discharged into a manhole on the downstream side of the segment, thus by-passing the sewer segment(s) under construction.

2. Pumping equipment shall have the capacity to convey 100% of peak flows around the construction area.

3. A standby pump of the same capacity shall be required on site.

4. Open channels or trenches shall not be used to convey flow.

5. Bypassing or spilling wastewater onto the ground, into the trench, or into adjacent waters is prohibited.

C. The Contractor shall be required to contact all residential and commercial customers whose service lines connect to the sewer main being bypassed and inform them that they will be temporarily out of service.

1. The Contractor shall also advise those customers against water usage until the mainline is back in service.

2. After completing the necessary work on the main line to allow its reuse, the Contractor shall advise those customers that the sewer main is back in service.

3. The Contractor shall maintain a high degree of professionalism, both in workmanship and appearance, at all times

D. Temporary Blocking and Back-Ups of Sewers and Sewage

1. Contractor shall be responsible to limit the extent and duration of such blockages and back-ups so that overflows and spillage onto public or private property and into storm sewers, waterways and streets does not occur.

a. In the event that such spillage or overflow does occur during the course, or as a result, of the Work, the Contractor performing the Work shall immediately eliminate the spillage or overflow and, as necessary, remove the blockage and eliminate the back-up.

b. Upon elimination of the spillage or overflow, the Contractor shall clean up and disinfect the area.

c. Work to stop or contain such event is to be deemed EMERGENCY in nature and sufficient justification for total mobilization of resources, the use of overtime or double time and any other reasonable measures to assure correction of the problem without delay.

d. Damages arising from blockages, back-ups, spillage or overflows of sewage during the course of the Work or because of the Work, shall be the sole responsibility of the Contractor.

e. The Contractor shall be responsible for paying all fines imposed for overflows or spills during construction.

2. Should a condition arise that the Contractor cannot restore service within 8 hours of service interruption, the Contractor shall make provisions for pumping all flows within the service interruption area at no cost to the Owner.

3.08 CONSTRUCTION METHOD

A. Equipment used to perform the work shall be located away from buildings in order to minimize noise impact which under all circumstances shall be less than 70 dB unless otherwise allowed by the Engineer due to circumstances beyond the Contractor of pipelining subcontractor.

1. A silent engine compartment with the winch shall be provided to reduce machine noise.

B The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the polyethylene pipe from damage during installation.

C. Lubrication may be used as recommended by the manufacturer. Under no circumstances shall the pipe be stressed beyond its elastic limit. The winch line must be centered in the existing pipe to be lined with an adjustable boom.

D. Line Obstructions: It is the responsibility of the Contractor to clear the line of obstructions, solids, dropped joints, or collapsed pipe that would prevent insertion or damage the slipliner pipe during insertion.

1. Excavations to remove obstructions shall be approved by the Construction Manager prior to the commencement of work.

E. Excavation: Insertion pits shall be only at locations shown on the drawings. If additional insertion pits are required, the Construction Manager shall approve the insertion pits and their locations prior to starting this work. The insertion pit size shall be no larger than is necessary.

1. The pit shall be sloped as required by the manufacturer or supplier. The sides of the pit must be supported and conform to OSHA requirements.
2. The pit shall be wide enough to install the slipliner pipe without damage.
3. Ground water pumping or well pointing shall be the responsibility of the Contractor.
4. After insertion of the slipliner pipe, the trench surrounding the new slipliner pipe or surrounding the new slipliner pipe and the top of the old pipe shall be filled with suitable properly compacted material.
    a. Sand stabilized with cement, crushed stone or flowable fill may be used. Backfill shall be compacted as noted on the plans.

F. Insertion of the Fused Liner: The polyethylene liner pipe shall be installed by pulling.

1. During insertion, precautions shall be taken to protect the slipliner pipe from scratches and gouges. The slipliner pipe shall be protected from ragged edges of the broken sewer pipe.

2. The slipliner pipe shall be allowed to relax and come to thermal equilibrium before sealing the annular space between the slipliner pipe and the existing sewer pipe at the manhole. The slipliner pipe must extend at least 8” into the manhole.

G. The installed polyethylene pipe shall be allowed to relax and cool following installation in accordance with the manufacturer’s recommended time, but not less than four (4) hours, prior to any reconnection of service lines, sealing of the annulus or backfilling of the insertion pit.

H. Sufficient excess length of new pipe, but not less than four (4) inches, shall be allowed to protrude into the manhole to provide for further length reduction. End restraint of pipe ends shall be achieved by means of Central Plastics Electrofusion couplings.

I. The Electrofusion couplings shall be slipped over pipe ends against manhole wall and fused in place. Installation of all electrofusion couplings shall be carried out in accordance with the manufacturers recommended procedures.

J. Following the relaxation period, the annular space may be sealed. Sealing shall be made with materials approved by the Construction Manager and shall extend a minimum of eight (8) inches into the manhole wall in such a manner as to form a smooth, uniform, watertight joint. The terminating pipe ends in manholes shall be connected by Central Plastics Electrofusion couplings to eliminate ground water infiltration. Electrofusion couplings shall be installed in accordance with the manufacturers recommended procedures.

3.09 PIPE JOINING

A. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint in strict accordance with the manufacturer’s instructions and ASTM D2620.

B. Threaded or solvent-cement joints and connections are not permitted.

C. All equipment and procedures used shall be used in strict compliance with the manufacturer’s instructions and recommendations.

D. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.

E. The butt-fused joint shall be true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure.

F. The joint shall be allowed adequate cooling time before removal of pressure. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe.

G. All joints shall be subject to acceptance by the engineer and/or his representative prior to insertion.

1. All defective joints shall be cut out and replaced at no cost to the County.
2. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site.
3. Where authorized by the Construction Manager, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above.
4. Any joint more than 1/8-inch high shall be trimmed to be smooth with the pipe prior to installation.

H. Any section of the pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the Construction Manager and/or his representative shall be discarded and not used.

I. Terminal sections of pipe that are joined within the insertion pit shall be connected with Central Plastics Electrofusion Couplings or connectors with tensile strength equivalent to that of the pipe being joined.

J. When transitioning from polyethylene pipe to ductile iron pipe, pipes shall be joined with a transition sleeve as recommended by the pipe manufacturer. Transition sleeves shall be approved by the Construction Manager.

K. See Section 33 31 00 for additional HDPE pipe installation requirements.

3.10 SERVICE CONNECTIONS

A. All existing live service connections shall be precisely located longitudinally and radially and logged for subsequent reinstatement following installation of the sliplining system. The complete list of service laterals, included relevant footage and diameter of lateral, shall be submitted, prior to pipe lining, to the Construction Manager for information.

B. Use CCTV and a robotic cutter device to field locate existing service connections.

C. Once begun, pipe insertion shall be continuous and without interruption from one manhole to another, except as approved by the Construction Manager.

D. Upon completion of insertion of the new pipe, the Contractor shall complete the reconnection of all service laterals. Reconnection of the laterals on the segment must be completed within 8 hours of the start of service interruption to minimize any inconvenience to customers.

E. The Contractor shall reinstate all live junctions immediately after installation of the slipliner pipe. Service connections may be reinstated by excavation or internally.

F. Confirm the number of service connections to be reinstated and complete work to bring them back on line.

1. Recover coupons at downstream manhole and remove.
2. All service lateral reinstatements shall be wire brushed to eliminate burrs and snags.

G. Existing sewer service laterals shall be internally reinstated to 100% of their pre-lining flow diameter.

1. The finished opening shall be smooth with no ragged edges and shall prevent clogging or blockages.

H. Do not reconnect services from abandoned or vacant lots, unless otherwise directed by the Construction Manager.

I. Show distance from nearest downstream manhole to reconnected service on record drawings.

J. When a remote cutting device is used and a cleanout is available, then a mini-camera down the service may also be used to assist the operator in cutting or trimming.

K. The preferred method of saddle connection to the main line shall be either by use of an Inserter Tee by Fowler Manufacturing, Oregon, or by fusion of saddle connection with one of the following approved systems:

1. Electrofusion saddles as manufactured by Central Plastics
2. Conventional Fusion saddles as manufactured by Central Plastics, Phillips Driscopipe, or Plexco
3. Saddle material shall be compatible with that of the main pipe.

L. Service connection openings shall be reinstated to 95 – 100% of their diameter and free from rough edges or protrusions.

M. All active laterals, taps, or side connections will be reinstated from inside the rehabilitated pipe where possible.

1. In smaller diameter pipe in which man-entry is not possible, side connections must be reinstated internally by suitable, TV-monitored, robotic cutting equipment.
2. Cross-sections of the opening of the side connections must be reinstated by at least 95-percent of the original opening.
3. Reinstated lateral service openings shall be brushed smooth to the satisfaction of the Construction Manager.
4. Main-to-lateral connections shall be as watertight as possible to the satisfaction of the Construction Manager and verified as such via post CCTV inspection.

5. The annular space between the original host sewer pipe and the slipliner pipe upstream and downstream of the lateral connection shall be sealed. Acceptable materials for sealing are urethane foam and oakum or low shrink grout.

N. The cost for correcting deficiencies discovered shall be the responsibility of the Contractor.

3.11 POST INSTALLATION

A. HDPE pipe installation shall be free from visual defects and other deformities.

1. Defects and deformities may, at discretion of the Construction Manager, be cause for rejection of entire slipliner.
2. Contractor shall correct failed and/or defective liner pipe.
   a. Identified from post installation television inspection.
   b. Test reports for structural values
3. Method of repair, which may require field or workshop demonstration, shall be approved by the Construction Manager prior to commencement of work.
4. Remove and replace pipe identified with defects or deformities that cannot be repaired to the satisfaction of the Construction Manager and/or the manufacturer.

B. Both ends of the slipliner pipe shall be cut smoothly 2 inches from the inlet and outlet points in the manhole.

1. Seal with an epoxy or resin mixture compatible with the slipliner pipe to provide a watertight seal.
2. Sealing material and installation method shall be submitted and approved by the Construction Manager prior to start of construction.
   a. Pipe manufacturer shall also be consulted for appropriate sealing material and installation method.
3. Hydraulic cements and quick-set cement products are not acceptable.

C. Where slipliners of any type are installed in two or more continuous manhole segments, the slipliner pipe invert through the intermediate manholes shall be left intact.

1. Final finishing of the installation in those intermediate manholes shall require removal of the top of the exposed slipliner pipe.
2. Neat trimming of the slipliner pipe edge where it touches the lip of the manhole bench.
3. Sealing between the new slipliner pipe and pre-existing manhole channel.

D. Portions of any piece of liner pipe material removed during installation shall be available for inspection and retention by the Construction Manager.

E. All manhole drop connections will be reviewed on an individual basis.

1. Reinstate openings for all drop assemblies after relining mainline sewer.
2. Everywhere possible, outside drop assemblies shall be lined with a liner compatible with the mainline slipliner pipe, for the full length of the drop assembly and bend.
3. Drop assemblies inside of manholes are not required to be relined, unless directed by the Construction Manager.

F. Each pipe segment lined shall be CCTV inspected as soon as practical after processing

1. Segments not fully conforming to these Specifications must be immediately brought to the Construction Manager attention with a proposed method of correction without cost to the Owner.

G. Manholes

1. Replacement: When a manhole is replaced, the replacement manhole shall be equipped with a boot connection. The boot will allow a secure connection to HDPE pipe.
2. Sealing Polyethylene Pipe in existing Manhole:
   a. The annular space between the polyethylene pipe and the existing sewer line shall be sealed where the polyethylene pipe enters or exits manholes.
   b. The pipe shall be allowed to relax and come to thermal equilibrium for a period of 24 hours before sealing.
   c. Seal the upstream manhole pipe connection, connect services to the HDPE pipe, and then seal the downstream manhole connection. Acceptable materials are urethane foam, oakum or low shrink grout.
   d. Foam sealant shall not protrude into the manhole and shall be finished over with a quick-set, non- shrink cement grout.

3.12 TESTING

A. Leakage Testing For Non-Pressure Piping

1. Non-pressure piping such as sewers shall be tested for excessive leakage in accordance with ASTM F1417.
2. Joint leakage and any defective materials and/or workmanship shall be repaired or replaced by the Contractor at no additional cost to the Owner.

B. Hydrostatic Leakage Testing For Pressure Piping

1. Hydrostatic leakage testing shall comply with ASTM F2164. Joint leakage and any defective materials and/or workmanship shall be repaired or replaced by the Contractor at no additional cost to the Owner.

2. Pneumatic (compressed air) leakage testing of PE4710 pressure piping is prohibited.

3.13 POST-INSTALLATION CCTV INSPECTION

A. Following installation of new pipelines between manholes where lining has occurred, CCTV inspection shall be carried out in accordance with the requirements of the Fulton County Manual for Internal Sewer Condition Assessment.

B. The finished lining shall be free of defects that would affect long term strength or hydraulic performance.

C. The finished video shall be continuous over the entire length of the sewer between two manholes and shall be completely free from visual defects.

D. The audio/video recording shall be prepared in the presence of the County's Inspector and provide the following:

1. An audio description to what is being viewed.
2. A continuous running footage indicator between manholes.

E. Prior to Final Acceptance the County shall be provided with one copy of the TV inspection report and video cassette showing the entire length of gravity sewer being tested.

1. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type joint, roundness and distance between manholes.
2. Any pipe found to be cracked, leaking, misaligned, bellied or otherwise defective shall be removed and replaced.

F. Should any portion of the inspection recording be of inadequate quality or coverage, as determined by the County, the Contractor will have the portion re-inspected and video recorded at no additional expense to the County.

3.14 Manholes

A. Replacement: When a manhole is replaced, the replacement manhole shall be equipped with a boot connection. The boot will allow a secure connection to HDPE pipe.

B. Sealing Polyethylene Pipe in existing Manhole:

1. The annular space between the polyethylene slipliner pipe and the existing sewer line shall be sealed where the slipliner pipe enters or exits manholes.
2. The pipe shall be allowed to relax and come to thermal equilibrium for a period of 24 hours before sealing.

3. Seal the upstream manhole slipliner pipe connection, connect services to the slipliner pipe, and then seal the downstream manhole connection. Acceptable materials are urethane foam, oakum or low shrink grout.

4. Foam sealant shall not protrude into the manhole and shall be finished over with a quick-set, non- shrink cement grout.

3.15 CLEAN-UP/RESTORATION

A. After the HDPE sliplining system installation work has been completed and all testing accepted by the Construction Manager, the Contractor shall clean up the work area.

1. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.

a. The debris and liquids shall be disposed of properly in accordance with all applicable laws.

b. The local municipality may furnish a letter to the landfill stating the Contractor is authorized to dispose of the non-hazardous materials.

c. Debris and liquids type and quantities are to be tracked in the daily Contractor diary.

d. Hauling and disposal costs will be borne by the Contractor.

B. All surfaces which have been disturbed by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of the Contractor's operations.

C. Suitable materials and methods, acceptable to the Owner, shall be used for such restoration.

D. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

E. The cost for correcting damage resulting from the Contractor's actions shall be the responsibility of the Contractor.

F. Refer to Section 33 30 00, Sewer and Accessories, for additional requirements.

3.16 FINAL ACCEPTANCE

A. After installation of the slipliner pipe, the Contractor shall, at the option of the Owner’s Representative, either TV inspect the sewer line or conduct a low pressure test on the slipliner pipe.

3.17 WARRANTY

A. Material Warranty:

1. A written guarantee of 10 years submitted to the County for the specific

project shall be provided by the Manufacturer against any defects of the slipliner pipe material.

a. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.

B. Workmanship Warranty

1. The Contractor shall guarantee his work for a warranty period of 3 years from the date of final acceptance and shall cover the cost of repairing and/or replacing the installed slipliner pipes and any freight to project site should the installed slipliner pipe have any defects in material or workmanship.

2. In addition to the standard pipe warranty, the fusing contractor shall provide in writing a three-year warranty from the date of installation acceptance covering defects in fusion joining workmanship that requires remaking defective butt fusion, saddle fusion or electrofusion joints. The warranty shall also include freight to project site, formation, installation and pressure testing.

3. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the Contractor and/or the fusion installer of warranty responsibility for the full warranty term.

C. Deficiencies related to material and workmanship shall be repairedby Contractor to the satisfaction of the Construction Manager.

D. No bell clamps or wrap around corsets are allowed as a means of repair on new pipelines.

E. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

F. If required, Contractor and replacement pipe manufacturer representatives may participate in inspections to determine such deficiencies.

G. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract.

H. Within the guarantee period, where no loss of customer service or property damage is involved, the Contractor shall begin work on requested repairs or corrective measures with 24 hours following notification by Owner.

I. If property damage or loss of customer service is involved, the Contractor shall begin work with four (4) hours of notification by Owner.

J. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

END OF SECTION

SECTION 33 01 30.73

SPIRAL WOUND PVC SLIPLINING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Sliplining of existing gravity sanitary sewers.
2. Reconnection of existing service connections.
3. CCTV inspections.

1.02 SYSTEM DESCRIPTION

A. Machine spiral wound PVC liner is intended for use in the rehabilitation of sanitary and storm sewers without excavation.

B. The lining process shall use a continuous one-piece PVC profile strip, which is machine wound directly into the deteriorated host pipe from an existing access chamber or manhole.

C. The system shall consist of a single, one-part PVC profile strip with “T” shaped ribs on one side. The edges of the strip shall interlock as it is spirally wound to form a liner inside the host pipe.

D. The winding process shall be continuous until the complete length of the existing pipe between access points or manholes has been lined.

E. The liner shall be wound at a fixed diameter, leaving an annular space between the liner and host pipe wall. It shall then be radially expanded by mechanical means, without the applications of heat, until the liner makes contact with the inside wall of the host pipe.

1.03 SUBMITTALS

A. Submit the following in accordance with the requirements of Section 01 33 23 of these Specifications:

1. Shop drawings, catalog data, and manufacturer’s technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer’s recommendations for handling, storage, joint welding and repair of pipe and fittings damaged.
2. Methodology for construction and restoration of existing sewer service connections.

3. Detail drawings and written descriptions of the entire construction procedure to install pipe, bypass sewerage flow and reconnection of sewer service connections, restoration of manhole base and provision for facilitating watertight junction of new pipe to existing and reconstructed manholes.

4. Certification of workmen trained for installing pipe by machine spiral wound sliplining.

5. Pre and post upgrade CCTV inspection reports and video recordings. Post upgrade reports and video recordings shall be made after liner installation and re-connection of all laterals and immediately prior to the commissioning stage

1.04 QUALIFICATIONS REQUIREMENTS

A. Product manufacturer shall have minimum 10 years' experience in machine spiral wound PVC liner manufacturing including:

1. Manufacture of a minimum of 100,000 linear feet of machine spiral wound PVC liner.

2. References for 10 projects for machine spiral wound PVC liner with pipe diameters of similar size or greater to those found on the Contract Drawings.

3. Personal experience of the manufacturing manager with other manufacturing companies may be substituted in lieu of the current company experience.

4. The machine spiral wound PVC liner system must have a proven performance record. Documentation of performance records shall be submitted with the Contractor's bid. Failure to provide this documentation may be grounds for disqualification.

B. Contractor's Qualifications

1. The Contractor shall be certified as a fully trained and licensed installer of the machine spiral wound PVC liner system.

2. Contractor or sliplining subcontractor shall have minimum experience of 150,000 linear feet of sliplining existing gravity sanitary sewer pipe and replacing with machine spiral wound PVC liner within the last five years.

C. Contractor shall hold the County and Design Engineer harmless in any legal action resulting from patent infringements.

1.05 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section, the Contractor shall comply with the latest edition of the Standard Specifications for Fulton County together with the latest adopted editions of the Regional and Fulton County Supplement Amendments, especially concerning the reconstruction of manholes and cleanouts.

1.06 QUALITY ASSURANCE

A. References

1. This Section contains references to the following documents. They are a part of this section to the extent referenced in this specification.
2. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.
3. In the event of a conflict between the requirements of this section and those of the referenced documents, the requirements of this specification shall prevail.
4. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the time of construction.
5. This document references American Society for Testing and Materials (ASTM) standard specifications, which are made a part hereof by such reference and shall be the latest edition and revision.
6. It is incumbent upon the Contractor to have a working familiarity with the following ASTM Standards:

    a. ASTM D256: Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics

    b. ASTM D638: Standard Test Method for Tensile Properties of Plastics

    c. ASTM D790: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

    d. ASTM D1784: Standard Specification for Rigid Poly Vinyl Chloride (PVC) Compounds and Chlorinated Poly Vinyl Chloride (CPVC) Compounds

    e. ASTM F1697-18: Standard Specification for Poly Vinyl Chloride (PVC) Profile Strip for Machine Spiral-Wound Liner Pipe Rehabilitation of Existing Sewers and Conduits

    f. ASTM F1741-18: Standard Practice for Installation of Machine Wound Poly Vinyl Chloride (PVC) Liner Pipe for Rehabilitation of Existing Sewers and Conduits ASTM F714

    g. ASTM F1417: Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

B. Manufacturer’s Certification

1. Product manufacturers shall provide the Construction Manager with written certification that all products furnished comply with all applicable provisions of these Specifications.

C. Contractor's Certification

1. The Contractor must certify that the liner system to be used is the exact system for which all submittals and certifications were made in the bid.

2. No substitutions will be allowed, and misrepresentations and/or omissions may be grounds for contract termination with the Contractor waiving any and all claims against the Owner for work performed or costs incurred.

D. Acceptable Manufacturer

1. Sekisui SPR Americas

2. Approved equal

1.07 REGULATORY REQUIREMENTS

A. The work of this Section shall comply with the current versions, with revisions, of OSHA 29 CFR 1910.146 (permit-required confined-space regulations).

B. All work and testing shall comply with the applicable Federal codes, including:

1. Federal Occupational Safety and Health Act of 1970.

2. Construction Safety Act of 1969, as amended.

3. Applicable State and local codes and standards.

4. To the extent applicable, requirements of the Underwriter's Laboratories, Inc. and the National Electric Code.

C. The Contractor shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.

D. No confined space entry will be permitted without the development and implementation of a confined space entry plan.

1. Plan shall be in accordance with OSHA standards.

2. Personnel involved shall have current training certificates.

3. Entry permit is required prior to entry.

1.08 DELIVERY, STORAGE AND HANDLING

A. Transportation, handling and storage of the extruded PVC profile strips shall be as recommended by manufacturer.

B. If the profile strips become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Construction Manager at the Contractor's expense, before proceeding further.

C. Deliver, store and handle other materials as required to prevent damage.

1.09 RESPONSIBILITY FOR OVERFLOWS OR SPILLS

A. It shall be the responsibility of the Contractor to schedule and perform his work in a manner that does not cause or contribute to incidence of overflows or spills of sewage from the sewer system.

B. In the event that the Contractor's work activities contribute to overflows or spills, the Contractor shall immediately take appropriate action to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill, and notify the designated Construction Manager in a timely manner.

C. Contractor will indemnify and hold harmless the County for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering and administrative expenses of the County in defending such fines and claims.

PART 2 – PRODUCTS

2.01 SPIRAL WOUND PVC LINING PROFILE STRIPS

A. Materials

1. The extruded PVC profile strip shall be made from unplasticized PVC compounds meeting the minimum requirements for cell classification 13354 or higher, as defined in ASTM D1784.

2. PVC profile strip for machine spiral wound liner pipe rehabilitation of existing sewers shall comply with ASTM F1697-18 except as modified herein.

B. Material and Equipment Acceptance

1. At the time of manufacture, each lot of extruded PVC profile strip shall be inspected for defects and tested for physical properties as specified.

   a. A "lot" is defined as a continuous extrusion run of a given profile designation on a spool.

2. PVC profile strip minimum dimensions and initial stiffness factors shall be in accordance with Table 1 below. In accordance with ASTM F1697-18, other profile configurations are permitted, provided similar details are provided as in Table 1.

TABLE 1

Profile Type	Minimum Width		Minimum Height		Minimum Waterway Wall		Minimum Initial Stiffness Factor (EI)	
	mm	in	mm	in	mm	in	MPa-mm^3	(in^3 – lbf/in^2)
1	51.0	2.00	5.5	0.216	1.4	0.0551	21.2x10^3	188.0
2	80.0	3.14	8.0	0.314	1.4	0.0551	63.4x10^3	561.0
3	121.0	4.76	13.0	0.511	1.6	0.0630	242.7x10^3	2148.0
7	121.0	4.76	19.0	0.748	2.1	0.0830	450x10^3	3983.0

Note: Initial Stiffness Factors are derived from testing in accordance with ASTM D790 as modified by ASTM F1697-18, using flat strips of profile

3. The following values of modulus of elasticity of PVC shall be used in design:
   a. Short Term: 400,000psi (2,750 MPa)
   b. Long Term: 116,000psi (800 MPa)
4. Design stiffness values for a specific PVC profile strip shall be available from the manufacturer and submitted to the Construction Manager.
5. Sealants and gaskets necessary for effective interlocking of the edges of PVC strip shall be pre-applied at the time of manufacture. They shall be suitable for use in a sewer environment.

C. Material Testing

1. Before installation of the liner has commenced, a sample of the PVC profile strip from each production run shall be tested to confirm that the value of initial stiffness factor detailed in Table 1 exceeds specified minimum values.
2. If requested by the Owner, Contractor shall furnish samples and material tests for compliance with this specification from an independent laboratory to verify the required physical properties and characteristics of supplied materials in accordance with the applicable ASTM Specification
   a. A certificate shall be furnished by the manufacturer, upon request, for all material furnished under this Specification.
   b. Profile strips that do not meet any of the requirements of this specification may be rejected.
   c. The Owner will pay for tests on profile material which meets specification requirements.
   d. Contractor shall pay for failed tests and re-testing of failed materials.

D. Marking

1. Each PVC profile strip shall be distinctly marked on its inside surface at intervals not to exceed 60 inches with a code number identifying the manufacturer, plant, date of manufacture shift and profile type.

. This information shall also appear on each reel.

E. Sizes of the spiral wound PVC liner to be used shall be such as to renew the sewer to greater flow capacity.

F. All profile strips shall be made of virgin material. No reworked material shall be used.

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS

A. All materials shall be installed in strict accordance with manufacturer's written instructions and recommendations.

B. All work shall be completed by workmen skilled in their trade.

C. All reconstruction of existing gravity sewer mains using an approved machine spiral wound PVC liner product and installer shall be performed in strict accordance with this Specification and the latest revision of ASTM F1697.

D. Where discrepancies exist, or any latitude is either inferred or interpreted between this specification and ASTM product and process standards, this Specification shall govern.

3.02 PREPARATION

A. The following installation procedures shall be adhered to unless otherwise approved by the Construction Manager.

1. Carry out all operations in accordance with all Federal, State, and local safety laws, regulations, standards, policies and procedures including those promulgated by OSHA and those recommended by the manufacturer.

a. Particular attention is drawn to those safety requirements involving entering confined spaces (follow OSHA requirements).

1) The Contractor shall take additional precautions to secure the work area and insure the safety of everyone in or around the spiral wound machinery.

2) Before utilizing this method, the Contractor shall submit a copy of the Contractor's standard operating procedures addressing safety issues for this methodology to the Construction Manager.

2. If necessitated by site conditions, the Contractor shall bypass wastewater around the sewer segment or sewer segments designated for lining.

a. Service connection effluent may be plugged only after proper notification to the affected properties.

b. Individual's sewer service shall not be interrupted for more than 8 hours.

1) If proposal is to interrupt service for more than 8 alternative means of providing service during construction shall be required.

3. Do not install liner if ground water temperatures and/or ambient temperatures are excessive for the manufacturer's recommended installation procedures.

4. Where practicable, liners may be installed in continuous runs through manholes:

a. Where there are two or more continuous sewer segments.

b. Or to connect several short segments with a continuous lining.

5. If a road/lane must be closed to traffic, the Contractor shall furnish a detailed traffic control plan and all labor and equipment necessary.

a. No separate payment will be made for traffic control.

b. It shall be an incidental part for spiral wound liner installation.

3.03 PRE-INSTALLATION PROCEDURE

A. Complete the following activities unless otherwise approved by the Construction Manager.

1. Perform operations in accordance with OSHA Standards.

2. Before work commences:

a. Required pre-installation submittals shall be approved by Construction Manager, including:

1) Traffic management plan/measures.

2) Safe pedestrian passage.

3) Provision of vehicular access to property.

4) Bypass/diversion pumping.

5) Emergency measures/contingent plans.

b. Submit an Installation Access Plan including:

1) Access manhole location(s).

2) Site plan sketch showing dimensions of access within work limits and utilities.

3) Approximate installation rate (ft/day).

4) Appropriate excavation/backfill/resurfacing procedures

including permits according to Georgia Department of Transportation and governing agency standards.

B Installation Responsibilities.

1. It shall be the responsibility of the Contractor to field locate and designate all access points, open and make accessible for the work based on the Contract Drawings.
2. The Contractor shall arrange for access to water hydrants for cleaning and other work related items requiring water.

3.04 PRE-INSERTION CLEANING

A. Prior to entering access as manholes, an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen must be undertaken in accordance with local, State or Federal safety regulations.

B. Cleaning of Host Pipeline

1. Host pipes shall be cleaned of all debris, roots and other materials that would inhibit proper insertion of spiral wound PVC liner.
   a Pipeline shall be cleaned with hydraulically powered equipment, high velocity jet cleaners or mechanically powered equipment.
   b Heavy cleaning of sewers shall be performed if roots are present which require the use of mechanical brushes or dragging devices or, if in the judgment of the Construction Manager, the pipe is more than 25% full of debris.
   c The host pipe shall be cleaned to the satisfaction of the Construction Manager.
   d See NASSCO Recommended Specifications for Sewer Collection System Rehabilitation as required for the machine spiral wound lining operation.
2. Utilizing high-pressure jet cleaning equipment, several passes may need to be completed to assure that all debris is removed from the pipe to the satisfaction of the Construction Manager.
3. Debris Disposal
   a All debris cleaned from the pipe shall be removed and disposed of at a dumpsite designated by the Owner at no additional cost to the Owner.
   b Debris shall not be allowed to wash into any other pipe segment either upstream or downstream from the pipe segment being cleaned.
   c Debris removed from sewer during cleaning shall be transported in watertight containers and disposed of in accordance with local, State, and Federal Regulations.

4. Provision and Usage of Water

a. The Owner shall make available all water required to perform this work.

b. The Owner shall provide a fire hydrant meter at no cost to the Contractor beyond the normal security deposit for use on the Project.

c. Contractor shall coordinate connection and usage limits and withdrawal locations with the Owner prior to construction.

d. The Contractor shall pay for all the water used based on the meter readings.

C. Existing Dimensions

1. After cleaning, the Contractor shall measure the I.D. of the existing pipe at the two (2) locations.

2. Prior to ordering of the liner, the Contractor shall:

a. Verify the internal dimensions of the existing sewer mains to insure that the lining utilized will be of appropriate dimension.

b. CCTV inspect and record ensuring the host pipe is free of debris and stable enough to line.

3.05 PRE-INSTALLATION VIDEO INSPECTION

A. Pipelines shall be inspected via CCTV in conformance with the Fulton County Manual for Internal Sewer Condition Assessment.

B. Prior to installation of the spiral wound liner, but not more than 48-hours prior to such installation, the section of sewer designated for machine spiral wound lining shall be televised its full length using a remote television camera specifically designed for that purpose.

C. Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by closed-circuit television.

D. Utilizing a color video inspection system with data recording capabilities, the entire pipe section to be lined shall be recorded in a digital format and two (2) copies produced.

1. The interior of the pipe shall be carefully inspected to determine the location of any conditions, which may prevent the proper installation of the CIPP and it shall be noted so that these conditions can be corrected.

2. Electronic files, including a suitable log, shall be submitted to the Construction Manager.

3. Logs shall include date, line size, length, manhole numbers, project number, direction of camera travel, direction of flow and all observed defects or comments.

4. For each service connection the log shall include:
    a. The distance from manhole.
    b. Its radial location (e.g. 9:00 or 2:00 o'clock).
    c. Street address or parcel identification.
    d. Distance from mainline to cleanout.
5. Videos between manhole segments shall be continuous and no breaks or "blink-outs" in the video shall be observed. The videos shall be in digital flash drive format.
6. The full cross-sectional area of the pipe shall be visible during video inspection except where misalignment of the sewer that may result in standing water in bellies or sags
7. The pre-installation video files shall be turned over to the Construction Manager prior to pipe lining.

E. The television camera used for this purpose shall be operative in one hundred percent moisture conditions.

1. Lighting for the camera shall be sufficient to yield a clear picture of the entire periphery of the pipe.
2. The camera, television monitor and other components of the video system shall be capable of producing a five hundred line resolution picture.
3. The camera's rate of travel shall not exceed 20 feet per minute.
4. At each service connection, the camera shall come to a complete stop and the service shall be panned so that the entire cross sectional area of the service can be inspected.
5. The footage meter count shall be clearly visible.
6. If for any reason the camera becomes disabled inside the sewer and cannot further proceed, the Contractor will be responsible for retrieving the camera at no additional cost to the Owner.

F. Identification and Pre-measurement of Lateral Connections

1. A 360-degree Pan-and-Tilt view camera shall be used to inspect the pipe.
2. At each connection the operator will stop and turn the camera lens toward the lateral thereby inspecting the first 8 to 12 inches of the lateral connection.
3. The Contractor shall be responsible for determining if the connection is active or inactive.
4. For each service connection determined by the Contractor to be active, the Contractor shall determine the condition of the service connection to the host pipe, make his recommendation for lateral connection repair and record both items in his log.

G. CCTV inspection additional requirements shall include the following:

1. Preconstruction video recordings shall be available for viewing by the Construction Manager before construction begins and throughout the project.

2. Video recordings shall be submitted to the Owner via a flash drive and shall remain property of the Owner. Contractor may retain the duplicate copy for his use.

3. All flows tributary to the reach of sewer being inspected are to be completely by-passed around the reach during pre-construction inspection if necessary and required by the Owner.

4. Should any portion of the inspection video be of inadequate quality or coverage, as determined by the Construction Manager, the Contractor shall have the portion re-inspected and video recorded at no additional expense to the Owner.

H. Line Obstructions

1. The host sewer pipe shall be clear of obstructions such as solids, dropped joints, protruding service connections, crushed or collapsed pipe, and reductions in the cross-sectional area of more than 40% that may hinder or prevent the installation of the insertion of the liner system

2. When service connections protrude into existing pipe more than ½ inch, as measured from inside pipe wall, remove protruding portion of service connection to within ½ inch of inside pipe wall.

3. If pre-installation inspection reveals an obstruction such as a dropped joint, or a collapse that will prevent the lining installation process and that cannot be removed by conventional sewer cleaning or pipe or root cutting equipment, the Contractor may be required to make a point repair excavation to uncover and remove or repair the obstruction.

4. Such excavation shall be approved in writing by the Construction Manager prior to the commencement of the work and shall be considered as a separate pay item.

5. The Contractor shall remove, grind or take other precautions necessary to address sharp edges or protrusions that could tear the liner or the protective sheets or films.

6. For pipes where sags exist in the pipe segment:

   a. Water in the sag is to be removed to avoid trapping water between the liner and the host pipe.

3.06 EXISTING FLOW

A. The Contractor shall be responsible for maintaining continuous sanitary sewer service to each and every property connected to the segment of sewer subject to sliplining operations.

B. The Contractor shall provide bypass pumping during the pipe lining/replacement process, if necessary.

1. The pumps and bypass lines shall be of adequate capacity and size to handle all flows including peak wet weather flow.

C. All costs for bypass pumping, tanking and all other private service flow management required during installation of the liner shall be included in the cost for pipe replacement by sliplining.

D. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, disinfection, repair, property damage as well as all resultant costs and claims.

E. When it is necessary to shut down a private sewer service line, notify the Construction Manager at least 1 week in advance to shut down. Notify building occupants regarding service lateral disconnection by placing a door hanger approved by the Construction Manager.

1. Place door hangers minimum 48 hours prior to shut down.

F. When service lateral need to be disconnected from main for more than 8 hours, lateral shall be positively drained or pump down.

1. Monitor status of flow and storage.

2. Pump lateral more frequently where flows exceed storage capacity of lateral or Contractor provided temporary storage.

G. If service lateral cannot be positively drained or pumped down or disconnection of service is anticipated being 8 hours or longer,

1. Contractor shall provide temporary living accommodations for resident at no additional cost to Owner or resident.

2. Temporary living quarters accommodations shall be approved by Construction Manager and coordinated through resident and Owner's Customer Support Representative.

3. Alternatively, Contractor may supply a temporary bypass pumping system to keep the lateral operational.

H. Notify building occupants when work is complete and uninterrupted service restored.

I. Commercial sewer services shall be maintained at all times while the business is open.

1. No sewage from the services or main line shall be discharged on theground or in waterways.

2. Holding pits or tanks are not allowed unless permitted by Federal, State, and local authorities having jurisdiction.

3.07 BY-PASS PUMPING

A. Bypass pumping may not be necessary for installation of the machine spiral wound liner. The Contractor shall be responsible for deciding the need for flow diversion to allow successful liner installation.

B. The Contractor shall provide all sewage bypass as necessary for the proper installation of liner.

C. Sewage flow shall be pumped around segments during the installation and testing of spiral wound liner pipe, the televising of sewers and lateral service reinstatement.

1 The flow shall be intercepted at the upstream end of the segment and shall be pumped through temporary piping of adequate size. The flow shall be discharged into a manhole on the downstream side of the segment, thus by-passing the sewer segment(s) under construction.

2. Pumping equipment shall have the capacity to convey 100% of peak flows around the construction area.

3. A standby pump of the same capacity shall be required on site.

4. Open channels or trenches shall not be used to convey flow.

5. Bypassing or spilling wastewater onto the ground, into the trench, or into adjacent waters is prohibited.

D. The Contractor shall be required to contact all residential and commercial customers whose service lines connect to the sewer main being bypassed and inform them that they will be temporarily out of service.

E. The Contractor shall notify all property owners who discharge sewage directly into the sewer main being rehabilitated at least 48 hours in advance, giving the date, starting and estimated completion time for the work being conducted and any anticipated impact to the property owner.

1. The Contractor shall also advise those customers against water usage until the mainline is back in service.

2. After completing the necessary work on the main line to allow its reuse, the Contractor shall advise those customers that the sewer main is back in service.

3. The Contractor shall maintain a high degree of professionalism, both in workmanship and appearance, at all times.

F. Temporary Blocking and Back-Ups of Sewers and Sewage

1. Contractor shall be responsible to limit the extent and duration of such blockages and back-ups so that overflows and spillage onto public or private property and into storm sewers, waterways and streets does not occur.

    a. In the event that such spillage or overflow does occur during the course, or as a result, of the Work, the Contractor performing the Work shall immediately eliminate the spillage or overflow and, as necessary, remove the blockage and eliminate the back-up.

    b. Upon elimination of the spillage or overflow, the Contractor shall clean up and disinfect the area.

    c. Work to stop or contain such event is to be deemed EMERGENCY in nature and sufficient justification for total mobilization of resources, the use of overtime or double time and any other reasonable measures to assure correction of the problem without delay.

    d. Damages arising from blockages, back-ups, spillage or overflows of sewage during the course of the Work or because of the Work, shall be the sole responsibility of the Contractor.

    e. The Contractor shall be responsible for paying all fines imposed for overflows or spills during construction.

2. Should a condition arise that the Contractor cannot restore service within 8 hours of service interruption, the Contractor shall make provisions for pumping all flows within the service interruption area at no cost to the Owner.

3.08 INSTALLATION AND FIELD INSPECTION

A. Installation of machine spiral wound PVC liner pipe for rehabilitation of existing sewers shall be in strict accordance with the recommendations and instruction of the manufacturer.

B. Installation of machine spiral wound PVC liner pipe for rehabilitation of existing sewers shall comply with ASTM F 1741-18 except as modified herein.

C. All existing live service connections shall be precisely located longitudinally and radially and logged for subsequent reinstatement following installation of the liner.

3.09 CONSTRUCTION METHOD

A. Equipment used to perform the work shall be located away from buildings in order to minimize noise impact which under all circumstances shall be less than 70 dB unless otherwise allowed by the Construction Manager due to circumstances beyond the Contractor of pipelining subcontractor.

1. A silent engine compartment with the winch shall be provided to reduce machine noise.

B. During installation the winding machine shall perform the following operations simultaneously:

1. A continuous ribbed liner profile strip is supplied from a reel and fed down through the existing manhole to the winding machine positioned at the base of the manhole.
2. Joint lubricating sealant shall be placed into the primary lock of the self-interlocking edges of the ribbed profile.
3. An elastomeric adhesive, which prevents the liner from expanding prematurely during winding shall be applied to the secondary lock during manufacture of the ribbed profile
4. High tensile wire shall be inserted.
    a. The wire shall remain only temporarily and shall be pulled out during the expansion stage.
5. The winding machine winds the PVC strip into a liner pipe by interlocking the edges.
6. Winding shall continue until the full length of the deteriorated pipe between manholes has been lined.
7. The liner shall then be radially expanded by mechanical means, without the application of heat, until the liner makes contact with the inside wall of the existing pipe.

C. End seals between the liner pipe and the existing pipe shall be installed with a sealing material that is compatible with the liner pipe material.

D. The transition between the liner invert and the invert in the manhole base shall be rendered smooth to reinstate the sewer flow line.

3.10 SERVICE CONNECTIONS

A. All existing live service connections shall be precisely located longitudinally and radially and logged for subsequent reinstatement following installation of the sliplining system. The complete list of service laterals, included relevant footage and diameter of lateral, shall be submitted, prior to pipe lining, to the Construction Manager for information.

B. Use CCTV and a robotic cutter device to field locate existing service connections.

C. Once begun, pipe insertion shall be continuous and without interruption from one manhole to another, except as approved by the Construction Manager.

D. Upon completion of insertion of the new pipe, the Contractor shall complete the reconnection of all service laterals. Reconnection of the laterals on the segment must be completed within 8 hours of the start of service interruption to minimize any inconvenience to customers.

E. The Contractor shall reinstate all live junctions immediately after installation of the liner. Service connections may be reinstated by excavation or internally.

F. Confirm the number of service connections to be reinstated and complete work to bring them back on line.

1. Recover coupons at downstream manhole and remove.
2. All service lateral reinstatements shall be wire brushed to eliminate burrs and snags.

G. Existing sewer service laterals shall be internally reinstated to 100% of their pre-spiral wound liner flow diameter.

1. The finished opening shall be smooth with no ragged edges and shall prevent clogging or blockages.

H. Do not reconnect services from abandoned or vacant lots, unless otherwise directed by the Construction Manager.

I. Show distance from nearest downstream manhole to reconnected service on record drawings.

J. When a remote cutting device is used and a cleanout is available, then a mini-camera down the service may also be used to assist the operator in cutting or trimming.

K. Service connection openings shall be reinstated to 95 – 100% of their diameter and free from rough edges or protrusions.

L. All active laterals, taps, or side connections shall be reinstated from inside the rehabilitated pipe where possible.

1. In smaller diameter pipe in which man-entry is not possible, side connections must be reinstated internally by suitable, TV-monitored, robotic cutting equipment.
2. Cross-sections of the opening of the side connections must be reinstated by at least 95-percent of the original opening.
3. Reinstated lateral service openings shall be brushed smooth to the satisfaction of the Construction Manager.
4. Main-to-lateral connections shall be as watertight as possible to the satisfaction of the Construction Manager and verified as such via post CCTV inspection.

M. The cost for correcting deficiencies discovered shall be the responsibility of the Contractor.

3.11 POST INSTALLATION

A. Machine spiral wound PVC liner installation shall be free from visual defects such as foreign inclusions, dry spots, keel, boat hull, pinholes, wrinkles and other

deformities.

1. Defects and deformities may, at discretion of the Construction Manager, be cause for rejection of entire liner.
2. Contractor shall correct failed and defective liners
    a. Identified from post installation television inspection.
    b. Test reports for structural values
    c. Thickness
3. Method of repair, which may require field or workshop demonstration, shall be approved by the Construction Manager prior to commencement of work.
4. Remove and replace pipe identified with defects or deformities that cannot be repaired to the satisfaction of the Construction Manager and/or the Manufacturer.

B. Both ends of the liner shall be cut smoothly 2 inches from the inlet and outlet points in the manhole.

1. Seal with an epoxy or resin mixture compatible with the liner system to provide a watertight seal.
2. Sealing material and installation method shall be submitted and approved by the Construction Manager prior to start of construction.
    a. The profile strip manufacturer shall also be consulted for appropriate sealing material and installation method.
3. Hydraulic cements and quick-set cement products are not acceptable.

C. Where liners of any type are installed in two or more continuous manhole segments, the liner invert through the intermediate manholes shall be left intact.

1. Final finishing of the installation in those intermediate manholes shall require removal of the top of the exposed liner.
2. Neat trimming of the liner edge where it touches the lip of the manhole bench.
3. Sealing between the new liner and pre-existing manhole channel.

D. Portions of any piece of liner material removed during installation shall be available for inspection and retention by the Construction Manager.

E. All manhole drop connections will be reviewed on an individual basis.

1. Reinstate openings for all drop assemblies after relining mainline sewer.
2. Everywhere possible, outside drop assemblies shall be lined with a liner compatible with the mainline slipliner, for the full length of the drop assembly and bend.
3. Drop assemblies inside of manholes are not required to be relined, unless directed by the Construction Manager.

F. Each pipe segment lined shall be CCTV inspected as soon as practical after processing to assure complete curing.

1. Segments not fully conforming to these Specifications must be immediately brought to the Construction Manager attention with a proposed method of correction without cost to the Owner.

G. Manholes

1. Replacement: When a manhole is replaced, the replacement manhole shall be equipped with a boot connection. The boot will allow a secure connection to spiral wound PVC pipe.

2. Sealing spiral wound PVC pipe in existing Manhole:

a. The annular space between the spiral wound PVC pipe and the existing sewer line shall be sealed where the spiral wound PVC pipe enters or exits manholes.

b. The pipe shall be allowed to relax and come to thermal equilibrium for a period of 24 hours before sealing.

c. Seal the upstream manhole pipe connection, connect services to the spiral wound PVC pipe, and then seal the downstream manhole connection. Acceptable materials are urethane foam, oakum or low shrink grout.

d. Foam sealant shall not protrude into the manhole and shall be finished over with a quick-set, non- shrink cement grout.

3.12 Final Acceptance

A. After installation of the liner, the Contractor shall, at the option of the Owner, either TV inspect the sewer line or conduct a low pressure test on the liner.

3.13 TESTING

A. Leakage Testing For Non-Pressure Piping

1. Non-pressure piping such as sewers shall be tested for excessive leakage in accordance with ASTM F1417.

2. Any leakage and defective materials and/or workmanship shall be repaired or replaced by the Contractor at no additional cost to the Owner.

3.14 POST-INSTALLATION CCTV INSPECTION

A. Following installation of new pipelines between manholes where lining has occurred, CCTV inspection shall be carried out in accordance with the requirements of the Fulton County Manual for Internal Sewer Condition Assessment to establish that the lining has been installed as specified and all live junctions have been reinstated.

B. The finished lining shall be free of defects that would affect long term strength or hydraulic performance.

C. The finished video recording shall be continuous over the entire length of the sewer between two manholes and shall be completely free from visual defects.

D. The audio/video recording shall be prepared in the presence of the County's Inspector and provide the following:

1. An audio description to what is being viewed.
2. A continuous running footage indicator between manholes.

E. Prior to Final Acceptance the County shall be provided with one copy of the TV inspection report and video recording showing the entire length of gravity sewer being sliplined.

1. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type joint, roundness and distance between manholes.
2. Any lining found to be cracked, leaking, misaligned, bellied or otherwise defective shall be removed and replaced.

F. Should any portion of the inspection recording be of inadequate quality or coverage, as determined by the County, the Contractor will have the portion re-inspected and video inspected at no additional expense to the County.

3.15 CLEAN-UP/RESTORATION

A. After the spiral wound PVC liner installation work has been completed and all testing accepted by the Construction Manager, the Contractor shall clean up the work area.

1. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.
    a. The debris and liquids shall be disposed of properly in accordance with all applicable laws.
    b. The local municipality may furnish a letter to the landfill stating the Contractor is authorized to dispose of the non-hazardous materials.
    c. Debris and liquids type and quantities are to be tracked in the daily Contractor diary.
    d. Hauling and disposal costs will be borne by the Contractor.

B. All surfaces which have been disturbed by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of the Contractor's operations.

C. Suitable materials and methods, acceptable to the Owner, shall be used for such restoration.

D. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

E. The cost for correcting damage resulting from the Contractor's actions shall be the responsibility of the Contractor.

F. Refer to Section 33 30 00, Sewer and Accessories, for additional requirements.

3.16 WARRANTY AND REPAIRS

A. Material Warranty:

1. A written guarantee of 20 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the liner pipe material including against breakdown of material effectiveness of structural repair elements.

a. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.

B. Workmanship Warranty:

1. The Contractor shall guarantee his work for a warranty period of 10 years from the date of final acceptance against any leakage, cracking, loss of bond or other discontinuity as identified.

2. The warranty shall cover the cost of repairing and/or replacing the installed spiral wound PVC liner and any freight to project site should the installed liner have any defects in material or workmanship.

a. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the Contractor of warranty responsibility for the full warranty term.

C. Deficiencies related to material and workmanship shall be repaired by Contractor to the satisfaction of the Construction Manager.

D. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

E. If required, Contractor and replacement pipe manufacturer representatives may participate in inspections to determine such deficiencies.

F. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract.

G. Within the guarantee period, where no loss of customer service or property

damage is involved, the Contractor shall begin work on requested repairs or corrective measures with 24 hours following notification by Owner.

H. If property damage or loss of customer service is involved, the Contractor shall begin work with four (4) hours of notification by Owner.

I. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

END OF SECTION

SECTION 33 01 30.74

UV CIPP SLIPLINING

PART 1 - GENERAL

1.01 SUMMARY

A. Work under this Section shall include rehabilitating a full length of an existing sewer main, from manhole to manhole, by the trenchless method known as ultra violet cured-in-place-pipe (UV-CIPP) in accordance with these Specifications.

B. CIPP consists of installing a resin-impregnated fiberglass material tube (Liner) that when cured extends the full length of the original pipe and provides a structurally sound, smooth, joint-less and watertight pipe.

1.02 DEFINITIONS

A. Ultra Violet Cured-in-Place-Pipe is defined as a hollow cylinder consisting of a glass reinforced fabric tube impregnated with an ultra violet light sensitive resin.

B. The impregnated tube is cured by the application of ultra violet light.

C. The UV-CIPP is formed within an existing host pipe and takes the shape of and fits tightly to the pipe, all as defined in ASTM Standard F1743.

D. The definitions in ASTM Standard F1216, and ASTM F2019 shall also apply.

1.03 SUBMITTALS

A. Submit the following in accordance with the requirements of Section 01 33 23 of these Specifications

B. Action Submittals for Review and Approval:

1. Shop drawings, catalog data, and manufacturer's engineering and technical data.
2. Comprehensive Construction Sequencing Plan including:
    a. Comprehensive Construction Sequencing Plan
        1) Proposed access routes.
        2) Set up locations for lining installation.
        3) Wet out area (if required) including:
            a) Typical insertion and curing schedule/plan.
            b) Submit wet out, insertion and curing plan for each and every lining proposed.

c) Submit minimum 48 hours (2 working days) prior to each installation.

3. Methodology for construction and restoration of existing sewer service connections.

4. Analysis of design criteria and calculations for CIPP thickness per ASTM F1216 full deteriorated condition.

a. Submit complete data and design calculations for each lining:

1) Include installation method statement for each lining including:

a) Repair details for potential sewer defects in conjunction with manholes, joints, laterals and infiltration.

b) Quality Control/Quality Assurances.

b. Design calculations establishing the structural capabilities, chemical composition, thickness, curing period, assumptions and other mechanical properties of the liner system proposed.

c. All calculations shall be submitted to the Construction Manager, in duplicate, for his review.

d. Calculations shall be prepared and stamped by a Professional Engineer in the State of Georgia.

1) Approval of the calculations shall not relieve the Contractor of any contractual obligations.

5. Curing temperature/monitoring system shop drawings

6. Detail drawings and written descriptions of the entire construction procedure to install pipe, bypass sewerage flow and reconnection of sewer service connections, restoration of manhole base and provision for facilitating watertight junction of new pipe to existing and reconstructed manholes.

7. Shop drawings for end seals and pre-liners to be used and method of installation.

8. Proposed testing procedure including:

a. Number, location and sampling methods.

b. Proposed testing laboratory with qualifications, experience history and references.

9. Qualification requirements for the Contractor, Installer and personnel (See Item 1.05 Qualifications, this specification)

C. Informational Submittals:

1. Manufacturer's brochures giving a complete description of the product proposed, its physical and chemical composition, the resin or epoxy hardener, the recommended range of curing period, cool-down procedures

and method of installation.

2. Third party testing results from previous installations of the product proposed for this project.
3. Manufacturer's technical literature and certificate demonstrating the materials to be used meet the referenced standards and the requirements of these specifications.
4. Proposed equipment and procedures for accomplishing the cured-in-place pipe lining work.
5. Manufacturer's printed installation instructions including:
    a. Installation method statement including:
        1) Details concerning curing methods.
        2) Inversion pressures necessary for proper installation.
        3) Minimum pressure required to hold tube tight against existing hostpipe.
        4) Maximum allowable pressure that will not damage tube.
        5) Type of insertion.
        6) Defect repair:
            a) Methods of repairing in conjunction with manholes.
            b) Joints.
            c) Laterals.
            d) Active infiltration.
            e) Quality control/quality assurance plan.
            f) Repair material test results.
6. Product data and Manufacturer's installation procedures for resin and catalyst system including but not limited to specifications, characteristics, properties and itemized exceptions/deviations to the Specification.
7. Certification of workmen trained for installing pipe by CIPP sliplining manufacturer.
8. Certified test reports on physical properties and chemical resistance of proposed resin.
9. Material Safety Data Sheets for all resins and other additives such as accelerants, colorants and lubricants utilized in the pipe lining process.
10. Manufacturer's Certificate of Compliance that resin material is appropriate for intended application and in conformance with the Specifications.
11. Annular space sealant.
12. Service connection fittings.

D. Project Submittals

1. The Contractor shall submit the following information during the project for the use of CIPP at a particular location:

a. Field measurements.

b. Design wall thickness calculations.

1) Signed and sealed by a Professional Engineer registered in the State of Georgia and proficient in the design of CIPP systems.

2) Manufacturer certification of material to values used in calculations.

2. "Wet-out" Plan: for each proposed lining section

a. Method for "wet-out" or flexible tube.

b. Specific insertion and curing schedule.

3. Contractor's procedures and materials for installing the liner and renewing sewer services including time and duration of sewer service unavailability.

4. Sampling procedures and locations for obtaining representative samples of the finished liner.

E. The Contractor shall submit a daily written record.

1. The Construction Manager shall certify receipt of the daily record (in email format) noting any items and adding any observations with reference to claims for payment to the Contractor.

2. The Construction Manager may request a weekly submission in the form of progress report.

a. Construction Manager shall provide the Contractor a written request for a weekly progress report.

F. Pre- and post- upgrade CCTV inspection reports and video files.

G. Post upgrade reports and video files shall be made after liner installation and re-connection of all laterals and immediately prior to the commissioning stage.

1.04 QUALITY ASSURANCE

A. References

1. This Section contains references to the following documents. They are a part of this section to the extent referenced in this specification.

2. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.

3. In the event of a conflict between the requirements of this section and those of the referenced documents, the requirements of this specification shall prevail.

4. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the time of construction.

Reference	Title
ASTM C581	*Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass Fiber Reinforced Structures Intended for Liquid Service.*
ASTM D543	*Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.*
ASTM D578/ ASTM D578M	*Standard Specification for Glass Fiber Strands.*
ASTM D618	*Standard Practice for Conditioning Plastics for Testing*
ASTM D638	*Standard Test Method for Tensile Properties of Plastics*
ASTM D790	*Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials*
ASTM D1598	*Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure*
ASTM D2122	*Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings*
ASTM D2412	*Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading*
ASTM D2837	*Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.*
ASTM D2990	*Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics*
ASTM D3567	*Standard Practice for Determining Dimensions of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings.*
ASTM D3681	*Standard Test Method for Chemical Resistance of Fiberglass (Glass-Fiber-Reinforced Thermosetting Resin) Pipe in a Deflected Condition.*
ASTM D5813	*Standard Specification for Cured-in Place Thermosetting Resin Sewer Pipe*
ASTM F1216	*Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube*
ASTM F1743	*Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)*

Reference	Title
ASTM F2019	*Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)*
NASSCO	Guideline for the use and handling of styrenated resins in cured-in-place-pipe, September, 2008

B. Manufacturer's Certification

1. Product manufacturers shall provide the Construction Manager with written certification that all products furnished comply with all applicable provisions of these Specifications.

C. Contractor's Certification

1. The Contractor must certify that the liner tube/resin composite system to be used is the exact system for which all submittals and certifications were made in the bid.

2. No substitutions will be allowed, and misrepresentations and/or omissions may be grounds for contract termination with the Contractor waiving any and all claims against the Owner for work performed or costs incurred.

1.05 QUALIFICATION REQUIREMENTS

A. Product manufacturer shall have minimum 10 years' experience in CIPP manufacturing including:

1. Manufacture of a minimum of 100,000 linear feet of CIPP.

2. References for 10 projects for CIPP with pipe diameters of similar size or greater to those found on the Contract Drawings.

3. Personal experience of the manufacturing manager with other manufacturing companies may be substituted in lieu of the current company experience.

4. The CIPP system must have a proven performance record. Documentation of performance record shall be submitted with the Contractor's bid. Failure to provide this documentation may be grounds for disqualification.

B. Contractor's Qualifications

1. Contractor shall have a minimum of 5 years' experience in the installation of Cured-in-Place-Pipe products.

a. Within the previous 5 years, the Contractor shall have successfully completed at least 30,000 linear feet in total utilizing CIPP trenchless technology in pipe diameter of similar size to those found on the Contract Drawings or greater.

b. The Contractor shall provide the names of the owners of such projects and contact information upon request.

c. Documentation of experience shall be submitted in the Contractor's bid. Failure to provide this documentation may be grounds for disqualification.

2. Personal experience of the Contractor's construction manager with other construction companies may be substituted in lieu of the current company experience.

   a. Substitution after award requires approval of the Construction Manager.

3. Contractor's Installing Superintendent and foreman must have:

   a. Minimum 3 years' active experience in commercial installation of CIPP liners.

   b. Key personnel shall each have completed minimum 30,000 linear feet and 100 line sections of CIPP in gravity sewers.

   c. Certified training on installing manufacturer's product approved by the manufacturer.

4. Demonstrated they have a manufacturer approved quality assurance program to standardize the materials, manufacture, wet out and installation of the specific CIPP product in place.

5. The superintendent for the job shall be on-site during all phases of the Work involving any pre- and post- installation video inspection, sewer cleaning insertion and processing of the CIPP.

6. Documentation of experience shall be submitted in the Contractor's bid.

   a. Failure to provide this documentation may be grounds for disqualification.

1.06 TESTING

A. CIPP samples shall be prepared and physical properties tested in accordance with ASTMF1216 or ASTM F1743, Section 8. The flexural properties must meet or exceed the values listed in Table 1 of the applicable ASTM and the values used herein for design.

B. Thickness of samples shall be determined as described in paragraph 8.1.6 of ASTM F1743. The minimum wall thickness at any point shall not be less than 87½% of the design thickness.

C. Inspection

1. Visual inspection of the CIPP shall be in accordance with ASTM F1743, section 8.6. Two (2) sets of post installation videos, labeled and audio keyed to the Contract Drawings and associated logs, shall be submitted to the Construction Manager **within 24 hours of the inspection.**

1.07 DELIVERY, STORAGE AND HANDLING

A. Packaging, handling and shipping shall be done in accordance with the

manufacturer's instructions.

1. The Contractor shall be responsible for the delivery, storage, and handling of products.
    a. Keep products safe from damage
    b. Promptly remove damaged products from the work site at the Contractor's expense.
        1) Dispose of all damaged items in accordance with current applicable local, state and federal regulations.
    c. Replace damaged products with undamaged products acceptable to the manufacturer and Construction Manager.
2. No products shall be shipped to the job site without the approval of the Construction Manager.

B. Resin shall be shipped directly to wet-out facility from resin manufacturer unless otherwise approved by the Construction Manager.

C. Store UV light cured liners in a light-proof, cool environment to prevent premature curing.

D. The tube shall be handled with such care as to avoid cuts, tears or abrasions and in a manner to minimize deleterious stretching during all phases of the delivery and installation process. Special care shall be taken to roller convey, pull, lift, or pressurize the tubes to limit stretching and other potential deleterious effects as recommended by the manufacturer.

E. All materials shall be accompanied by test reports certifying that the materials conform to the ASTM standards listed herein.

1. Materials shall be shipped, stored, and handled in a manner consistent with written recommendations of the manufacturer.
2. The liner wet-out report must be provided for liner material and resin type.
    a. The ratio of resin and fiberglass must be provided by the manufacturer.

F. Any liner damaged in shipment shall be replaced as directed by the Construction Manager. Any liner showing a split or tear or has been mishandled shall be marked as rejected and removed at once from the work.

1.08 REGULATORY REQUIREMENTS

A. The work of this Section shall comply with the current versions, with revisions, of OSHA 29 CFR 1910.146 (permit-required confined-space regulations).

B. All work and testing shall comply with the applicable Federal codes, including:

1. Federal Occupational Safety and Health Act of 1970.

2. Construction Safety Act of 1969, as amended.

3. Applicable state and local codes and standards.

4. To the extent applicable, requirements of the Underwriter's Laboratories, Inc. and the National Electric Code.

C. The Contractor shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.

D. No confined space entry will be permitted without the development and implementation of a confined space entry plan.

1. Plan shall be in accordance with OSHA standards.

2. Personnel involved shall have current training certificates.

3. Entry permit is required prior to entry.

1.09 WARRANTY AND REPAIRS

A. Material Warranty:

1. A written guarantee of 10 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the replacement pipe material including against breakdown of material effectiveness of structural repair elements.

a. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.

B. Workmanship Warranty:

1. The Contractor shall guarantee his work for a warranty period of 3 years from the date of final acceptance against any leakage, cracking, loss of bond or other discontinuity as identified.

2. The warranty shall cover the cost of repairing and/or replacing the installed CIPP liner and any freight to project site should the installed liner have any defects in material or workmanship.

a. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the Contractor of warranty responsibility for the full warranty term.

C. Deficiencies related to material and workmanship shall be repaired by Contractor to the satisfaction of the Construction Manager.

D. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

E. If required, Contractor and replacement pipe manufacturer representatives may

participate in inspections to determine such deficiencies.

F. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract

G. Within the guarantee period, where no loss of customer service or property damage is involved, the Contractor shall begin work on requested repairs or corrective measures with 24 hours following notification by Owner.

H. If property damage or loss of customer service is involved, the Contractor shall begin work with four (4) hours of notification by Owner.

I. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

1.10 RESPONSIBILITY FOR OVERFLOWS OR SPILLS

A. It shall be the responsibility of the Contractor to schedule and perform his work in a manner that does not cause or contribute to incidence of overflows or spills of sewage from the sewer system.

B. In the event that the Contractor's work activities contribute to overflows or spills, the Contractor shall immediately take appropriate action to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill, and notify the designated Construction Manager in a timely manner.

C. Contractor will indemnify and hold harmless the County for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering and administrative expenses of the County in defending such fines and claims.

PART 2 - PRODUCTS

2.01 GENERAL

A. The cured-in-place pipe material shall be fabricated from materials which, when cured, will be suitable for the environment intended.

1. The liner shall be resistant to exposure to the following:

a. Internal exposure to sewage gases containing normal levels for domestic sewage of hydrogen sulfide, carbon monoxide, carbon dioxide, methane, traces of mercaptan, kerosene, saturation with moisture and dilute sulfuric acid.

b. External exposure to soil bacteria and any chemical attack which may be due to materials in the surrounding ground.

B. The net inside diameter of the reconstructed/lined sewer shall be as large and smooth as possible to maintain the lined pipe's final capacity as close as possible to its original capacity.

C. Final product must not deteriorate, corrode or lose structural strength in any manner that will preclude the pipe from meeting the expected design life.

D. The Contractor shall be fully responsible for the design of the CIPP (liner) and shall save and hold harmless the Owner and Engineer from any and all costs or damages directly or indirectly related to the structural design of the CIPP.

E. Prior to design and ordering of the liner, the internal dimensions of the existing sewer mains shall be verified to insure that the lining utilized will be of appropriate dimension.

2.02 GLASS FIBER LINER TUBES

A. All materials shall be commercially available products from manufacturers acceptable to the Owner.

B. Glass Fibers

1. The glass fibers shall be corrosion resistant E-CR
2. Each lot of glass fibers liner shall be inspected for defects and tested in accordance with applicable sections of ASTM F2019.

C. Liner Tube

1. Any materials not approved by the Construction Manager prior to installation into the piping shall be rejected and shall be removed and replaced with approved materials at the Contractor's expense.
2. The liner shall have an impervious internal and external coating material to protect the resin from ultra violet light exposure and from contamination during shipping and installation.
3. The fiberglass liner shall be saturated with the appropriate resin using the resin bath or vacuum suction impregnation methods and allow the least amount of air entrapment.
4. Manufacture/construct the UV-CIPP using materials and methods that when installed:
    a. Provides a jointless and continuous structurally sound liner.
    b. Able to withstand all imposed static and dynamic loads on a long-term basis.
5. The impregnation of the resin into the glass fiber tube must be performed at the manufacturer's factory.
    a. No on-site wet-out of the tube will be allowed.
    b. The liner shall be designed specifically to meet this Contract's requirements.

6. The liner shall be sized such that when installed it will tightly fit the internal circumference of the host pipe.
7. The manufacturer shall test raw materials and liner material at various stages of manufacturing.
8. Every finished liner shall be sampled and tested for flexural modulus and strength, modulus of elasticity and wall thickness.
    a. The results shall be provided to the Construction Manager.
9. The liner shall be seamless so that homogeneous properties are attained throughout the length and circumference.
10. The inner and outer membranes shall be certified styrene gas barriers.
11. All liners shall be packaged in special shipping containers and UV protection foil,
    a. Allowing storage of the resin impregnated liner for up to 6 months, withno need for refrigeration.

D. The liner thickness shall be designed in accordance with ASTM F1216 and the following criteria:

1. The structural performance of the cured-in-place pipe must be adequate to accommodate all internal and external loads (live and dead) over its service life.
2. The physical properties used in the design submittal shall be clearly identified. These physical properties shall be the basis for the acceptance of submittals of field samples and the acceptance of the final product.
3. Design Life: 50 Years
4. Pipe Diameters: Per Contract Drawings
5. Ovality: 2%
6. Maximum Deflection: 5%
7. Host Pipe Condition: Fully deteriorated
8. External Water: Ground water shall be actual depth or at least 5 feet below grade.
9. Physical Properties:
    a. Tensile Strength: 20,000 psi - Test Method ASTM D790
    b. Flexural Strength: 20,000 psi - Test Method ASTM D790
    c. Short Term Flexural Modules: 1,000,000 psi - Test Method ASTM D790
    d. Long Term Flexural Modules: 600,000 psi - Test Method ASTM D790
10. Reduction Factor: 50%

11. k Enhancement Factor: 7
12. Soil Modules: 1,000 psi
13. Prism Load: Soil density equal or greater than125 pcf
14. Highway Live Load: AASHTO H-25
15. Safety Factor: 2 minimum
16. Minimum Thickness: The liner thickness of each pipe segment shall be determined by the Contractor and submitted per Paragraph 1.05 of this Section. The minimum CIPP design thicknesses are listed below.

6”- 10” Diameter	3 mm
12” – 15” Diameter	6 mm
18” - 24” Diameter	7 mm

    a. The nominal liner wall thickness shall be constructed to the nearest 0.5 mm increment.

17. Poisson’s ratio: 0.3.
18. Liner shall be watertight.
19. Detailed design calculations for all external loading conditions shall be submitted for review and approval.
    a. The CIPP shall be designed as per ASTM F1216, Appendix X1.3.1 for the Fully Deteriorated Pressure Pipe condition.
    b. These detailed calculations shall provide the input data as well as the actual calculations for Equations X1.1, X1.3, and X1.4 of Appendix X1. of the latest edition of ASTM F1216.
    c. The design submittal shall also clearly identify the physical properties used for design.

E. Resin:

1. All Resin must be able to cure by Ultraviolet light.
2. A corrosion resistant vinyl ester resin system may be used that, when properly cured within the tube composite, meets the requirements of ASTM F1216 and ASTM F1743, the physical properties herein and those which are to be utilized in the design of the CIPP for this Project.
3. The resin shall produce a CIPP which will comply with the structural and chemical resistance requirements of this Specification.
4. General purpose, unsaturated, polyester, epoxy, isophtalic neopentyl glycol or thermosetting vinyl ester resin including:
    a. Catalyst system, initiators or hardeners providing specified cured physical strengths and properties.

b. Compatible with reconstruction inversion process.

5. Resistant to municipal wastewater environment including:

a. Immersion in septic sewage at temperatures up to 75 degrees F.

6. PET resins, resin fillers, resin additives and resin enhancement agents are prohibited.

a. Only neat resins are acceptable.

b. Old resins and reworked resins are prohibited regardless of whether or not they are mixed with new resin.

7. Chemical resistance of resin system shall have been tested by resin manufacturer in accordance with ASTM D543.

a. Exposure to chemical solutions listed below at temperatures of up to 75 degrees F shall be conducted for a minimum period of 1 month and shall result in a loss of not more than 20 percent of initial structural properties.

1) Minimum Chemical Solution Concentration, ASTM F1216:

a) Tap Water, pH 6 to 9: 100 percent.

b) Nitric Acid: 5 percent.

c) Phosphoric Acid: 10 percent.

d) Sulfuric Acid: 10 percent.

e) Gasoline: 100 percent.

f) Vegetable Oil: 100 percent.

g) Detergent or Soap: 0.1 percent.

8. Produce cured tube resistant to shrinkage, non-corroded or oxidized and resistant to abrasion from solids, grit, and sand in wastewater.

9. Bond between tube layers shall be strong and uniform.

10. Layers, after cure, shall be saturated with resin.

11. The resin color shall not interfere with visual inspection of cured liner.

2.03 ULTRA VIOLET LIGHT CATALYST SYSTEM

A. When inserting the curing equipment in the liner, care shall be taken to not damage the inner film material.

B. Approved UV light systems shall have the ability to record specific parameters during the curing process to ensure the liner is properly cured.

C. The recording parameters shall include:

1. Project name.

2. Line section.

3. Date and time.
4. Curing speed.
5. Light source working & wattage.
6. Inner air pressure.
7. Inner temperatures.
8 Length of liner.

2.04 SOURCE QUALITY CONTROL

A. At time of manufacture, each lot of liner shall be inspected and certified to be free of defects.

B. Mark inside of tube in at least one location per set up.

1. Mark shall include manufacturer of liner, at regular intervals, not to exceed 5 feet, along full length.

C. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction.

1. CIPP samples with and without plastic coating shall meet these chemical testing requirements.
2. CIPP Field Samples:
   a. Submit test results from field installations of the same resin system and tub materials as proposed for the actual installation.
   b. Test results must verify that CIPP physical properties specified have been achieved in previous field applications.

D. Retention Factor - The retention factor for the design shall be a default value of 50% or a factor calculated from ASTM D2990 testing data.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. All materials shall be installed in accordance with manufacturer's written instructions and recommendations.

B. All work shall be completed by workmen skilled in their trade.

C. All reconstruction of existing gravity sewer mains using an approved CIPP product and installer shall be performed in strict accordance with this Specification and the latest revision of ASTM F1216.

D. Where discrepancies exist, or any latitude is either inferred or interpreted between this specification and ASTM product and process standards, this Specification shall govern.

3.02 PREPARATION

A. The following installation procedures shall be adhered to unless otherwise approved by the Construction Manager.

1. Carry out all operations in accordance with all Federal, State, and local safety laws, regulations, standards, policies and procedures including those promulgated by OSHA and those recommended by the manufacturer.
    a. Particular attention is drawn to those safety requirements involving entering confined spaces (follow OSHA requirements).
        1) The Contractor shall take additional precautions to secure the work area and insure the safety of everyone in or around the curing apparatus.
        2) Before utilizing this method, the Contractor shall submit a copy of the Contractor's standard operating procedures addressing safety issues for this methodology to the Construction Manager.
2. The Contractor shall bypass wastewater around the sewer segment or sewer segments designated for lining.
    a. Service connection effluent may be plugged only after proper notification to the affected properties.
    b. Individual's sewer service shall not be interrupted for more than 8 hours.
        1) If proposal is to interrupt service for more than 8 hours alternative means of providing service during construction will be required.
3. Do not install liner if ground water temperatures and/or ambient temperatures are excessive for the manufacturer's recommended installation procedures.
4. Where practicable, liners may be installed in continuous runs through manholes:
    a. Where there are two or more continuous sewer segments.
    b. Or to connect several short segments with a continuous lining.
5. If a road/lane must be closed to traffic, the Contractor shall furnish a detailed traffic control plan and all labor and equipment necessary.
    a. No separate payment will be made for traffic control.
    b. It shall be an incidental part for CIPP installation.

3.03 PRE-INSTALLATION PROCEDURE

A. Complete the following activities unless otherwise approved by the Construction Manager.

1. Perform operations in accordance with OSHA Standards.

2. Before Work commences:

a. Required pre-installation submittals shall be approved by Construction Manager, including:

1) Traffic management plan/measures.

2) Safe pedestrian passage.

3) Provision of vehicular access to property.

4) Bypass/diversion pumping.

5) Emergency measures/contingent plans.

b. Submit an Installation Access Plan including:

1) Access manhole location(s).

2) Site plan sketch showing dimensions of access within work limits and utilities.

3) Approximate installation rate (ft/day).

4) Appropriate excavation/backfill/resurfacing procedures including permits according to Georgia Department of Transportation and governing agency standards.

B Installation Responsibilities.

1. It shall be the responsibility of the Contractor to field locate and designate all access points, open and make accessible for the work based on the Contract Drawings.

2. The Contractor shall arrange for access to water hydrants for cleaning and other work related items requiring water.

3.04 PRE-INSERTION CLEANING

A. Prior to entering access areas, such as manholes, an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen must be undertaken in accordance with local, state or federal safety regulations.

B. Cleaning of Host Pipeline

1. Sewers shall be cleaned of all debris, roots and other materials that would inhibit proper insertion of CIPP.

a Pipeline shall be cleaned with hydraulically powered equipment, high velocity jet cleaners or mechanically powered equipment.

b Heavy cleaning of sewers shall be performed if roots are present which require the use of mechanical brushes or dragging devices

or, if in the judgment of the Construction Manager, the pipe is more than 25% full of debris.

c The pipe shall be cleaned to the satisfaction of the Construction Manager.

d See NASSCO Recommended Specifications for Sewer Collection System Rehabilitation as required for the CIPP lining operation.

2. Utilizing high-pressure jet cleaning equipment, several passes may need to be completed to assure that all debris is removed from the pipe to the satisfaction of the Construction Manager.

3. Debris Disposal

a All debris cleaned from the pipe shall be removed and disposed of at a dumpsite designated by the Owner at no additional cost to the Owner.

b Debris shall not be allowed to wash into any other pipe segment either upstream or downstream from the pipe segment being cleaned.

c Debris removed from sewer during cleaning shall be transported in watertight containers and disposed of in accordance with local, State, and Federal Regulations.

4. Provision and Usage of Water

a. The Owner shall make available all water required to perform this work.

b. The Owner shall provide a fire hydrant meter at no cost to the Contractor beyond the normal security deposit for use on the Project.

c. Contractor shall coordinate connection and usage limits and withdrawal locations with the Owner prior to construction.

d. The Contractor shall pay for all the water used based on the meter readings.

C. Existing Dimensions

1. After cleaning, the Contractor shall measure the I.D. of the existing pipe at the two (2) locations.

2. Prior to ordering of the liner, the Contractor shall:

a. Verify the internal dimensions of the existing sewer mains to insure that the lining utilized will be of appropriate dimension.

b. CCTV inspect and record ensuring the host pipe is free of debris and stable enough to line.

3.05 PRE-INSTALLATION VIDEO INSPECTION

A. Pipelines shall be inspected via CCTV in conformance with the Fulton County Manual for Internal Sewer Condition Assessment.

B. Prior to installation of the CIPP, but not more than 48-hours prior to such installation, the section of sewer designated for CIPP shall be televised its full length using a remote television camera specifically designed for that purpose.

C. Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by closed-circuit television.

D. Utilizing a color video inspection system with data recording capabilities, the entire pipe section to be lined shall be recorded in a digital format and two (2) copies produced.

1. The interior of the pipe shall be carefully inspected to determine the location of any conditions, which may prevent the proper installation of the CIPP and it shall be noted so that these conditions can be corrected.
2. Electronic files, including a suitable log, shall be submitted to the Construction Manager.
3. Logs shall include date, line size, length, manhole numbers, project number, direction of camera travel, direction of flow and all observed defects or comments.
4. For each service connection the log shall include:
    a. The distance from manhole.
    b. Its radial location (e.g. 9:00 or 2:00 o'clock).
    c. Street address or parcel identification.
    d. Distance from mainline to cleanout.
5. Videos between manhole segments shall be continuous and no breaks or "blink-outs" in the video shall be observed. The videos shall be in digital flash drive format.
6. The full cross-sectional area of the pipe shall be visible during video inspection except where misalignment of the sewer that may result in standing water in bellies or sags
7. The pre-installation video files shall be turned over to the Construction Manager prior to pipe lining.

E. The television camera used for this purpose shall be operative in one hundred percent moisture conditions.

1. Lighting for the camera shall be sufficient to yield a clear picture of the entire periphery of the pipe.
2. The camera, television monitor and other components of the video system shall be capable of producing a five hundred line resolution picture.
3. The camera's rate of travel shall not exceed 20 feet per minute.

4. At each service connection, the camera shall come to a complete stop and the service shall be panned so that the entire cross sectional area of the service can be inspected.
5. The footage meter count shall be clearly visible.
6. If for any reason the camera becomes disabled inside the sewer and cannot further proceed, the Contractor will be responsible for retrieving the camera at no additional cost to the Owner.

F. Identification and Pre-measurement of Lateral Connections

1. A 360-degree Pan-and-Tilt view camera shall be used to inspect the pipe.
2. At each connection the operator will stop and turn the camera lens toward the lateral thereby inspecting the first 8 to 12 inches of the lateral connection.
3. The Contractor shall be responsible for determining if the connection is active or inactive.
4. For each service connection determined by the Contractor to be active, the Contractor shall determine the condition of the service connection to the host pipe, make his recommendation for lateral connection repair and record both items in his log.

G. CCTV inspection additional requirements shall include the following:

1. Preconstruction video recordings shall be available for viewing by the Construction Manager before construction begins and throughout the project.
2. Video recordings shall be submitted to the Owner via a flash drive and shall remain property of the Owner. Contractor may retain the duplicate copy for his use.
3. All flows tributary to the reach of sewer being inspected are to be completely by-passed around the reach during pre-construction inspection if necessary and required by the Owner.
4. Should any portion of the inspection video be of inadequate quality or coverage, as determined by the Construction Manager, the Contractor shall have the portion re-inspected and video recorded at no additional expense to the Owner.

H. Line Obstructions

1. The host sewer pipe shall be clear of obstructions such as solids, dropped joints, protruding service connections, crushed or collapsed pipe, and reductions in the cross-sectional area of more than 40% that may hinder or prevent the installation of the insertion of the liner system
2. When service connections protrude into existing pipe more than ½ inch, as measured from inside pipe wall, remove protruding portion of service connection to within ½ inch of inside pipe wall.

3. If pre-installation inspection reveals an obstruction such as a dropped joint, or a collapse that will prevent the lining installation process and that cannot be removed by conventional sewer cleaning or pipe or root cutting equipment, the Contractor may be required to make a point repair excavation to uncover and remove or repair the obstruction.

4. Such excavation shall be approved in writing by the Construction Manager prior to the commencement of the work and shall be considered as a separate pay item.

5. The Contractor shall remove, grind or take other precautions necessary to address sharp edges or protrusions that could tear the liner or the protective sheets or films.

6. For pipes where sags exist in the pipe segment:

   a. Water in the sag is to be removed to avoid trapping water between the liner and the host pipe.

3.06 EXISTING FLOW

A. The Contractor shall be responsible for maintaining continuous sanitary sewer service to each and every property connected to the segment of sewer subject to sliplining operations.

B. The Contractor shall provide bypass pumping during the pipe lining/replacement process, if necessary.

   1. The pumps and bypass lines shall be of adequate capacity and size to handle all flows including peak wet weather flow.

C. All costs for bypass pumping, tanking and all other private service flow management required during installation of the liner shall be included in the cost for pipe replacement by sliplining.

D. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, disinfection, repair, property damage as well as all resultant costs and claims.

E. When it is necessary to shut down a private sewer service line, notify the Construction Manager at least 1 week in advance to shut down. Notify building occupants regarding service lateral disconnection by placing a door hanger approved by the Construction Manager.

   1. Place door hangers minimum 48 hours prior to shut down.

F. When service lateral need to be disconnected from main for more than 8 hours, lateral shall be positively drained or pump down.

   1. Monitor status of flow and storage.

   2. Pump lateral more frequently where flows exceed storage capacity of lateral or Contractor provided temporary storage.

G. If service lateral cannot be positively drained or pumped down or disconnection of service is anticipated being 8 hours or longer,

1. Contractor shall provide temporary living accommodations for resident at no additional cost to Owner or resident.

2. Temporary living quarters accommodations shall be approved by Construction Manager and coordinated through resident and Owner's Customer Support Representative.

3. Alternatively, Contractor may supply a temporary bypass pumping system to keep the lateral operational.

H. Notify building occupants when work is complete and uninterrupted service restored.

I. Commercial sewer services shall be maintained at all times while the business is open.

1. No sewage from the services or main line shall be discharged on theground or in waterways.

2. Holding pits or tanks are not allowed unless permitted by Federal,State, and local authorities having jurisdiction.

3.07 BY-PASS PUMPING

A. The contractor shall provide all sewage bypass as necessary for the proper installation of liner.

B. Sewage flow shall be pumped around segments during the installation and testing of cured-in-place pipe, the televising of sewers and lateral service reinstatement.

1 The flow shall be intercepted at the upstream end of the segment and shall be pumped through temporary piping of adequate size. The flow shall be discharged into a manhole on the downstream side of the segment, thus by-passing the sewer segment(s) under construction.

2. Pumping equipment shall have the capacity to convey 100% of peak flows around the construction area.

3. A standby pump of the same capacity shall be required on site.

4. Open channels or trenches shall not be used to convey flow.

5. Bypassing or spilling wastewater onto the ground, into the trench, or into adjacent waters is prohibited.

C. The Contractor shall be required to contact all residential and commercial customers whose service lines connect to the sewer main being bypassed and inform them that they will be temporarily out of service.

D. The Contractor shall notify all property owners who discharge sewage directly into the sewer main being rehabilitated at least 48 hours in advance, giving the date,

starting and estimated completion time for the work being conducted and any anticipated impact to the property owner.

1. The Contractor shall also advise those customers against water usage until the mainline is back in service.
2. After completing the necessary work on the main line to allow its reuse, the Contractor shall advise those customers that the sewer main is back in service.
3. The Contractor shall maintain a high degree of professionalism, both in workmanship and appearance, at all times.

E. Temporary Blocking and Back-Ups of Sewers and Sewage

1. Contractor shall be responsible to limit the extent and duration of such blockages and back-ups so that overflows and spillage onto public or private property and into storm sewers, waterways and streets does not occur.
    a. In the event that such spillage or overflow does occur during the course, or as a result, of the Work, the Contractor performing the Work shall immediately eliminate the spillage or overflow and, as necessary, remove the blockage and eliminate the back-up.
    b. Upon elimination of the spillage or overflow, the Contractor shall clean up and disinfect the area.
    c. Work to stop or contain such event is to be deemed EMERGENCY in nature and sufficient justification for total mobilization of resources, the use of overtime or double time and any other reasonable measures to assure correction of the problem without delay.
    d. Damages arising from blockages, back-ups, spillage or overflows of sewage during the course of the Work or because of the Work, shall be the sole responsibility of the Contractor.
    e. The Contractor shall be responsible for paying all fines imposed for overflows or spills during construction.
2. Should a condition arise that the Contractor cannot restore service within 8 hours of service interruption, the Contractor shall make provisions for pumping all flows within the service interruption area at no cost to the Owner.

3.08 ULTRA VIOLET LINER INSTALLATION

A. General

1. Field verify diameters and lengths before manufacturing and cutting liner to length.
2. The tube shall be fabricated to a size that, when installed, will neatly fit the internal circumference of the host pipe designated for CIPP. Allowance shall be made for the circumferential stretching during insertion of the tube.

3. After curing of the resin is completed, the hardened CIPP shall extend from manhole to manhole of the section designated providing a structurally sound, corrosion resistant, watertight conduit that excludes exfiltration and infiltration, is tight-fitting within the host pipe and is free of voids or annular spaces between the CIPP and the host pipe walls.

4. All terminations into manhole walls shall be watertight at the time of final inspection.

5. No annular space shall be visible between the CIPP and manhole wall. In the event that an annular space is present, it shall be completely filled with epoxy or other suitable material to the satisfaction of the Construction Manager.

6. Install in accordance with ASTM F1216, Section 7 or ASTM F1743, Section 6

   a. Active infiltration must be removed prior to insertion of the liner.

B. Resin Impregnation (Wet-Out)

1. Tube shall be impregnated with resin either by the resinbath or vacuum suction methods under controlled conditions.

   a. Resin bath impregnation must be performed at the manufacturer's factory.

   b. Vacuum suction impregnation facility location must be designated prior to CIPP installation.

   c. No onsite wet-out of the tube will be allowed.

   d. If requested, allow Construction Manager to inspect materials and procedures used to impregnate the tube.

   e. If Contractor uses an alternative method of resin impregnation, method shall produce the equivalent results.

      1) An alternative resin impregnation method shall be documented to Construction Manager's satisfaction that saturation of CIPP is sufficient.

   f. Handle resin impregnated tube to retard or prevent settling until it is ready for insertion.

2. Resin must be uniformly distributed throughout the tube.

   a. Use roller system to uniformly distribute resin throughout tube.

3. Volume:

   a. Resin shall fill voids in tube material at nominal thickness and diameter. No air spaces or pockets will be allowed.

   b. Adjust by adding excess resin to change resin volume because of polymerization and to allow for migration of resin into crack and joints in host pipe.

4. Complete wet-out process control sheet for every lining completed. Control

sheet shall provide the following information:

a. Liner manufacturer.

b. Liner diameter.

c. Number of layers.

d. Resin manufacturer.

e. Resin amount.

f. Resin type.

g. Batch number.

h. Catalyst and accelerator name/type.

i. Hardener name/type.

j. Mixing ratios.

k. If vacuum suction method use: pressure of impregnation process.

l. Wet-out start time and date.

C. Insertion

1. CIPP installation shall be in accordance with applicable ASTM F2019 and manufacturer's specifications.

2. The Contractor and Manufacturer shall provide all appropriate transport, handling and protection equipment to deliver the impregnated tube to the project site.

   a. All materials should be protected from the weather and exposure to UV light during the manufacture, storage, transport and installation.

3. All fabricating and Contractor testing shall be carried out under cover and no materials shall be exposed to the weather until they are readyto be inserted.

4. Each liner shall be accompanied by suitable documentation indicating:

   a. Time and date of manufacture.

   b. Fiberglass thickness.

   c. Length of liner.

   d. Resin types.

   e. Resin content.

   f. Catalyst.

   g. Relevant batch numbers.

5. Liner protection: Prior to inserting the liner, a plastic slip/rub sheet,10 mil thick, shall be pulled and laid flat into the host pipe such that it protects the liner from damage as the liner is pulled in.

6. Liner Insertion

a. Insert the liner through an existing manhole or approved access point.

b. Fully extend to the next designated manhole or termination point.

c. Pulling speed shall not exceed 15 ft/min.

d. Exercise care that no axial stretching occurs so that there is no damage to the tube during the pulling phase.

7. The tube shall be positioned in the pipeline using the method specifiedby the manufacturer.

a. Exercise care not to damage the tube as a result of installation.

8. Liner Inflation

a. Liner shall be inflated per manufacture's recommended inflation process.

b. Pressurize the tube to achieve and maintain a tight fit(no gap) against the host pipe throughout the curing process.

1) End plugs or packers shall be used to cap each end of the liner to prepare for pressurizing.

2) The end caps shall be secured with straps or by other means to prevent them from being expelled.

c. Once working inflation pressures are reached the liner shall be inspected by integrated CCTV on the curing light assembly checking for proper fit and expansion of the liner.

d. The curing light train and CCTV camera shall be installed and directed through the entire length of the tube during which a detailed CCTV inspection is performed of the uncured tube.

e. Any defects, such as water bubbles, shall be addressed before the curing begins.

f. The light train is the activated and moved back along the lengthof the tube to effect the curing of the tube into a UV-CIPP.

9. The liner ends shall be the full size of the host pipe and shall be tightfitting to the end of the host pipe.

a. No wrinkles are acceptable at the termination of the liner.

b. No leaking from the liner/host pipe interface will be acceptable.

10. The light cure train shall be fitted with suitable monitors to gauge the cure achieved throughout the length of the liner.

a. The speed of cure shall be as per the manufacturer's requirements.

11. The inner tube protective membrane shall be removed after the liner has been cured.

12. Complete installation process control sheets for every lining completed.

Control sheet shall provide the following information:

a. Date and time.

b. Liner length.

c. Pressure required to inflate tube and hold tight until curingprocess complete.

d. Time curing process started.

e. Curing time.

f. Time curing process ended.

g. Light source and wattage.

h. Exothermic (curing) Temperatures.

i. Time cutting ends started.

j. Time cutting laterals started.

k. Number of laterals cut.

D. Curing

1. The Contractor shall be responsible for the thorough curing of the liner to achieve the specified results.

   a. The curing process shall be performed in accordance with the manufacturer's recommendations.

2. Curing Speeds – Initial curing speeds shall start off at a sufficient speed to ensure the first 15 feet of liner is cured properly, ramping up to working speed to properly cure the remainder of liner per manufacturer's protocol.

3. The same process shall be adhered to during the last 15 feet of liner

4. Contractor shall extend, at their expense, curing time to achieve a hard, sound liner demonstrating the specified mechanical and chemical properties, if required.

5. Integrated camera

   a. The integrated CCTV camera on the light assembly shall inspect post curing operations, fit of liner and any problems that may occur during the curing process.

3.09 SAMPLE TESTING

A. The Construction Manager, may, at his discretion, direct the Contractor to collect samples of the cured CIPP for laboratory determination of flexural strength, flexural modulus and wall thickness for each test sample during the execution of this

Contract.

1. These three individual analyses shall comprise one completed test.
2. The tests shall be used to verify that the installed CIPP meets these Specifications.
    a. CIPP thickness shall be measured in accordance with ASTM D5813.
    b. Flexural properties shall be determined per ASTM D790.

B. All samples shall be collected per the sampling protocols set forth in ASTM F1216.

C. For sewers 15-inch and larger, plate samples may be taken and cured in the same manner as the installed CIPP.

D. For each sample taken, the Contractor shall cut and deliver a 1-inch wide representative sample (taken at least 2 inches from the end of the specimen) to the Construction Manager.

1. The sample delivered to the Construction Manager shall be labeled, dated and removed from any restraining mold.

E. All testing shall be performed by an independent, ASTM-certified testing laboratory of the Owner's designation and at the Owner's expense.

F. The Contractor shall have the finished liner samples taken from manhole cutoffs, service coupons, etc.

1. A minimum of one 12-inch long restrained sample shall be taken from each liner segment installed or as directed by the Construction Manager.
2. Physical samples removed for testing shall be individually labeled and logged to record the following:
    a. Owner’s Project number and title.
    b. Sample number.
    c. Segment number of line as noted on plans.
    d. Date and time of sample.
    e. Name of Contractor.
    f. Location and by whom tested.
    g. Results of test.
    h. Street name and address.
3. Send one (1) sample from each liner segment installed to test in accordance with ASTM standards for:
    a. Flexural Modulus,
    b. Flexural Strength

c. Wall thickness shall be conducted, a minimum of three samples per project shall be tested.

d. Any liner that does not meet the specified strength and/or thickness requirements, regardless of the amount below the specified requirements, shall be corrected by the Contractor in a manner approved by the Construction Manager at no additional cost to the Owner.

1) The Construction Manager's decision on how to correct deficient CIPP installations shall be final.

e. If tests do not meet the minimum values:

1) Additional samples originally not sent for testing may be required to be tested, as directed by the Construction Manager.

2) Contractor bears all costs associated with additional testing.

3) Payment to the Contractor shall be withheld pending the Owner's acceptance of the CIPP test results.

Property	ASTM Test	Minimumm
Flexural Strength	D790	20,000 psi
Flexural Modulus	D790	1,000,000 psi
Thickness	D2122 (per F2019)	Contract requirement

G. Resin Sampling:

1. Wet-out facility resin mixing equipment shall have a valve downstream of the mixing function and immediately upstream of application of mixed resin of tube where resin samples may be drawn.

2. Batch mix facilities, if any, shall provide sampling of mixed batch.

3. Submitted "wet-out" schedule may not be modified without 24-hour notice to Construction Manager.

4. Resin samples shall be drawn at times determined by Construction Manager.

H. Field thickness testing:

1. Perform prior to conducting laboratory tests.

2. Take a wall thickness measurement in accordance with ASTM D2122

3. Make a minimum of four measurements, evenly spaced, on each test specimen.

a. Calculate average thickness using measured values.

4. Average thickness shall be equal or greater than required design thickness.

5. Failure of thickness test shall be grounds for rejection for CIPP liner.

I. If properties tests do not meet the minimum physical and thickness requirements, the CIPP shall be repaired or replaced at the Contractor's expense.

J. All curing, cutting and identification of samples shall be witnessed by the Construction Manager.

3.10 ACCEPTANCE

A. Laboratory Testing: one sample shall be sent to an independentlaboratory and tested.

1. Preparation and testing standards shall be performed in accordancewith the approved submittals.
2. Failure of any test can be grounds for rejection of the CIPP liner.
3. At the direction of the Construction Manager a second sample shall be tested.

B. Destructive Testing: Where test results of samples from the 12-inch long pipe section are lower than required values, at the direction of the Construction Manager, Contractor shall cut samples form liner along length ofpipe.

1. The size and shape of the samples shall be determined by Construction Manager.
2. The Contractor shall repair the CIPP liner and host pipe at no additional cost to the Owner.
3. Failure of test shall be grounds for rejection for the CIPP liner.

C. Resin Sampling: Construction Manager drawing the samples will arrive unannounced and shall be afforded immediate access to the equipment.

1. Resin sample shall be sent to the independent laboratory and tested.
2. Testing standards shall be performed in accordance with approved submittals.
3. Failure of any test can be grounds for rejection for the CIPP liner.

D. Low-pressure air testing or hydrostatic exfiltration test: Acceptance based on successful completion of this test as specified herein.

E. The Contractor shall submit to the Construction Manager, for acceptance and approval:

1. Two (2) copies of unedited post-installation videos
2. Associated certified test reports for each sewer main segment within 10 working days of the liner installation.
3. No more than one sewer main segment shall be included on a post-

installation Inspection recording or curing report.

F. It is the intent of these specifications the completed liner, with all appurtenances, to be essentially equivalent in final quality and appearance tonew sewer pipe installation.

1. The conditions of the existing host pipe will be taken into consideration.

G. Where, in the opinion of the Construction Manager, a defect in the CIPP liner requires removing a section of the CIPP liner, the Contractor shall make all repairs as directed by the Construction Manager and shall install a segmental liner, compatible with the CIPP liner, to accomplish a continuous finished liner.

1. No separate measurement and payment will be made for such defect repair or for the post-repair segmental liner.

3.11 SERVICE CONNECTIONS

A. All existing live service connections shall be precisely located longitudinally and radially and logged for subsequent reinstatement following installation of the sliplining system. The complete list of service laterals, included relevant footage and diameter of lateral, shall be submitted, prior to pipe lining, to the Construction Manager for information.

B. Use CCTV and a robotic cutter device to field locate existing service connections.

C. Once begun, pipe insertion shall be continuous and without interruption from one manhole to another, except as approved by the Construction Manager.

D. Upon completion of insertion of the new pipe, the Contractor shall complete the reconnection of all service laterals. Reconnection of the laterals on the segment must be completed within 8 hours of the start of service interruption to minimize any inconvenience to customers.

E. The Contractor shall reinstate all live junctions immediately after installation of the liner. Service connections may be reinstated by excavation or internally.

F. Confirm the number of service connections to be reinstated and complete work to bring them back on line.

1. Recover coupons at downstream manhole and remove.

2. All service lateral reinstatements shall be wire brushed to eliminate burrs and snags.

G. Existing sewer service laterals shall be internally reinstated to 100% of their pre-CIPP flow diameter.

1. The finished opening shall be smooth with no ragged edges and shall prevent clogging or blockages.

H. Do not reconnect services from abandoned or vacant lots, unless otherwise directed by the Construction Manager.

I. Show distance from nearest downstream manhole to reconnected service on record drawings.

J. When a remote cutting device is used and a cleanout is available, then a mini-camera down the service may also be used to assist the operator in cutting or trimming.

K. Service connection openings shall be reinstated to 95 -100% of their diameter and free from rough edges or protrusions.

L. All active laterals, taps, or side connections will be reinstated from inside the rehabilitated pipe where possible.

1. In smaller diameter pipe in which man-entry is not possible, side connections must be reinstated internally by suitable, TV-monitored, robotic cutting equipment.

2. Cross-sections of the opening of the side connections must be reinstated by at least 95-percent of the original opening.

3. Reinstated lateral service openings shall be brushed smooth to the satisfaction of the Construction Manager.

4. Main-to-lateral connections shall be as watertight as possible to the satisfaction of the Construction Manager and verified as such via post CCTV inspection.

M. The cost for correcting deficiencies discovered shall be the responsibility of the Contractor.

3.12 POST INSTALLATION

A. UV-CIPP installation shall be free from visual defects such as foreign inclusions, dry spots, keel, boat hull, pinholes, wrinkles and other deformities.

1. Defects and deformities may, at discretion of the Construction Manager, be cause for rejection of entire liner.

2. Contractor shall correct failed UV-CIPP and defective UV-CIPP

a. Identified from post installation television inspection.

b. Test reports for structural values

c. Thickness

3. Method of repair, which may require field or workshop demonstration, shall be approved by the Construction Manager prior to commencement of work.

4. Remove and replace pipe identified with defects or deformities that cannot be repaired to the satisfaction of the Construction Manager and/or the Manufacturer.

B. Both ends of the cured Liner shall be cut smoothly 2 inches from the inlet and outlet points in the manhole.

1. Seal with an epoxy or resin mixture compatible with the liner/resin system to provide a watertight seal.
2. Sealing material and installation method shall be submitted and approved by the Construction Manager prior to start of construction.
    a. Tube manufacturer shall also be consulted for appropriate sealing material and installation method.
3. Hydraulic cements and quick-set cement products are not acceptable.

C. Where liners of any type are installed in two or more continuous manhole segments, the liner invert through the intermediate manholes shall be left intact.

1. Final finishing of the installation in those intermediate manholes shall require removal of the top of the exposed liner
2. Neat trimming of the liner edge where it touches the lip of the manhole bench.
3. Sealing between the new liner and pre-existing manhole channel.

D. Portions of any piece of liner material removed during installation shall be available for inspection and retention by the Construction Manager.

E. All manhole drop connections will be reviewed on an individual basis.

1. Reinstate openings for all drop assemblies after relining mainline sewer.
2. Everywhere possible, outside drop assemblies shall be lined with a liner compatible with the mainline slipliner, for the full length of the drop assembly and bend.
3. Drop assemblies inside of manholes are not required to be relined, unless directed by the Construction Manager.

F. Each pipe segment lined shall be CCTV inspected as soon as practical after processing to assure complete curing.

G. Manholes

1. Replacement: When a manhole is replaced, the replacement manhole shall be equipped with a boot connection. The boot will allow a secure connection to CIPP
2. Sealing CIPP in existing Manhole:
    a. The annular space between the CIPP and the existing sewer line shall be sealed where CIPP enters or exits manholes.
    b. The pipe shall be allowed to relax and come to thermal equilibrium for a period of 24 hours before sealing.
    c. Seal the upstream manhole pipe connection, connect services to

the CIPP, and then seal the downstream manhole connection. Acceptable materials are urethane foam, oakum or low shrink grout.

d. Foam sealant shall not protrude into the manhole and shall be finished over with a quick-set, non- shrink cement grout.

H. Each pipe segment lined shall be CCTV inspected as soon as practical after processing to assure complete curing.

1. Segments not fully conforming to these Specifications must be immediately brought to the Construction Manager attention with a proposed method of correction without cost to the Owner.

3.13 POST-INSTALLATION CCTV INSPECTION

A. Following installation of new pipe liners between manholes where lining has occurred, CCTV inspection shall be carried out in accordance with the requirements of the Fulton County Manual for Internal Sewer Condition Assessment to establish that the lining has been installed as specified and all live junctions have been reinstated.

B. The finished lining shall be free of defects that would affect long term strength or hydraulic performance.

C. The finished video recording shall be continuous over the entire length of the sewer between two manholes and shall be completely free from visual defects.

D. The audio/video recording shall be prepared in the presence of the Construction Manager and provide the following:

1. An audio description to what is being viewed.

2. A continuous running footage indicator between manholes.

E. Prior to Final Acceptance the Construction Manager shall be provided with one copy of the TV inspection report and video recording showing the entire length of gravity sewer being sliplined.

1. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type joint, roundness and distance between manholes.

2. Any lining found to be cracked, leaking, misaligned, bellied or otherwise defective shall be removed and replaced.

F. Should any portion of the inspection recording be of inadequate quality or coverage, as determined by the County, the Contractor will have the portion re-inspected and video inspected at no additional expense to the Owner.

3.14 INSPECTIONS

A. The materials and processes must be reasonably available for pre-installation, installation, and post-installation inspections. Areas which require inspection include (but are not limited to) the following:

1. Materials used in the tube should exhibit sufficient transparency to allow visual inspection to assure the quality of resin-impregnation.
2. After completion of the lining process and reinstatement of service connections, the installation shall be inspected with a 360° integral lighthead camera.
    a. This post-installation television inspection is to take place within 24 hours after completion of each section.
    b. No Work shall be accepted that fails this post-installation television inspection.
    c. Post installation videos shall be provided to the Owner within 24 hours after their completion.
    d. Post construction videos shall be submitted to the Owner before final invoices, including retainage, are released.
3. All workmanship and materials shall meet the standards of the industry.
    a. The finished CIPP shall be continuous over the length of pipe between two manholes and shall be an impermeable, joint-less conduit, free from visual defects such as foreign inclusions, dry spots, pin holes, lifts or delamination.
    b. Wrinkles in the CIPP, (other than minor, longitudinal pressure wrinkles) will not be acceptable.
    c. The Construction Manager shall determine as to the acceptability of pressure wrinkling with that decision being final.
    d. In the event the finished liner does not fit tightly against the host pipe at its termination point(s), the space between the liner and the host pipe shall be made watertight, utilizing manhole end seals, hydro-tite gaskets or approved equal.

3.15 CLEAN-UP/RESTORATION

A. After the CIPP liner installation work has been completed and all testing accepted by the Construction Manager, the Contractor shall clean up the work area.

1. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.
    a. The debris and liquids shall be disposed of properly in accordance with all applicable laws.
    b. The local municipality may furnish a letter to the landfill stating the Contractor is authorized to dispose of the non-hazardous materials.

c. Debris and liquids type and quantities are to be tracked in the daily Contractor diary.

d. Hauling and disposal costs will be borne by the Contractor.

B. All surfaces which have been disturbed by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of the Contractor's operations.

C. Suitable materials and methods, acceptable to the Owner, shall be used for such restoration.

D. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

E. The cost for correcting damage resulting from the Contractor's actions shall be the responsibility of the Contractor.

F. Refer to Section 33 30 00, Sewer and Accessories, for additional requirements.

END OF SECTION

SECTION 33 01 30.75

FUSIBLE PVC SLIPLINING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Sliplining of existing gravity sanitary sewers.
2. Reconnection of existing service connections.
3. CCTV inspection

B. Refer to Section 33 32 00, PVC Pipe and Fittings, for additional requirements.

1.02 DEFINITIONS

A. Sliplining: Sewer rehabilitation by which the lining unit pulls a new fusible PVC pipe through an existing pipe.

1.03 SUBMITTALS

A. Submit the following in accordance with the requirements of Section 01 33 23 of these Specifications:

1. Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendations for handling, storage, joint welding and repair of pipe and fittings damaged.
2. Methodology for construction and restoration of existing sewer service connections.
3. Detail drawings and written descriptions of the entire construction procedure to install pipe, bypass sewerage flow and reconnection of sewer service connections, restoration of manhole base and provision for facilitating watertight junction of new pipe to existing and reconstructed manholes.
4. Certification of workmen trained for fusible PVC pipe fusion and installation.
5. Pre and post upgrade CCTV inspection reports and video files. Post upgrade reports and videos shall be made after pipe installation and re-connection of all laterals and immediately prior to the commissioning stage.

B. The following information shall be submitted by pipe and fitting suppliers:

1. Name of the pipe manufacturer and a list of the piping and quantities to be provided by manufacturer.
2. Name(s) of fitting manufacturer(s) and lists of fittings and quantities to be provided by manufacturer.
3. Pipe and fitting product data indicating conformance with this Specification, applicable standards, and warranty provisions, including written documentation regarding any intended variance from this specification and applicable standards.
4. At the time of shipment, the supplier shall provide certified documentation of pipe and fitting conformance with this Specification and applicable pipe and fitting standards specified herein.

C. The following information shall be submitted by Fusion Providers.

1. Documentation that each Fusion Technician has met requirements for joining proficiency for each type of fusion joint performed by the Fusion Technician under this specification.
2. Documentation of conformance with this Specification and applicable standards, including written documentation regarding any intended variance from this Specification and applicable standards.
    a. This will include fusion joint warranty information and recommended project specific fusion parameters including criteria logged and recorded by data logger.

D. The following AS-RECORDED DATA is required from the Contractor and/or Fusion Provider:

1. Fusion reports for each fusion joint performed on the project, including joints that were rejected.
2. Submittals of the Fusion Technician's joint reports are required as requested by Construction Manager.
3. Specific requirements of the Fusion Technician's joint report shall include:
    a. Pipe or fitting size, DR and pressure class rating.
    b. Fusion equipment size and identification.
    c. Fusion technician identification.
    d. Job identification number.
    e. Fusion number.
    f. Fusion joining parameters.
    g. Ambient temperature.

1.04 QUALIFICATIONS

A. The Contractor shall be certified as a fully trained and licensed installer of the pipe lining system.

B. Fusible PVC pipe jointing shall be performed by a Fusion Technician fully qualified by the pipe manufacturer to install fusible PVC pipe of the type(s) and size(s) being used.

1. The Fusion Technician shall be trained in the use of butt-fusion equipment and recommended methods for new pipe connections.

a. Personnel directly involved with installing the new pipe shall receive training in the proper methods for handling and installing the fusible PVC pipe.

b. Training shall be performed by a qualified representative.

2. Qualification shall be current as of the actual date of fusion performance on the Project.

C. Contractor shall hold the County and Engineer harmless in any legal action resulting from patent infringements.

D. Contractor or sliplining subcontractor shall have:

1. Minimum experience of 150,000 L.F. of sliplining existing gravity sanitary sewer pipe and replacing with fusible PVC pipe within the last three years.

E. Acceptable manufacturers

1. Ipex
2. Underground Solutions
3. Approved equal

1.05 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section, the Contractor shall comply with the latest edition of the Standard Specifications for Fulton County together with the latest adopted editions of the Regional and Fulton County Supplement Amendments, especially concerning the reconstruction of manholes and cleanouts.

1.06 QUALITY ASSURANCE

A. References

1. This Section contains references to the following documents. They are a part of this section to the extent referenced in this specification.
2. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.
3. In the event of a conflict between the requirements of this section and those of the referenced documents, the requirements of this specification shall prevail.

4. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the time of construction.

5. This document references American Society for Testing and Materials (ASTM) standard specifications, which are made a part hereof by such reference and shall be the latest edition and revision.

6. It is incumbent upon the Contractor to have a working familiarity with the following ASTM Standards:

   a. ANSI/AWWA C110/A21.10 American National Standard for Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids

   b. AWWA C605 Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

   c. AWWA C900 Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 60 in. (100mm Through 1500mm), for Water Distribution

   d. AWWA M23 AWWA Manual of Supply Practices PVC Pipe-Design and Installation, Second Edition

   e. ASTM C923 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals

   f. ASTM D1784 Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds

   g. ASTM D1785 Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120

   h. ASTM D2152 Test Method for Degree of Fusion of Extruded Poly vinyl Chloride (PVC) Pipe and Molded Fittings by Acetone Immersion

   i. ASTM D2241 Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR)

   j. ASTM D2665 Polyvinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

   k. ASTM D3034 Standard Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings

   l. ASTM F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe

   m. ASTM F679 Standard Specification for Polyvinyl Chloride (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings

   n. ASTM F1057 Standard Practice for Estimating the Quality of Extruded Polyvinyl Chloride (PVC) Pipe by the Heat Reversion Technique

   o. ASTM F1417 Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

p. UNI-B-6 Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe

q. UNI-PUB-08 Tapping Guide for PVC Pressure Pipe

r. PPI TR-2 PVC Range Composition Listing of Qualified Ingredients

1.07 REGULATORY REQUIREMENTS

A. The work of this Section shall comply with the current versions, with revisions, of OSHA 29 CFR 1910.146 (permit-required confined-space regulations).

B. All work and testing shall comply with the applicable Federal codes, including:

1. Federal Occupational Safety and Health Act of 1970
2. Construction Safety Act of 1969, as amended
3. Applicable state and local codes and standards
4. To the extent applicable, requirements of the Underwriter's Laboratories, Inc. and the National Electric Code.

C. The Contractor shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.

D. No confined space entry will be permitted without the development and implementation of a confined space entry plan.

1. Plan shall be in accordance with OSHA standards.
2. Personnel involved shall have current training certificates.
3. Entry permit is required prior to entry.

1.08 DELIVERY AND OFF-LOADING

A. Transportation, handling, and storage of the PVC pipe and fittings shall be as recommended by manufacturer.

B. All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the Construction Manager.

C. Each pipe shipment shall be inspected prior to unloading to check if the load has shifted or otherwise been damaged.

1. Notify the Construction Manager immediately if more than immaterial damage is found.
2. Each pipe shipment should be checked for quantity and proper pipe size, color, and type.

D. Pipe shall be loaded, off-loaded, and otherwise handled in accordance with AWWA M23 and all of the pipe supplier's guidelines shall be followed.

E. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut or gouge the pipe are strictly prohibited.

F. During removal and handling, make sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.

G. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces.

1. Care shall be taken to insure that pipe is not dropped or damaged.

2. Pipe shall be carefully lowered, not dropped, from trucks.

H. If new pipe become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Construction Manager at the Contractor's expense, before proceeding further.

1.09 HANDLING AND STORAGE

A. Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the Work.

1. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area.

2. Limits of the acceptable length of pipe shall be determined by the Construction Manager.

B. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the Construction Manager.

C. Pipe lengths should be stored and placed on level ground.

1. Pipe shall be stored at the job site in the unit packaging provided by the manufacturer.

2. Caution shall be exercised to avoid compression, damage, or deformation to the ends of the pipe.

3. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.

D. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.

E. The pipe shall be shaded or otherwise shielded from direct sunlight. .

1. Covering of the pipe which allows for temperature build-up is strictly prohibited
2. Pipe shall be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.

F. Pipe shall be stored and stacked per the pipe supplier's guidelines. .

1.10 RESPONSIBILITY FOR OVERFLOWS OR SPILLS

A. It shall be the responsibility of the Contractor to schedule and perform his work in a manner that does not cause or contribute to incidence of overflows or spills of sewage from the sewer system.

B. In the event that the Contractor's work activities contribute to overflows or spills, the Contractor shall immediately take appropriate action to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill and notify the Owner and Construction Manager in a timely manner.

C. Contractor will indemnify and hold harmless the County for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering and administrative expenses of the County in defending such fines and claims.

PART 2 – PRODUCTS

2.01 FUSIBLE PVC PIPE AND FITTINGS

A. General

1. All piping shall be made from PVC compound conforming to cell classification 12454 per ASTM D1784.
2. Sizes of the insertions to be used shall be such to renew the sewer to greater flow capacity.
3. The pipe shall be homogenous throughout and shall be free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters or other deleterious faults.

B. Fusible PVC Sewer Piping

1. Fusible PVC pipe shall conform to AWWA C900, ASTM D2241 or ASTM D1785 for standard dimensions, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types.
2. Pipe shall be manufactured with 100% virgin resin. Pipe shall also have 0% recycled plastics content and shall not consist of any rework compound including that obtained from the manufacturer's own production using the same formulation.

3. Fusible PVC pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
4. Fusible PVC pipe shall be manufactured in a standard 40-foot nominal length or custom lengths as specified in the Drawings.
5. Fusible PVC pipe shall be green in color for wastewater use.
6. Pipe shall be marked as follows:
    a. Nominal pipe size.
    b. PVC.
    c. Dimension Ratio (DR), Standard Dimension Ratio (SDR) or Schedule.
    d. AWWA pressure class or standard pressure rating for non-AWWA pipe as applicable.
    e. AWWA standard designation number or pipe type for non-AWWA pipe as applicable.
    f. Extrusion production-record code.
    g. Trademark or trade name.
    h. Cell Classification 12454 and/or PVC material code 1120 shall also be included.

C. Fusion Joints

1. Unless otherwise specified, fusible PVC pipe lengths shall be assembled in the field with butt-fused joints.
2. The Contractor shall follow the pipe supplier's written guidelines for this procedure.
3. All fusion joints shall be completed as described in this Specification.

2.02 DIMENSIONS AND RATIOS:

A. The minimum wall thickness of the fusible PVC pipe shall be DR 18 throughout.

B. Fusible PVC pipe shall be of Ductile Iron Pipe Size (DIPS).

2.03 TESTING

A. Fusible PVC pipe shall be tested at the extrusion facility for properties required to meet all applicable parameters as outlined in AWWA C900 and applicable sections of ASTM D2241.

1. Testing priority shall be in conformance with AWWA C900.

B. Contractor shall furnish samples and material tests for compliance with this Specification from an independent laboratory to verify the required physical

properties and characteristics of supplied materials in accordance with the applicable ASTM Specification.

1. A certificate shall be furnished by the manufacturer, upon request, for all material furnished under this Specification.
2. Fusible PVC pipe that does not meet any of the requirements of this Specification will be rejected.
3. The Owner shall pay for tests on pipe material which meets specification requirements. Contractor shall pay for failed tests and re-testing of failed materials

2.04 WINCH UNIT

A. The winch shall be of the constant tension type but shall be fitted with a direct reading load gauge to measure the winching load which must automatically be maintained at a constant tension at a set tonnage reading.

B. The winch, which shall be hydraulically operated to provide the constant tension throughout the lining operation, shall supply sufficient cable in one continuous length so that the pull may be continuous between approved winching points.

C. The winch, cable and cable drum must be provided with safety cage and supports so that it may be operated safely without injury to persons or property.

D. The Contractor shall provide a system of guide pulleys and bracing at each manhole to minimize cable contact with the existing sewer between manholes.

E. The supports to the trench shoring in the insertion pit shall remain completely separate from the winch boom support system and shall be so designed that neither the pipe nor the winch cable shall be in contact with them.

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS

A. All materials shall be installed in accordance with manufacturer's written instructions and recommendations.

B. All work shall be completed by workmen skilled in their trade.

C. Where discrepancies exist, or any latitude is either inferred or interpreted between this specification and ASTM product and process standards, this Specification shall govern.

3.02 INSTALLATION RESPONSIBILITIES

A. It shall be the responsibility of the Contractor to field locate and designate all access points open and accessible for the work based on the Contract Drawings.

B. The Contractor shall arrange for access to water hydrants for cleaning, and other work related items requiring water.

3.03 CLEANING

A. Prior to entering access areas, such as manholes, an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen must be undertaken in accordance with local, state or federal safety regulations.

B. Cleaning of Pipeline

1. Sewers shall be cleaned of all debris, roots and other materials that would inhibit proper insertion of the slipliner pipe.

a. Pipeline shall be cleaned with hydraulically powered equipment, high velocity jet cleaners or mechanically powered equipment.

b. Heavy cleaning of sewers shall be performed if roots are present which require the use of mechanical brushes or dragging devices or, if in the judgment of the Construction Manager, the pipe is more than 25% full of debris, the pipe shall be cleaned to the satisfaction of the Construction Manager.

2. Utilizing high-pressure jet cleaning equipment, several passes may need to be completed to assure that all debris is removed from the pipe to the satisfaction of the Construction Manager.

3. Debris Disposal

a. All debris cleaned from the pipe shall be removed and disposed of at a dumpsite designated by the Owner at no additional cost to the Owner.

b. Debris will not be allowed to wash into any other pipe segment either upstream or downstream from the pipe segment being cleaned.

4. Provision and Usage of Water

a. The Owner will make available all water required to perform this work.

b. The Owner will provide a fire hydrant meter at no cost to the Contractor beyond the normal security deposit for use on the Project.

c. Contractor shall coordinate connection and usage limits and withdrawal locations with the Owner prior to construction.

d. The Contractor shall pay for all the water used based on the meter readings.

C. Existing Dimensions

1. After cleaning, the Contractor shall measure the I.D. of the existing pipe at two (2) locations.

2. Prior to ordering of the liner pipes:

   a. Verify the internal dimensions of the existing sewer mains to insure that the pipe utilized will be of appropriate dimension.

   b. CCTV inspect and record ensuring the host pipe is free of debris and stable enough to line.

3.04 SEWER SERVICE CONNECTIONS

A. All existing live service connections shall be precisely located longitudinally and radially and logged for subsequent reinstatement following installation of the sliplining system. The complete list of service laterals, included relevant footage and diameter of lateral, shall be submitted, prior to pipe lining, to the Construction Manager for information.

B. Use CCTV and a robotic cutter device to field locate existing service connections.

C. Once begun, pipe insertion shall be continuous and without interruption from one manhole to another, except as approved by the Construction Manager.

D. Upon completion of insertion of the new pipe, the Contractor shall complete the reconnection of all service laterals. Reconnection of the laterals on the segment must be completed within 8 hours of the start of service interruption to minimize any inconvenience to customers.

E. The Contractor shall reinstate all live junctions immediately after installation of the slipliner pipe. Service connections may be reinstated by excavation or internally

F. Confirm the number of service connections to be reinstated and complete work to bring them back on line.

   1. Recover coupons at downstream manhole and remove.

   2. All service lateral reinstatements shall be wire brushed to eliminate burrs and snags.

G. Existing sewer service laterals shall be internally reinstated to 100% of their pre-lining flow diameter.

   1. The finished opening shall be smooth with no ragged edges and shall prevent clogging or blockages.

H. Do not reconnect services from abandoned or vacant lots, unless otherwise directed by the Construction Manager.

I. Show distance from nearest downstream manhole to reconnected service on record drawings.

J. When a remote cutting device is used and a cleanout is available, then a mini-camera down the service may also be used to assist the operator in cutting or trimming.

K. Service connection openings shall be reinstated to 95 – 100% of their diameter and free from rough edges or protrusions.

L. All active laterals, taps, or side connections will be reinstated from inside the rehabilitated pipe where possible.

1. In smaller diameter pipe in which man-entry is not possible, side connections must be reinstated internally by suitable, TV-monitored, robotic cutting equipment.

2. Cross-sections of the opening of the side connections must be reinstated by at least 95-percent of the original opening.

3. Reinstated lateral service openings shall be brushed smooth to the satisfaction of the Construction Manager.

4. Main-to-lateral connections shall be as watertight as possible to the satisfaction of the Construction Manager and verified as such via post CCTV inspection.

5. The annular space between the original host sewer pipe and the liner upstream and downstream of the lateral connection shall be sealed. Acceptable materials for sealing are urethane foam and oakum or low shrink grout.

M. The cost for correcting deficiencies discovered shall be the responsibility of the Contractor.

3.05 EXISTING FLOW

A. The Contractor shall be responsible for maintaining continuous sanitary sewer service to each and every property connected to the segment of sewer subject to slip lining operations.

B. The Contractor shall provide bypass pumping during the pipe lining/replacement process, if necessary.

1. The pumps and bypass lines shall be of adequate capacity and size to handle all flows including peak wet weather flow.

C. All costs for bypass pumping, tanking and all other private service flow management required during installation of the pipe shall be included in the cost for pipe replacement by sliplining.

D. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, disinfection, repair, property damage as well as all resultant costs and claims.

E. When it is necessary to shut down a private sewer service line, notify the Construction Manager at least 1 week in advance to shut down. Notify building occupants regarding service lateral disconnection by placing a door hanger approved by the Construction Manager.

1. Place door hangers minimum 48 hours prior to shut down.

F. When service lateral need to be disconnected from main for more than 8 hours, lateral shall be positively drained or pump down.

1. Monitor status of flow and storage.

2. Pump lateral more frequently where flows exceed storage capacity of lateral or Contractor provided temporary storage.

G. If service lateral cannot be positively drained or pumped down or disconnection of service is anticipated being 8 hours or longer,

1. Contractor shall provide temporary living accommodations for resident at no additional cost to Owner or resident.

2. Temporary living quarters accommodations shall be approved by Construction Manager and coordinated through resident and Owner's Customer Support Representative.

3. Alternatively, Contractor may supply a temporary bypass pumping system to keep the lateral operational.

H. Notify building occupants when work is complete and uninterrupted service restored.

I. Commercial sewer services shall be maintained at all times while the business is open.

1. No sewage from the services or main line shall be discharged on theground or in waterways.

2. Holding pits or tanks are not allowed unless permitted by Federal, State, and local authorities having jurisdiction.

3.06 BY-PASS PUMPING

A. The contractor shall provide all sewage bypass as necessary for the proper installation of liner.

B. The Contractor shall bypass pump sewage flows around the segment being rehabilitated while the work is being performed. A detailed bypass plan shall be submitted to the Construction Manager for approval before any work taking place.

C. Sewage flow shall be pumped around segments during the installation and testing of the slipliner pipe, the televising of sewers and lateral service reinstatement.

1. The flow shall be intercepted at the upstream end of the segment and shall be pumped through temporary piping of adequate size. The flow shall be discharged into a manhole on the downstream side of the segment, thus by-passing the sewer segment(s) under construction.

2. Pumping equipment shall have the capacity to convey 100% of peak flows around the construction area.

3. A standby pump of the same capacity shall be required on site.

4. Open channels or trenches shall not be used to convey flow.

5. Bypassing or spilling wastewater onto the ground, into the trench, or into adjacent waters is prohibited.

D. The Contractor shall be required to contact all residential and commercial customers whose service lines connect to the sewer main being bypassed and inform them that they will be temporarily out of service.

E. The Contractor shall notify all property owners who discharge sewage directly into the segment being rehabilitated at least 48 hours in advance, giving the date, starting and estimated completion time for the work being conducted and any anticipated impact to the property owner.

1. The Contractor shall also advise those customers against water usage until the mainline is back in service.

2. After completing the necessary work on the main line to allow its reuse, the Contractor shall advise those customers that the sewer main is back in service.

3. The Contractor shall maintain a high degree of professionalism, both in workmanship and appearance, at all times.

F. Temporary Blocking and Back-Ups of Sewers and Sewage

1. Contractor shall be responsible to limit the extent and duration of such blockages and back-ups so to prevent overflows and spillage onto public or private property and into storm sewers, waterways, and streets.

a. In the event that such spillage or overflows do occur during the course, or as a result, of the Work, the Contractor performing the Work shall immediately eliminate the spillage or overflow and, as necessary, remove the blockage and eliminate the back-up.

b. Upon elimination of the spillage or overflow, the Contractor shall clean up and disinfect the area.

c. Work to stop or contain such events is to be deemed EMERGENCY in nature and sufficient justification for total mobilization of resources, the use of overtime or double time, and any other reasonable measures to assure correction of the problem without delay.

d. Damages arising from blockages, back-ups, spillage, or overflows of sewage during the course of the Work or because of the Work shall be the sole responsibility of the Contractor.

e. The Contractor is responsible for paying all fines imposed for overflows or spills during construction.

2. Should a condition arise that the Contractor cannot restore service within 8 hours of service interruption, the Contractor shall make provisions for

pumping all flows within the service interruption area at no cost to the Owner.

3.07 PRE-INSTALLATION CCTV INSPECTION

A. Pipelines shall be televised (CCTV) in conformance with the Fulton County Manual for Internal Sewer Condition Assessment.

B. Prior to installation of the fusible PVC pipe, but not more than 48-hours prior to such installation, the segment of sewer designated for sliplining shall be televised its full length using a remote television camera specifically designed for that purpose.

C. Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by closed-circuit television.

D. Utilizing a color video inspection system with data recording capabilities, the entire pipe section to be lined shall be recorded in a digital format and two (2) copies produced.

1. The interior of the pipe shall be carefully inspected to determine the location of any conditions, which may prevent the proper installation of the liner pipe and it shall be noted so that these conditions can be corrected.
2. Electronic files, including a suitable log, shall be submitted to the Construction Manager.
3. Logs shall include date, line size, length, manhole numbers and project number, direction of camera travel, direction of flow and any observed defects or comments.
4. For each service connection the log shall include:
    a. The distance from manhole.
    b. Its location (e.g. 9:00 or 2:00 o'clock).
    c. Street address or parcel identification.
    d. Distance from mainline to cleanout.
5. Videos between manhole segments shall be continuous and no breaks or "blink-outs" in the video shall be observed. The videos shall be in digital flash drive format.
6. The full cross-sectional area of the pipe shall be visible during video inspection except where misalignment of the sewer may have resulted in standing water in bellies or sags
7. The pre-installation video (copy) shall be turned over to the Construction Manager prior to pipe lining.

E. The television camera used for this purpose shall be operative in one hundred percent moisture conditions.

1. Lighting for the camera shall be sufficient to yield a clear picture of the entire periphery of the pipe.
2. The camera, television monitor and other components of the video system shall be capable of producing a five hundred line resolution picture.
3. The camera's rate of travel shall not exceed 20 feet per minute.
4. At each service connection, the camera shall come to a complete stop and the service shall be panned so that the entire cross-sectional area of the service is inspected.
5. The footage meter count shall be clearly visible.
6. If for any reasons the camera becomes disabled inside the sewer and cannot further proceed, the Contractor will be responsible for retrieving the camera at no additional cost to the Owner.

F. Identification and Pre-measurement of Lateral Connections

1. A 360-degree Pan-and-Tilt view camera shall be used to inspect the pipe.
2. At each connection the operator will stop and turn the camera lens toward the lateral thereby inspecting the first 8 to 12 inches of the lateral connection.
3. The Contractor shall be responsible for determining if the connection is active or inactive.
4. For each service connection determined by the Contractor to be active, the Contractor shall determine the condition of the service connection to the main, make his recommendation for lateral connection repair and record both items in his log.

G. CCTV inspection conditions shall include the following:

1. Preconstruction video shall be available for viewing by the Construction Manager before construction begins and throughout the project.
2. Video shall be submitted to the County via a flash drive and shall remain property of the County. Contractor to retain the second copy for his use.
3. All flows tributary to reach of sewer being inspected are to be completely by-passed around the reach during preconstruction inspection if necessary and required by the County.
4. Should any portion of the inspection be of inadequate quality or coverage, as determined by the Construction Manager, the Contractor shall have the portion re-inspected and video recorded at no additional expense to the County.

3.08 FUSION PROCESS

A. General

1. Fusible PVC pipe shall be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this Specification and pipe supplier's guidelines.
2. Fusible PVC pipe shall be fused by qualified fusion technicians, as documented by the pipe supplier.
3. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine.
4. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following elements:
    a. Heat Plate - Heat plates shall be in good condition with no deep gouges or scratches.
        1) Plates shall be clean and free of any debris or contamination.
        2) Heater controls shall function properly. Cord and plug shall be in good condition.
        3) The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused per the pipe supplier's guidelines.
    b. Carriage – Carriage shall travel smoothly with no binding at less than 50 psi.
        1) Jaws shall be in good condition with proper inserts for the pipe size being fused.
        2) Insert pins shall be installed with no interference to carriage travel.
    c. General Machine - Overview of machine body shall yield no obvious defects, missing parts or potential safety issues during fusion.
    d. Data Logging Device – An approved datalogging device with the current version of the pipe supplier's recommended and compatible software shall be used.
        1) Datalogging device operations and maintenance manual shall be kept with the unit at all times.
        2) If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.
    e. Other equipment specifically required for the fusion process shall include the following:
        1) Pipe rollers shall be used for support of pipe to either side of the machine
        2) A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement, extreme temperatures

and/or windy weather, per the pipe supplier's recommendations.

3) An infrared (IR) pyrometer for checking pipe and heat plate temperatures.

4) Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.

5) Facing blades specifically designed for cutting fusible polyvinylchloride pipe shall be used.

B. Joint Recording

1. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine.

2. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of fusible polyvinyl chloride pipe.

3. The software shall register and/or record the parameters required by the pipe supplier and these specifications.

4. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.

3.09 CONSTRUCTION METHOD

A. Installation guidelines from the pipe supplier shall be strictly followed for all installations.

B. Where fusible PVC pipe is installed by pulling in tension, the recommended Safe Pulling Force established by the pipe supplier shall not be exceeded.

C. Equipment used to perform the work shall be located away from buildings in order to minimize noise impact which under all circumstances shall be less than 70 dB unless otherwise allowed by the Construction Manager due to circumstances beyond the control of the Contractor or pipelining subcontractor.

1. A silent engine compartment with the winch shall be provided to reduce machine noise.

D. The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the fusible PVC pipe from damage during installation.

E. Lubrication may be used as recommended by the manufacturer.

1. Under no circumstances shall the pipe be stressed beyond its elastic limit.

2. The winch line must be centered in the existing pipe to be lined with an adjustable boom.

F. Line Obstructions: It is the responsibility of the Contractor to clear the line of obstructions, solids, dropped joints, or collapsed pipe that would prevent insertion or damage the liner during insertion.

1. The host sewer pipe shall be clear of obstructions such as solids, dropped joints, protruding service connections, crushed or collapsed pipe, and reductions in the cross-sectional area of more than 40% that may hinder or prevent the installation of the slipling system.
2. When service connections protrude into existing pipe more than ½ inch, as measured from inside pipe wall, remove protruding portion of service connection to within ½ inch of inside pipe wall.
3. If pre-installation inspection reveals an obstruction such as a dropped joint, or a collapse that will prevent the lining installation process and that cannot be removed by conventional sewer cleaning or pipe or root cutting equipment, the Contractor may be required to make a point repair excavation to uncover and remove or repair the obstruction.
4. Such excavation shall be approved in writing by the Construction Manager prior to the commencement of the work and will be considered as a separate pay item.
5. The Contractor shall remove, grind or take other precautions necessary to address sharp edges or protrusions that could tear the slipliner pipe or the protective sheets or films.
6. For pipes where sags exist in the pipe segment:
    a. Water in the sag is to be removed to avoid trapping water between the slipliner pipe and the host pipe.

G. Excavation: Insertion pits shall be only at locations shown on the Drawings. If additional insertion pits are required, the Construction Manager shall approve the insertion pits and their locations prior to starting this work. The insertion pit size shall be no larger than is necessary.

1. The pit shall be sloped as required by the manufacturer or supplier. The sides of the pit must be supported and conform to OSHA requirements.
2. The pit shall be wide enough to install the liner without damage.
3. Ground water pumping or well pointing shall be the responsibility of the Contractor.
4. After insertion of the slipliner pipe, the trench surrounding the slipliner pipe or surrounding the slipliner pipe and the top of the host pipe shall be filled with suitable properly compacted material.
    a. Sand stabilized with cement, crushed stone or flowable fill may be used. Backfill shall be compacted as noted on the Plans.

H. Insertion of the fused slipliner pipe: The fusible PVC slipliner pipe shall be installed by pulling.

1. During insertion, precautions shall be taken to protect the slipliner pipe from scratches and gouges. The slipliner pipe shall be protected from ragged edges of the broken host sewer pipe.

I. The installed slipliner pipe shall be allowed to relax and cool following installation in accordance with the manufacturer's recommended time, but not less than four (4) hours, prior to any reconnection of service lines, sealing of the annulus or backfilling of the insertion pit.

J. Following the relaxation period, the annular space may be sealed. Sealing shall be made with materials approved by the Construction Manager and in such a manner as to form a smooth, uniform, watertight joint.

3.10 POST INSTALLATION

A. Fusible PVC pipe installation shall be free from visual defects and other deformities.

1. Defects and deformities may, at discretion of the Construction Manager, be cause for rejection of entire slipliner.

2. Contractor shall correct failed and/or defective liner pipe.

a. Identified from post installation television inspection.

b. Test reports for structural values

3. Method of repair, which may require field or workshop demonstration, shall be approved by the Construction Manager prior to commencement of work.

4. Remove and replace pipe identified with defects or deformities that cannot be repaired to the satisfaction of the Construction Manager and/or the manufacturer.

B. Both ends of the slipliner pipe shall be cut smoothly 2 inches from the inlet and outlet points in the manhole.

1. Seal with an epoxy or resin mixture compatible with the slipliner pipe to provide a watertight seal.

2. Sealing material and installation method shall be submitted and approved by the Construction Manager prior to start of construction.

a. Pipe manufacturer shall also be consulted for appropriate sealing material and installation method.

3. Hydraulic cements and quick-set cement products are not acceptable.

C. Where slipliners of any type are installed in two or more continuous manhole segments, the slipliner pipe invert through the intermediate manholes shall be left intact.

1. Final finishing of the installation in those intermediate manholes shall require removal of the top of the exposed slipliner pipe.

2. Neat trimming of the slipliner pipe edge where it touches the lip of the manhole bench.

3. Sealing between the new slipliner pipe and pre-existing manhole channel.

D. Portions of any piece of liner pipe material removed during installation shall be available for inspection and retention by the Construction Manager.

E. All manhole drop connections will be reviewed on an individual basis.

1. Reinstate openings for all drop assemblies after relining mainline sewer.

2. Everywhere possible, outside drop assemblies shall be lined with a liner compatible with the mainline slipliner pipe, for the full length of the drop assembly and bend.

3. Drop assemblies inside of manholes are not required to be relined, unless directed by the Construction Manager.

F. Each pipe segment lined shall be CCTV inspected as soon as practical after processing

1. Segments not fully conforming to these Specifications must be immediately brought to the Construction Manager attention with a proposed method of correction without cost to the Owner.

3.11 TESTING

A. Leakage Testing For Non-Pressure Piping

1. Non-pressure piping such as sewers shall be tested for excessive leakage in accordance with ASTM F1417.

2. Joint leakage and any defective materials and/or workmanship shall be repaired or replaced by the Contractor at no additional cost to the Owner.

B. Circularity Tests

1. Where required by the Construction Manager, pipes may be tested at ground surface for circularity before installation and welding commences.

2. Circularity will be checked by pulling a closed cylindrical mandrel through the polyethylene pipe.

3. The mandrel's outside dimension shall be sized to permit no more than 5.0 percent deflection.

4. The percent deflection shall be established from the base inside diameter of the pipe.

a. If the internal beading of the fused joints for the pipe is not required to be removed, the mandrel shall account for this clearance as well.

5. The mandrel shall be approved by the Construction Manager prior to use.

6. The mandrel shall be at least three times the diameter of the pipe in length and not greater than inside diameter of pipe minus 2 millimeters.

7. Lines that permit safe entry may allow other deflection test options, such as direct measurements.

8. Pipes will be rejected which have greater than 5% deformation due to thermal softening.

C. Hydrostatic Leakage Testing For Pressure Piping

1. Hydrostatic leakage testing shall comply with ASTM F2164. Joint leakage and any defective materials and/or workmanship shall be repaired or replaced by the Contractor at no additional cost to the Owner.

3.12 POST-INSTALLATION CCTV INSPECTION

A. Following installation of new pipe liner between manholes where sliplining has occurred, CCTV inspection shall be carried out in accordance with the requirements of the Fulton County Manual for Internal Sewer Condition Assessment.

B. The finished video shall be continuous over the entire length of the sewer between two manholes and shall be completely free from visual defects.

C. The audio/video recording shall be prepared in the presence of the Construction Manager and provide the following:

1. An audio description to what is being viewed.

2. A continuous running footage indicator between manholes.

D. Prior to Final Acceptance the Owner shall be provided with one copy of the TV inspection report and video recording showing the entire length of gravity sewer being tested.

1. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type joint, roundness and distance between manholes.

2. Any pipe found to be cracked, leaking, misaligned, bellied or otherwise defective shall be removed and replaced.

E. Should any portion of the inspection recording be of inadequate quality or coverage, as determined by the County, the Contractor shall have the portion re-inspected and video recorded at no additional expense to the County.

3.13 PIPE JOINING

A. The fusible PVC pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint in strict accordance with the manufacturer’s instructions and ASTM D2657.

B. Threaded or solvent-cement joints and connections are not permitted.

C. All equipment and procedures used shall be used in strict compliance with the manufacturer's instructions and recommendations.

D. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of fusible PVC pipe and/or fusing equipment.

E. The butt-fused joint shall be true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure.

F. The joint shall be allowed adequate cooling time before removal of pressure. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe.

G. All joints shall be subject to acceptance by the Construction Manager prior to insertion.

1. All defective joints shall be cut out and replaced at no cost to the Owner.
2. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site.
3. Where authorized by the Construction Manager, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above.
4. Any joint more than 1/8-inch high shall be trimmed to be smooth with the pipe prior to installation.

H. Any section of the pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the Construction Manager and/or his representative shall be discarded and not used.

I. Terminal sections of pipe that are joined within the insertion pit shall be connected with Central Plastics Electrofusion Couplings or connectors with tensile strength equivalent to that of the pipe being joined.

3.14 MANHOLES

A. Replacement: When a manhole is replaced, the replacement manhole shall be equipped with a boot connection. The boot will allow a secure connection to the fusible PVC pipe.

B. Sealing fusible PVC Pipe in existing Manhole:

1. The annular space between the slipliner and the existing sewer line shall be sealed where the liner enters or exits manholes.
2. The pipe shall be allowed to relax and come to thermal equilibrium for a period of 24 hours before sealing.

3. Seal the upstream manhole liner connection, connect services to the liner, and then seal the downstream manhole connection. Acceptable materials are urethane foam, oakum or low shrink grout.

4. Foam sealant shall not protrude into the manhole and shall be finished over with a quick-set, non- shrink cement grout.

3.15 CLEAN-UP/RESTORATION

A. After the fusible PVC liner installation work has been completed and all testing accepted by the Construction Manager, the Contractor shall clean up the work area.

1. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.

a. The debris and liquids shall be disposed of properly in accordance with all applicable laws.

b. The local municipality may furnish a letter to the landfill stating the Contractor is authorized to dispose of the non-hazardous materials.

c. Debris and liquids type and quantities are to be tracked in the daily Contractor diary.

d. Hauling and disposal costs will be borne by the Contractor.

B. All surfaces which have been disturbed by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of the Contractor's operations.

C. Suitable materials and methods, acceptable to the Owner, shall be used for such restoration.

D. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

E. The cost for correcting damage resulting from the Contractor's actions shall be the responsibility of the Contractor.

F. Refer to Section 33 30 00, Sewer and Accessories, for additional requirements

3.16 FINAL ACCEPTANCE

A. After installation of the slipliner pipe, the Contractor shall, at the option of the Owner’s Representative, either TV inspect the sewer line or conduct a low pressure test on the liner.

3.17 WARRANTY

A. Material Warranty:

1. A written guarantee of 10 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the

slipliner pipe material.

a. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.

B. Workmanship Warranty

1. The Contractor shall guarantee his work for a warranty period of 3 years from the date of final acceptance and shall cover the cost of repairing and/or replacing the installed slipliner pipes and any freight to project site should the installed slipliner pipe have any defects in material or workmanship.

2. In addition to the standard pipe warranty, the fusing contractor shall provide in writing a three-year warranty from the date of installation acceptance covering defects in fusion joining workmanship that requires remaking defective butt fusion, saddle fusion or electrofusion joints. The warranty shall also include freight to project site, formation, installation and pressure testing.

3. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the Contractor and/or the fusion installer of warranty responsibility for the full warranty term.

C. Deficiencies related to material and workmanship shall be repairedby Contractor to the satisfaction of the Construction Manager.

D. No bell clamps or wrap around corsets are allowed as a means of repair on new pipelines.

E. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

F. If required, Contractor and replacement pipe manufacturer representatives may participate in inspections to determine such deficiencies.

G. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract.

H. Within the guarantee period, where no loss of customer service or property damage is involved, the Contractor shall begin work on requested repairs or corrective measures with 24 hours following notification by Owner.

I. If property damage or loss of customer service is involved, the Contractor shall begin work with four (4) hours of notification by Owner.

J. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

END OF SECTION

SECTION 33 01 31

FIBERGLASS REINFORCED POLYESTER MANHOLE LINERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fiberglass Reinforce Polyester (FRP) Manhole Liners

1.02 SUBMITTALS

A. Complete product data and engineering data, including shop drawings, shall be submitted to the Construction Manager in accordance with the requirements of Section 01 33 23 of these Specifications.

1. Manufacturer's brochures giving a complete description of the product proposed, its physical properties and chemical composition, the thermosetting resin or epoxy hardener, the recommended range of curing temperature, period of cure, cool-down procedures, method of installation, repair and field quality control.

2. Design calculations establishing the structural capabilities, chemical composition, thickness, curing temperature and period, assumptions, and other mechanical properties of the liner system proposed, signed and sealed by a Professional Engineer licensed in the state of Georgia.

B. The Contractor shall submit complete shop drawings of the manhole lining system(s) to demonstrate compliance with these Specifications, materials and detailed installation procedures.

1. Testing procedures and quality control procedures shall also be submitted.

C. Certifications that the lining system was manufactured in accordance with these Specifications and the applicable ASTM standards shall be submitted with each material shipment..

1.03 QUALITY ASSURANCE

A. References

1. This section contains references to the following documents. They are a part of this section to the extent referenced in this specification.

2. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.

3. In the event of a conflict between the requirements of this section and those of the referenced documents, the requirements of this specification shall prevail.

4. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the time of construction.

B. Standards

1. ASTM D695 – Test Method for Compressive Properties of Rigid Plastics

2. ASTM D790 – Test Method for Flexural Properties of Non-Reinforced and Reinforced Plastics and Electrical Insulating Materials

3. ASTM D2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

4. ASTM D3753 – Standard Specification for Glass-Reinforced Polyester Manholes and Wetwells.

1.04 DELIVERY, STORAGE AND HANDLING

A. Unloading

1. Contractor shall inspect manhole liners upon arrival to jobsite, ensuring that manhole liners have arrived undamaged. Manufacturer shall be notified of any damage immediately upon discovering.

2. Furnish equipment and facilities for unloading, handling, distributing and storing manhole liners.

3. Make equipment available at all times for use in unloading. Do not drop, impact or dump the fiberglass manhole liners.

4. Any liner dropped or dumped will be subject to rejection without additional justification.

B. Storage

1. Stored manhole liners shall be kept safe from damage.

2. Contractor shall avoid storing manhole liners on rocks, uneven ground or other surface that may cause point loading or damage to the liner.

3. Manholes liners with a height-to-diameter ratio greater than 2:1 shall be stored in horizontal position, prior to use.

4. Manhole liners shall not be stacked upon one another.

C. Handling

1. Handle manhole liners carefully to prevent shock or damage.

2. Manholes liners shall not be dropped or impacted in a manner that may be detrimental to the manhole liner.

3. Manhole liners may be lifted using a forklift or nylon/textile sling wrapped around the main body of the liner.

4. Manhole liners may also be lifted by inserting a 4" x 4" timber of sufficient length to span the liner opening and attaching cable to midpoint of timber or by attaching a nylon/textile sling around the center of the liner.

5. Use of chains or cables in contact with the liner surface is prohibited.

6. Manholes liners shall be unloaded from trucks one at a time.

7. Do not use liners damaged in handling.

1.05 REGULATORY REQUIREMENTS

A. The work of this Section shall comply with the current versions, with revisions, of OSHA 29 CFR 1910.146 (permit-required confined-space regulations).

B. All work and testing shall comply with the applicable Federal codes, including:

1. Federal Occupational Safety and Health Act of 1970

2. Construction Safety Act of 1969, as amended

3. Applicable state and local codes and standards

4. To the extent applicable, requirements of the Underwriter's Laboratories, Inc. and the National Electric Code.

C. The Contractor shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.

D. No confined space entry will be permitted without the development and implementation of a confined space entry plan.

1. Plan shall be in accordance with OSHA standards.

2. Personnel involved shall have current training certificates.

3. Entry permit is required prior to entry.

1.06 WARRANTY AND REPAIRS

A. Material Warranty:

1. A written guarantee of 10 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the liner material including against breakdown of material effectiveness of structural repair elements.

B. Workmanship Warranty:

1. The Contractor shall guarantee his work for a warranty period of 3 years from the date of final acceptance against any leakage, cracking, loss of bond or other discontinuity as identified.

2. The warranty shall cover the cost of repairing and/or replacing the installed FRP liner and any freight to project site should the installed liner have any defects in material or workmanship.

C. Deficiencies related to material and workmanship shall be repaired by Contractor to the satisfaction of the Construction Manager.

D. The FRP liner shall be repairable at any time during the life of the structure, with the same type of liner materials used in the original installation, including repair or lining of the upper chimney portion where grade adjustments have been made. Repair/lining materials shall be of the type that will bond to the original liner materials.

E. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

F. If required, Contractor and FRP liner manufacturer representatives may participate in inspections to determine such deficiencies.

G. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract.

H. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

PART 2 - PRODUCTS

2.01 GENERAL

A FRP manhole liner shall be manufactured from commercial grade polyester resin or vinyl ester resin with fiberglass reinforcements.

B. The resin system shall be suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection systems.

C. The manhole liner shall be a one piece unit manufactured to meet or exceed all specifications of ASTM D3753.

2.02 MATERIALS AND WORKMANSHIP

A. Resin Systems

1. The resins used shall be a commercial grade unsaturated polyester resin, or vinyl ester resin or other suitable polyester.

2. Resins shall be suitable for the service environment intended(i.e. domestic sanitary wastewater).

B. Additives

1. Additives, when used, shall produce a laminate that is inert to the service environment.
2. All particulate additives used in filament wound components shall be pre-blended with resin using a high shear mixer to assure complete wetting of particulate surfaces.
    a Pre-blending of particulate additives shall result in a homogeneous colloidal mixture with additives evenly dispersed and suspended throughout the resin prior and during use.
3. Manhole liner components manufactured using the filament winding process shall contain no sand.
4. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to meet the requirements of the ASTM D3753 standard.
5. The resulting reinforced-plastic material must meet the requirements of this Specification.

C. Reinforcing Materials

1. The reinforcing materials shall be commercial Grade “E” type glass in the form of continuous roving and chop roving, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin.

D. Interior Surfacing Material

1. The inner surface exposed to the chemical environment shall be a resin-rich layer of 0.010 to 0.020 inch thick.
2. The inner surface layer exposed to the corrosive environment shall be followed with a minimum of two passes of chopped roving of minimum length 0.5 inch to maximum length of 2.0 inch and shall be applied uniformly to an equivalent weight of 3 oz/ft.
3. Each pass of chopped roving shall be well rolled prior to the application of additional reinforcement.
4. The combined thickness of the inner surface and interior layer shall not be less than 0.10 inch.
5. The interior surface shall be resin rich with no exposed fibers.
6. The surface shall be free of crazing, de-lamination, blisters larger than 0.5-inch in diameter, and wrinkles of 0.125-inch or greater in depth.
7. Surface pits shall be permitted if they are less than 0.75-inch in diameter and less than 0.0625-inch deep.
8. Voids that cannot be broken with finger pressure and are entirely below the resin surface shall be permitted if they are less than 0.5-inch in diameter and less than 0.0625-inch thick.
9. Indentations or other shape imperfections that will not affect performance are allowed.

E. Exterior Surface

1. Exterior surface shall be coated with 0.125-inches of gel coat as an additional water barrier.
2. Gel coat shall be pigmented gray as an additional UV inhibitor.
3. The exterior surface shall be relatively smooth with no sharp projections.
4. Handwork finish is acceptable if enough resin is present to saturate all fibers and eliminate fiber show.
5. The exterior surface shall be free of blisters larger than 0.5-inch in diameter, de-lamination or fiber show.
6. Indentations or other shape imperfections that will not affect performance are allowed.

F. Repairs: All fiberglass laminate repairs are subject to meeting the requirements of ASTM D3753 and this Specification.

2.03 MANUFACTURE AND CONSTRUCTION

A. Acceptable Manufacturer

1. Manufacturer shall have 10-years of experience in the manufacture of fiberglass manholes for use in domestic or industrial sanitary sewer applications.
2. Acceptable manufacturer shall have a quality control program that is currently ISO 9001 certified.
3. Manufacturer shall be L.F. Manufacturing, Inc. or approved equal.

B. Manhole cylinders, manway reducers, and connectors shall be produced from fiberglass-reinforced polyester or vinyl ester resin using a combination of chop and continuous filament winding process.

C. Wall Construction Procedure

1. After inner layer has been applied the manhole liner wall shall be constructed with chop and continuous strand filament wound manufacturing process which insures continuous reinforcement and uniform strength and composition.
2. Each layer of glass laminate shall be mechanically roller compacted to remove entrapped air and thoroughly saturate the glass laminate with resin prior to adding another layer of glass reinforcement.
3. The cone section, if produced separately, shall be affixed to the barrel section at the factory with resin-glass reinforced joint resulting in a one piece unit.
4. Seams shall be fiberglass laminated on the inside and the outside using the same glass-resin jointing procedure.

5. Field joints shall be performed by the manufacturer, its agent or qualified third-party.

D. Ribs

1. When used, ribs may be manufactured as a solid construction or with fiberglass laminate applied over a structural or non-structural form.
2. The resulting structure shall meet the requirements of ASTM D3753.

E. Assembly segments

1. Individual fiberglass components of manhole liner shall be joined by fiberglass-reinforced laminate overlay.
2. The resulting structure shall meet the all loading and soundness requirements of ASTM D3753.

F. Height Adjustment

1. Fiberglass manhole liners shall be height adjustable using an internal adjustment ring.
2. Riser sections cut for height adjustment shall be rejoined byfiberglass-reinforced laminate, MacWrap or approved equal.
3. Fiberglass manholes shall maintain all loading and soundness characteristics required by ASTM D3753 after height adjustment has occurred.

G. Interior Access

1. No steps shall be required with the installation of FRP manhole liners.
2. All manhole liners shall be designed so that a ladder or step system can be supported by the installed manhole liner. Manhole steps are not typically required and will not be installed unless required.

H. Manway Reducer

1. Manway reducers shall be concentric or eccentric with respect to the centerline of the manhole riser section, as designated by the Owner.

I. Ring and Cover Support Platform:

1. Top of cone/reducer shall have a fiberglass support platform upon which concrete grade rings may be installed to accept a typical cast iron or composite ring.
2. For H-20 traffic loading, a 4-inch (minimum) thick concrete grade ring shall be required. Outside diameter of grade rings, for H-20 loading, shall exceed outside diameter of fiberglass support plate by a minimum of 1 inch on all sides.

3. The manhole liner shall provide an area for which grade rings or bricks can be installed to accept a typical metal or composite ring and cover and have the strength to support a traffic load without damage to the manhole liner.

4. Grade rings, ring and cover shall be placed over fiberglass neck (chimney) and onto fiberglass support plate in a manner that evenly distributes loading.

5. No loading shall be placed onto fiberglass neck.

J. Marking and Identification

1. Each manhole shall be marked on the inside and outside with the following information:

a Manufacturer's name or trademark.

b Manufacturer's factory location.

c Manufacturer's serial number.

d Total manhole depth.

2.04 DIMENSIONS

A. Diameters

1. Manhole liner diameter shall meet the requirements of the project Specifications and shall be measured in accordance with ASTM D3753 Section 8.3.

2. Tolerance of inside diameter shall be +/- 1% of required liner diameter.

B. Length

1. Manhole length shall be measured from lowest bench elevation to rim elevation and be sufficient to allow for 12 inches of concrete grade rings, plus ring height.

C. Wall Thickness

1. Design thickness shall be sufficient to withstand all dead and live loads imposed on the manhole for the project conditions.

2. Manholes subject to highway traffic loading, as indicated on the Drawings, shall meet the requirements of AASHTO H20 as described in ASTM D3753. Wall thickness shall be 1/4” minimum.

2.05 MANHOLE DESIGN

A. Load Rating

1. The complete manhole liner shall have a minimum dynamic-load rating of 16,000 lbs. when tested in accordance with ASTM D3753 8.4 (See note[1]).

2. To establish this rating the complete manhole liner shall not leak, crack, or suffer other damage when load tested to 40,000 lbs and shall not deflect

vertically downward more than 0.25 inch at the point of load application when loaded to 24,000 lbs.

B. Stiffness

1. The manhole cylinder shall have the minimum pipe-stiffness values shown in the table below when tested in accordance with ASTM D3753 8.5 (See Note [1]).

LENGTH – FT.	F/AY – PSI
6 or less	0.75
6+ to 12	1.26
12+ to 20	2.01
20+ to 25	3.02
25+ to 35	5.24
35+	See Note[1]

Note[1] – For depths greater than 35-feet, pipe stiffness shall be extrapolated from shallower values or Manufacturer shall provide structural design method.

C. Soundness

1. In order to determine soundness, apply an air or water pressure test to the manhole test sample.
2. Test pressure shall not be less than 3 psig or greater than 5 psig.
3. While holding at the established pressure, inspect the entire manhole for leaks.
4. Any leakage through the laminate is cause for failure of the test.
5. Refer to ASTM D3753 8.6.

D. Chemical Resistance:

1. The fiberglass manhole and all related components shall be fabricated from corrosion proof material suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection systems.

2.06 PHYSICAL PROPERTIES

	Hoop Direction	Axial Direction
a. Tensile Strength(psi)	18,000	5,000
b. Tensile Modules(psi)	0.6×10^6	0.7×10^6
c. Flexural Strength(psi)	26,000	4,500
d. Flexural Modules(psi)	1.4×10^6	0.7×10^6
e. Compressive (psi)	18,000	5,000

2.07 TEST METHODS

A. All tests shall be performed as specified in ASTM D3753 latest edition, section 8. Test method ASTM D790 and test method ASTM D695.

2.08 QUALITY CONTROL

A. Each completed manhole liner shall be examined for dimensional requirements, hardness, and workmanship.

B. All required ASTM D3753 testing shall be completed and records of all testing shall be kept and copies of test records shall be presented to the Construction Manager upon formal written request within a reasonable time period.

2.09 CERTIFICATIONS

A. As a basis of acceptance, the manufacturer shall provide an independent certification which consists of a copy of the manufacturer's test report and accompanied by a copy of the test results stating that the manufacturer's fiberglass manhole has been sampled, tested and inspected in accordance with the provisions of this Specification and meets all requirements.

PART 3 - EXECUTION

3.01 INSTALLATION PROCEDURE:

A. Manhole liners shall not be installed until all required mainline sewer rehabilitation and/or other manhole work is completed.

B. The Contractor shall clean each manhole to be restored and shall dispose of any debris or resulting material in a manner and place acceptable to the Owner.

1. Cleaning shall be performed using a high-pressure jet wash at a minimum

of 3,500 psi water pressure to remove all dust, biological growths, grease, oils or any other surface contaminants or coatings.

2. The Contractor shall conduct a visual inspection of each manhole after it is cleaned.

   a. All loose mortar and rubble of existing benches, walls and inverts shall be removed.

   b. Roots shall be removed by manually cutting them from inside the manhole.

3. The Contractor shall prepare the manhole as necessary by reshaping and repairing benches, inverts and walls where required including smoothing out irregular shaped corbel and chimney sections prior to inserting the liner.

4. The invert channel (where applicable and as directed by the Construction Manager) shall be coated with an appropriate quick-set grout in accordance with the manufacturer's instructions.

C. Alterations:

1. Contractor shall not alter the design or construction of manhole liner without notification of manufacturer and manufacturer’s written consent.

2. Only manufacturer and its agents may alter design or construction of manhole liner.

D. Host Manhole:

1. Contractor shall confirm depth of the host manhole from rim to top of bench prior to excavation of host manhole cone.

2. Manhole liner length shall be of sufficient length to provide the proper rim elevation after being placed on host manhole’s bench.

E. Removal of Host Manhole Cone:

1. Contractor shall remove host manhole cone (to sufficient depth for brick manholes) to expose the full diameter of the manhole.

2. Contractor shall ensure proper circumference clearance of manhole liner by lowering into host manhole prior to trimming liner to proper length.

F. Mapping of Host Manhole:

1. After Contractor has confirmed sufficient fit and length of manhole liner, Contractor shall measure the centerline location and outside diametersof all pipe penetrations

2. Contractor shall trim the manhole liner to sufficient length to reach the proper rim elevation.

3. Contractor shall take into consideration any concrete grade rings to be used.

4. Contractor shall trim manhole liner for all pipe penetrations at the proper

centerline locations.

5. For steeply sloped bench surfaces, manhole liner may be trimmed to match bench slope.

6. For internal drop connections, Inserta-Tee connections (or equal) shall be used to seal around the incoming pipe.

7. Contractor may consider using masonry or carbide tipped cutters to cut and trim manhole liner.

8. Contractor shall use OSHA approved eye protection and dust mask while cuttingand trimming liner.

G. Grout Bulkhead

1. Contractor shall place a ring of uncured grout along the circumference of host manhole bench, and over crown of pipe penetrations at invert, of sufficient strength, width and thickness to provide a bulkhead seal along the bottom of the manhole liner.

H. Manhole Liner Installation:

1. Manhole liner shall be lifted by placing a textile sling around liner or by placing a 4”x4” timber of sufficient length to internally span across manway, attaching a sling to the timber and lifting.

2. Steel cables or chains shall not be wrapped around manhole liner for lifting and handling.

3. Contractor shall carefully lift manhole liner and lower liner into host manhole in a controlled manner.

4. Manhole liner shall be centered within the host manhole to create equal annular space around manhole liner.

5. Bottom edge of manhole liner shall be carefully pressed down into uncured grout ring on the bench.

6. Excess grout on interior of manhole liner shall be troweled smooth around circumference of liner to assure no gaps exist between bottom of manhole liner and the bench surface.

7. Small amounts of additional grout may be required to seal gaps around pipe penetrations at the invert.

8. Wooden wedges may be placed at the top of the annular space (three, recommended minimum) and evenly spaced to maintain a center position and prevent teetering of manhole liner during grouting.

9. Wooden wedges, if used, shall be placed by hand only and shall not be hammered into place. Internal drops shall be reconnected prior to annular grouting.

I. Unless shown otherwise on the Drawings and approved by the Construction Manager, concrete grout shall be used for backfill between the host manhole and the FRP manhole liner.

J. Annular Grouting:

1. Contractor shall allow grout bulkhead, at the bottom of manhole liner, to cure to sufficient strength to prevent flowing or yield due to annular grout pressure.
2. Annular grout shall be poured in lifts no greater than 12” around the manhole liner and distributed evenly prior to adding more grout.
3. Contractor shall ensure that equal pressure is maintained on all sides of manhole liner and that manhole liner is not subjected to unbalanced external grouting loads.
4. Annular grout shall have a compressive strength of 300 psi minimum.
5. Maximum height of uncured grout shall not exceed 20 vertical feet.
6. At 20 vertical feet, Contractor shall allow grout to cure prior to adding another stage of grout.
7. Grout shall be poured to the top of the host manhole riser.

K. Manhole Liner Backfill:

1. Any manhole liner extending above and beyond the host manhole shall be backfilled with select native material or #67 (¾ inch to 1 inch) crushed aggregate.
2. The material chosen shall be free of large lumps or clods which will not readily break down under compaction.
3. The Backfill material will be subject to approval by the Construction Manager.
4. Backfill material shall be placed in 12-inch lifts (max) and compacted to 95% Standard Proctor Density.
5. Backfill shall be distributed evenly around the manhole for each lift and compacted evenly prior to the following lift.
6. Care should be taken to prevent the placement of large clods, cobbles, frozen soil, and organic matter against the manhole liner.
7. The backfill around the excavated reducer section shall be stabilized sand or crushed stone.

L. Casting and Grade Rings:

1. Top of cone/reducer, shall be clean and free of debris prior to placing concrete grade rings onto manhole.
2. Concrete grade rings shall be carefully lowered over fiberglass neck (chimney) and onto top of cone in a controlled manner so as not to cause damage to manhole.

3. For AASHTO H20 traffic rated manholes, a 4-inch minimum thick concrete grade ring shall overhang shoulder of fiberglass grade ring platform by 1 inch.

4. Flexible grade rings (e.g. HDPE, rubber, etc) shall not be used on H20 traffic rated manholes.

5. Butyl mastic sealing material shall be placed between manhole, grade rings and cast iron ring to prevent the infiltration of ground water.

6. Cast iron ring and cover may be placed directly on top of cone for non-traffic rated manholes.

M. A complete watertight seal shall be provided at the pipe and manhole wall connections. The Contractor shall submit details of how watertight connections will be made to the Construction Manager for approval prior to performing any work.

N. Repairs:

1. Any damage to manhole liners shall be reported to the manufacturer.

2. All repairs shall be performed by manufacturer, its agent or qualified third-party with manufacturer's written consent.

3.02 Field Testing

A. Inflow/Infiltration Test:

1. Each manhole liner shall be visually inspected for inflow/infiltration.

2. Any inflow/infiltration that is in excess of project Specifications shall be corrected.

B. Vacuum Testing

1. All manholes shall be vacuum tested when ALL manhole rehabilitation is completed. Manholes shall not be tested until at least 7 days after installation of the manhole liner.

2. Vacuum testing shall be performed in accordance with ASTM C1244.

3. The Construction Manager shall be present for all testing. The Contractor shall notify the Construction Manager 48 hours prior to testing.

4. The Contractor shall submit test reports of the testing which include:

a. Project name

b. Manhole tested

c. Testing data (vacuum pressure, duration of test, etc.)

d. Statements of whether the manhole passed or failed the test.

e. If applicable, test reports must be submitted citing the reason(s) for failure noted on the report.

C. Any manhole failing the test shall be repaired and retested immediately by the Contractor at no additional cost to the Owner.

3.03 EXISTING FLOW

A. The Contractor shall be responsible for maintaining continuous sanitary sewer service to each and every property connected to the segment of sewer affected by the manhole lining operations.

B. The Contractor shall provide bypass pumping during the manhole lining process, if necessary.

1. The pumps and bypass lines shall be of adequate capacity and size to handle all flows including peak wet weather flow.

C. All costs for bypass pumping, tanking and all other private service flow management required during installation of the manhole liner shall be included in the cost for pipe replacement by sliplining.

D. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, disinfection, repair property damage as well as all resultant costs and claims.

E. When it is necessary to shut down a private sewer service line, notify the Construction Manager at least 1 week in advance to shut down. Notify building occupants regarding service lateral disconnection by placing a door hanger approved by the Construction Manager.

1. Place door hangers minimum 48 hours prior to shut down.

F. When service lateral need to be disconnected from main for more than 8 hours, lateral shall be positively drained or pump down.

1. Monitor status of flow and storage.

2. Pump lateral more frequently where flows exceed storage capacity of lateral or Contractor provided temporary storage.

G. If service lateral cannot be positively drained or pumped down or disconnection of service is anticipated being 8 hours or longer,

1. Contractor shall provide temporary living accommodations for resident at no additional cost to Owner or resident.

2. Temporary living quarters accommodations shall be approved by Construction Manager and coordinated through resident and Owner's Customer Support Representative.

3. Alternatively, Contractor may supply a temporary bypass pumping system to keep the lateral operational.

H. Notify building occupants when work is complete and uninterrupted service restored.

I. Commercial sewer services shall be maintained at all times while the business is open.

1. No sewage from the services or main line shall be discharged on theground or in waterways.

2. Holding pits or tanks are not allowed unless permitted by Federal, State, and local authorities having jurisdiction.

3.04 BY-PASS PUMPING

A. The Contractor shall provide all sewage bypass as necessary for the proper installation of liner insert.

B. The Contractor shall bypass pump sewage flows around the manhole being rehabilitated while the work is being performed. A detailed bypass plan shall be submitted to the Construction Manager for approval before any work taking place.

C. Sewage flow shall be pumped around segments during the installation and testing of the manhole liner.

1. The flow shall be intercepted at the upstream end of the segment and shall be pumped through temporary piping of adequate size.

2. The flow shall be discharged into a manhole on the downstream side of the segment, thus by-passing the manhole under construction.

3. Pumping equipment shall have the capacity to convey 100% of peak flows around the construction area.

4. A standby pump of the same capacity shall be required on site.

5. Open channels or trenches shall not be used to convey flow.

6. Bypassing or spilling wastewater onto the ground, into the trench, or into adjacent waters is prohibited.

D. The Contractor shall be required to contact all residential and commercial customers whose service lines connect to the sewer main being bypassed and inform them that they will be temporarily out of service.

E. The Contractor shall notify all property owners who discharge sewage directly into the manhole being rehabilitated at least 48 hours in advance, giving the date, starting and estimated completion time for the work being conducted and any anticipated impact to the property owner.

1. The Contractor shall also advise those customers against water usage until the mainline is back in service.

2. After completing the necessary work on the manhole to allow its reuse, the Contractor shall advise those customers that the sewer main is back in service.

3. The Contractor shall maintain a high degree of professionalism, both in workmanship and appearance, at all times.

F. Temporary Blocking and Back-Ups of Sewers And Sewage

1. Contractor shall be responsible to limit the extent and duration of such blockages and back-ups so that overflows and spillage onto public or private property and into storm sewers, waterways, and streets does not occur.

   a. In the event that such spillage or overflows do occur during the course of or as a result of the Work, the Contractor performing the Work shall immediately eliminate the spillage or overflow and, as necessary, remove the blockage and eliminate the back-up.

   b. Upon elimination of the spillage or overflow, the Contractor is to clean up and disinfect the area.

   c. Work to stop or contain such events is to be deemed EMERGENCY in nature and sufficient justification for total mobilization of resources, the use of overtime or double time, and any other reasonable measures to assure correction of the problem without delay.

   d. Damages arising from blockages, back-ups, spillage, or overflows of sewage during the course of the Work or because of the Work shall be the sole responsibility of the Contractor.

   e. The Contractor is responsible for paying all fines imposed for overflows or spills during construction.

2. Should a condition arise that the Contractor cannot restore service within 8 hours of service interruption, the Contractor shall make provisions for pumping all flows within the service interruption area at no cost to the Owner.

3.05 INSPECTION AND TESTING

A. Field Acceptance

1. Field acceptance of manhole lining shall be based on the Construction Manager's field inspection and evaluation of the appropriate installation.

2. If the Construction Manager has to enter the manhole to inspect the work, the Contractor shall provide forced air ventilation, gas monitors, harnesses, lights, confined space entry, etc. for the Construction Manager to enter the manhole and perform the inspection in strict and complete accordance with OSHA requirements at no additional cost to the Owner.

B. Finished Lining Systems

1. There shall be no groundwater infiltration or other leakage, active or previously active, through the manhole walls, benches, inverts or pipe connections at the manhole after it has been lined.

2. If leakage is detected, it shall be eliminated with an appropriate cement mortar, grout or sealant as recommended by the manufacturer and approved by the Construction Manager at no additional cost to the Owner.

3. Injection grouting may be required to stop leaks around and/or in invert channels, pipe connections and benches.

4. The Construction Manager's decision on defective linings shall be final.

5. If any lining is found to be defective after it has been installed or during the warranty period, it shall be repaired or replaced in a manner satisfactory to the Construction Manager and at no additional cost to the Owner.

C. Payments

1. Payments will not be made for the installed lining until:

a. The manhole passes the vacuum test.

3.06 CLEAN-UP/RESTORATION

A. After the FRP manhole liner installation work has been completed and all testing accepted by the Construction Manager, the Contractor shall clean up the work area.

1. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.

a. The debris and liquids shall be disposed of properly in accordance with all applicable laws.

b. The local municipality may furnish a letter to the landfill stating the Contractor is authorized to dispose of the non-hazardous materials.

c. Debris and liquids type and quantities are to be tracked in the daily Contractor diary.

d. Hauling and disposal costs will be borne by the Contractor.

B. All surfaces which have been disturbed by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of the Contractor's operations.

C. Suitable materials and methods, acceptable to the Owner, shall be used for such restoration.

D. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

E. The cost for correcting damage resulting from the Contractor's actions shall be the responsibility of the Contractor.

F. Refer to Section 33 30 00, Sewer and Accessories, for additional requirements.

END OF SECTION

SECTION 33 01 32

EPOXY MANHOLE LINERS

PART 1 – GENERAL

1.01 SUMMARY

A. The work to be done under this section includes all labor, materials, and services necessary to structurally rehabilitate and leak proof manholes. Work included, but not limited to, follows:

1. Clean and sanitize the interiors of the manhole.
2. Inspect the interiors of the manhole for extent of required repairs.
3. Structural repair and restoration of the manhole invert channels, benches, walls, chimneys, including the removal of any unsound material if necessary.
4. Application of water-stopping grout to stop active leaks.
5. Cleaning and preparatory patching of manhole surfaces receiving cementitious restoration and/or chemical coatings, including removal of spalling or unsound material.
6. Application of corrosion-resistant chemical coatings over the restored manhole surfaces to protect against future deterioration.

1.02 SUBMITTALS

A. Complete product data and engineering data, including shop drawings, shall be submitted to the Construction Manager in accordance with the requirements of Section 01 33 23 of these Specifications.

B. Submit manufacturer's product data including chemical composition, physical properties, surface preparation, repair, application, curing, and field quality control.

C. The Contractor shall submit complete shop drawings of the manhole lining system(s) to demonstrate compliance with these Specifications, materials and detailed installation procedures.

1. Testing procedures and quality control procedures shall also be submitted.

D. Certifications that the lining system was manufactured in accordance with these Specifications and the applicable ASTM standards shall be submitted with each material shipment.

1.03 QUALITY ASSURANCE

A. REFERENCES

1. This Section contains references to the following documents. They are a part of this section to the extent referenced in this specification.
2. Where a referenced document contains references to other standards, those documents are included as references under this Section as if referenced directly.
3. In the event of a conflict between the requirements of this Section and those of the referenced documents, the requirements of this Specification shall prevail.
4. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the time of construction.
5. This document references American Society for Testing and Materials (ASTM) standard specifications, which are made a part hereof by such reference and shall be the latest edition and revision.
6. It is incumbent upon the Contractor to have a working familiarity with the following ASTM Standards:

Reference	Title
ASTM C109	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
ASTM C293	Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading)
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C811	Standard Practice for Surface Preparation of Concrete for Application of Chemical-Resistant Resin Monolithic Surfacings
ASTM C882	Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear
ASTM C920	Standard Specification for Elastomeric Joint Sealants
ASTM C1244	Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers —Tension
ASTM D624	Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D638	Standard Test Method for Tensile Properties of Plastics
ASTM D695	Standard Test Method for Compressive Properties of Rigid Plastics
ASTM D756	Standard Practice for Determination of Weight and Shape Changes of Plastics under Accelerated Service Conditions
ASTM D790	Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D882	Standard Test Method for Tensile Properties of Thin Plastic Sheeting

Reference	Title
ASTM D1042	Standard Test Method for Linear Dimensional Changes of Plastics Under Accelerated Service
ASTM D1653	Standard Test Methods for Water Vapor Transmission of Organic Coating Films
ASTM D2370	Standard Test Method for Tensile Properties of Organic Coatings
ASTM D2371	Standard Test Method for Pigment Content of Solvent-Reducible Paints
ASTM F2414	Standard Practice for Sealing Sewer Manholes Using Chemical Grouting
ASTM D2697	Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings
ASTM D3574	Standard Test Methods for Flexible Cellular Materials-Slab, Bonded, and Molded Urethane Foams
ASTM D3960	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
ASTM D4541	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM G23	Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials
TT-S-00227E	Interim Federal Specification: Sealing Compound: Elastomeric Type, Multi-Component (For Calking, Sealing, And Glazing In Buildings And Other Structures)

B. All components of the repair/liner system which include those for active leak control, crack repairs, flexible joint sealants, repair mortar and protective liners shall be provided by the same manufacturer.

C. MANUFACTURER'S CERTIFICATION

1. Product manufacturers shall provide the Construction Manager with written certification that all products furnished comply with all applicable provisions of these Specifications.

1.04 REGULATORY REQUIREMENTS

A. 146 (permit-required confined-space regulations).

B. All work and testing shall comply with the applicable Federal codes, including:

1. Federal Occupational The work of this Section shall comply with the current versions, with revisions, of OSHA 29 CFR 1910.Safety and Health Act of 1970
2. Construction Safety Act of 1969, as amended
3. Applicable state and local codes and standards

4. To the extent applicable, requirements of the Underwriter's Laboratories, Inc. and the National Electric Code.

C. The Contractor shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.

D. No confined space entry will be permitted without the development and implementation of a confined space entry plan.

1. Plan shall be in accordance with OSHA standards.
2. Personnel involved shall have current training certificates.
3. Entry permit is required prior to entry.

1.05 WARRANTY AND REPAIRS

A. Material Warranty:

1. A written guarantee of 10 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the liner material including against breakdown of material effectiveness of structural repair elements.

B. Workmanship Warranty:

1. The Contractor shall guarantee his work for a warranty period of 3 years from the date of final acceptance against any leakage, cracking, loss of bond or other discontinuity as identified.
2. The warranty shall cover the cost of repairing and/or replacing the installed Epoxy liner and any freight to project site should the installed liner have any defects in material or workmanship.

C. Deficiencies related to material and workmanship shall be repaired by Contractor to the satisfaction of the Construction Manager.

D. The Epoxy liner shall be repairable at any time during the life of the structure, with the same type of liner materials used in the original installation, including repair or lining of the upper chimney portion where grade adjustments have been made. Repair/lining materials shall be of the type that will bond to the original liner materials.

E. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

F. If required, Contractor and FRP liner manufacturer representatives may participate in inspections to determine such deficiencies.

G. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the

original warranty period required by the Contract.

H. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

I. Repair/lining system materials shall be of the type that will bond to the original liner materials.

PART 2 – PRODUCTS

2.01 GENERAL

A. All materials shall be designed, manufactured and intended for manhole rehabilitation and the specific application in which they are used.

B. Each material shall be designed for application to SSD (Surface Saturated Dry), but not wet surfaces or surfaces with actively running water, without degradation of the final product or the bond between the product and the wet well surface.

C. All materials, systems, and application processes shall be subject to approval by the Construction Manager prior to installation.

D. Protective coating materials shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions.

1. When requested, the Contractor shall provide the Construction Manager with the names of not less than 10 successful applications of the proposed manufacturer's products that comply with these requirements.

E. Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, name of manufacturer, all of which shall be plainly legible at the time of use.

F. The cured surfacing thickness shall be smooth, even (without ridges or bumps) and continuous with proper sealing connections to any non-rehabilitated areas.

G. Chemical sealants or grouts used to seal active manhole leaks, patch holes or cracks, fill voids and to otherwise prepare the manhole surface for lining shall be suitable for sewer system service and chemically resistant to any chemicals or vapors normally associated with domestic sewerage installations.

2.02 PRODUCT REQUIREMENTS

A. Active Leak Control

1. Hydraulic Cement

a. Hydraulic cement shall be rapid set (1-minute) high density, reinforced mortar compound designed for use as a structural patching, leak stopper and water plug, which is capable of instantly

stopping running water and/or seepage through concrete or masonry walls and floors.

b. Hydraulic cement shall contain no metallic fillers, will not shrink or oxidize.

c. Hydraulic cement shall be designed for an ultra-quick reaction and sets in 60 to 90 seconds, depending upon the temperature of the mixing water and the surface onto which it is applied, and the mass.

d. The lining compounds shall contain no VOCs.

e. Technical Properties

1)	Type	Hydraulic cement (polymer modified)
2)	Compress Strength	5,500 psi (28 days)
3)	Flexural Strength	950 psi (28 days)
4)	Bond Strength	880 psi (28 days)
5)	Shrinkage	<0.01%

f. Acceptable Products

1) Epoxytec Mortartec Hydrxx-1

2) Approved equal

2. Chemical Grout.

a. Chemical grouts shall conform to the requirements of ASTM F2414.

b. Low viscosity liquid resin that reacts with water and expands to form a closed cell, watertight foam.

1) Type Hydrophilic, water-activated polyurethane grout.

c. Technical Properties

1)	Tensile Strength	ASTM D3574	450 psi
2)	Tensile Elongation	ASTM D3574	350%
3)	Shrinkage	ASTM D1042/D756	<2%
4)	Tear Resistance	ASTM D3574	21 lbs/inch
5)	Initial Reaction Time	@ 73° F	30 seconds
6)	Full Rise	@73° F	110 seconds

d. Acceptable products

1) Prime Flex 900 XLV as manufactured by Prime Resins.

2) Or approved equal.

B. Crack Repairs

1. Compound used for crack repairs shall be a two-component moisture insensitive, highly adhesive, chemical resistant, 100% solids, high strength epoxy paste and reinforced structural-grade epoxy.
2. Compound shall be non-sag patching material designed for cracks and small spalls and shall contain no solvent.
3. Compound shall bond to concrete, steel, wood, brick, some plastics and most construction materials.
4. Compound shall be moisture insensitive and may be used on damp surfaces (SSD).
5. Setting time shall be approximately 3 hours at 75^{o}F.
6. Technical Properties

a.	Gel time (60g Mass)	ASTM C811	14 minutes
b.	Tack Free Cure	ASTM D2371	3 hours
c.	Working Time		30 minutes
d.	Compressive Strength (7day)	ASTM D695	6,118 psi
e.	Compressive Modulus (7 day)	ASTM D695	105,800 psi
f.	Bond Strength (14 day)	ASTM D882	1,635 psi

7. Acceptable Products
   a. Epoxytec CPP Gel: Crack Injection
   b. Approved equal.

C. Flexible joint sealants

1. Polyurethane joint sealant shall be two component, aliphatic, chemically curing, 100% solid urethane sealant formulated as a high build coating/ joint sealing system for vertical and overhead use.
2. Once cured, the material shall form a high quality elastomeric sealant.
3. Joint sealants shall be suited for indoors or outdoors with use on concrete, wood and most construction materials.
4. Joint sealants shall produce a flexible, long-lasting sealant with adhesion, cohesion, and elasticity that resists deterioration caused by weathering, stress, movement, water, oils, and many chemicals.
5. Provides corrosion protection and chemical resistance.
6. Technical Properties

a.	Hardness, Shore A	ASTM C920	45
b.	Artificial Weathering	ASTM G23-89	No elastomeric property changes
c.	Freeze/Thaw (no damage)	ASTM C666	300 cycles
d.	Bond Durability	ASTM C920-87	No failure after 25% extension

e.	Tensile Strength	ASTM D412	240 psi
f.	Ultimate Elongation	ASTM D412	800%
g.	Recovery	TT-S-00227E	96%
h.	Weight Loss	TT-S-00227E	4.75%
i.	Tear Resistance	ASTM D624-86	44 lbs/in
j.	Service Temperature		-40°F to 170°F
k.	Initial Cure (80°F)		5 hours
l.	Final Cure (80°F)		48 hours

7. Acceptable Products
   a. Epoxytec Uroseal 45V
   b. Approved equal

D. Repair Mortar

1. Repair mortar shall be a single component, high strength, rapid set Portland cement based repair material for repairing concrete or masonry structures. The material may be applied by hand trowel or spray application to a minimum thickness of 1/8 inch. The repair mortar shall have the following minimum requirements.
   a. Compressive Strength of 7,000 psi (ASTM C109)
   b. Bond Strength of 2,200 psi (ASTM C882)
   c. Flexural Strength of 1,500 psi (ASTM C293)
   d. Approved manufacturers include Epoxytec, Sauereisen, A.W. Cook, Madewell Products Corp., or approved equal.

E. Protective Lining

1. The protective lining shall be a two-component, 100% solids, high build, spray- or trowel- applied, structural grade epoxy system.
   a. Formulated specifically for rehabilitation and lining of sanitary sewer collection systems (manholes, cylindrical lift stations, pipe, etc).
   b. Designed with high moisture tolerance, H_2S resistance and sealed I&I barrier protection.
   c. Blended with reinforcing agents and various fibers, when cured, the liner shall create reinforcement lining as a fiber-reinforced-polymer (FRP), with high strength and flexural properties for partially or fully deteriorated manholes.
   d. The lining compounds shall contain no VOCs.
2. The lining shall be suitable for application as a single coat or multi-coat system.

a. Maximum build-up per coat shall be 3/8" (375 mils) without sag per coat, depending on temperature.

3. Minimum Coverage

a. One-gallon (231 cu.in.) of neat epoxy shall yield:

1) @ 1/16" (~60 mils), product yields 26 sq.ft.

2) @ 1/8" (125 mils), product yields 12.8 sq.ft.

3) @ 1/4" (250 mils), product yields 6.4 sq.ft.

4. The material shall be capable of sprayed ultra-high build, up to 1/4" (250 mils) per pass.

5. Technical Properties

a.	Type	Hybrid FRP (epoxy/epoxide)	
b.	Solids by Volume	ASTM D2697	100%
c.	Solvent (VOC)	ASTM D3960	none
d.	Adhesion Strength	ASTM D4541	substrate failure
e.	Adhesion Strength	ASTM D4541	2,000 psi (steel)
f.	Water Absorption	ASTM D1653	< 0.1 g/sq. m.
g.	Tensile Strength	ASTM D638	7,800 psi
h.	Flexural Modulus	ASTM D790	580,000 psi
i.	Flexural Strength	ASTM D790	7,000 psi
j.	Compressive Strength	ASTM D695	12,000 psi
k.	Elongation	ASTM D2370	3%
l.	Complete Cure		24 hours (77°F)
m.	Temperature Exposure (wet)		32°F – 180°F
n.	Temperature Exposure (dry)		5°F – 180°F

6. Acceptable Products

a. CPP Sprayliner by Epoxytec

b. Approved equal

PART 3 – EXECUTION

3.01 EXISTING FLOW

A. The Contractor shall be responsible for maintaining continuous sanitary sewer service to each and every property connected to the segment of sewer subject to sliplining operations.

B. The Contractor shall provide bypass pumping during the manhole lining process, if necessary.

1. The pumps and bypass lines shall be of adequate capacity and size to handle all flows including peak wet weather flow.

C. All costs for bypass pumping, tanking and all other private service flow management required during installation of the liner shall be included in the cost for pipe replacement by sliplining.

D. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, disinfection, repair, property damage as well as all resultant costs and claims.

E. When it is necessary to shut down a private sewer service line, notify the Construction Manager at least 1 week in advance to shut down. Notify building occupants regarding service lateral disconnection by placing a door hanger approved by the Construction Manager.

1. Place door hangers minimum 48 hours prior to shut down.

F. When service lateral need to be disconnected from main for more than 8 hours, lateral shall be positively drained or pump down.

1. Monitor status of flow and storage.
2. Pump lateral more frequently where flows exceed storage capacity of lateral or Contractor provided temporary storage.

G. If service lateral cannot be positively drained or pumped down or disconnection of service is anticipated being 8 hours or longer,

1. Contractor shall provide temporary living accommodations for resident at no additional cost to Owner or resident.
2. Temporary living quarters accommodations shall be approved by Construction Manager and coordinated through resident and Owner's Customer Support Representative.
3. Alternatively, Contractor may supply a temporary bypass pumping system to keep the lateral operational.

H. Notify building occupants when work is complete and uninterrupted service restored.

I. Commercial sewer services shall be maintained at all times while the business is open.

1. No sewage from the services or main line shall be discharged on theground or in waterways.
2. Holding pits or tanks are not allowed unless permitted by Federal,State, and local authorities having jurisdiction.

3.02 BY-PASS PUMPING

A. The Contractor shall provide all sewage bypass as necessary for the proper installation of liner/repair system.

B. The Contractor shall bypass pump sewage flows around the manhole being rehabilitated while the work is being performed. A detailed bypass plan shall be submitted to the Construction Manager for approval before any work taking place.

C. Sewage flow shall be pumped around segments during the installation and testing of the manhole liner.

1. The flow shall be intercepted at the upstream end of the segment and shall be pumped through temporary piping of adequate size.
2. The flow shall be discharged into a manhole on the downstream side of the segment, thus by-passing the manhole under construction.
3. Pumping equipment shall have the capacity to convey 100% of peak flows around the segment.
4. A standby pump of the same capacity shall be required on site.
5. Open channels or trenches shall not be used to convey flow.
6. Bypassing or spilling wastewater onto the ground, into the trench, or into adjacent waters is prohibited.

D. The Contractor shall be required to contact all residential and commercial customers whose service lines connect to the sewer segment being bypassed and inform them that they will be temporarily out of service.

1. The Contractor shall also advise those customers against water usage until the mainline is back in service.
2. After completing the necessary work on the main line to allow its reuse, the Contractor shall advise those customers that the sewer main is back in service.
3. The Contractor shall maintain a high degree of professionalism, both in workmanship and appearance, at all times.

E. The Contractor shall notify all property owners who discharge sewage directly into the manhole being rehabilitated at least 48 hours in advance, giving the date, starting and estimated completion time for the work being conducted and any anticipated impact to the property owner.

1. The Contractor shall also advise those customers against water usage until the mainline is back in service.
2. After completing the necessary work on the main line to allow its reuse, the Contractor shall advise those customers that the sewer main is back in service.
3. The Contractor shall maintain a high degree of professionalism, both in workmanship and appearance, at all times.

F. Temporary Blocking and Back-Ups of Sewers and Sewage.

1. Contractor shall be responsible to limit the extent and duration of such blockages and back-ups so to prevent overflows and spillage onto public or private property and into storm sewers, waterways, and streets.

a. In the event that such spillage or overflows do occur during the course of or as a result of the Work, the Contractor performing the Work shall immediately eliminate the spillage or overflow and, as necessary, remove the blockage and eliminate the back-up.

b. Upon elimination of the spillage or overflow, the Contractor is to clean up and disinfect the entire affected area.

c. Work to stop or contain such events is to be deemed EMERGENCY in nature and sufficient justification for total mobilization of resources, the use of overtime or double time, and any other reasonable measures to assure correction of the problem without delay.

d. Damages arising from blockages, back-ups, spillage, or overflows of sewage during the course of the Work or because of the Work shall be the sole responsibility of the Contractor.

e. The Contractor is responsible for paying all fines imposed for overflows or spills during construction.

2. Should a condition arise that the Contractor cannot restore service within 8 hours of service interruption, the Contractor shall make provisions for pumping all flows within the service interruption area at no cost to the Owner.

3.03 DELIVERY AND HANDLING

A. The materials shall be delivered to the job site in original unopened packaging and clearly labeled with the manufacturer’s identification and printed instructions.

B. The Contractor shall handle and store all material and shall dispose of all wastes in accordance with applicable regulations.

C. The Contractor shall keep products safe from damage.

D. The Contractor shall promptly remove damaged products from the job site and replace damaged products with undamaged goods.

3.04 SURFACE PREPARATION

A. Manhole liners shall not be installed until all required mainline sewer rehabilitation and/or other manhole work is completed

B. Prior to entering manholes, an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen must be undertaken in accordance with local, state or federal safety regulations.

C. Surface preparation of the substrate must be completed immediately prior to utilizing any repair material and/or coating/lining material that will require bonding to the substrate.

1. Re-inspection and/or subsequent surface preparation shall be required should conditions change after initial preparation.

D. All manhole surfaces shall be thoroughly cleaned and made free of all foreign materials and contaminants that would interfere with adhesion of repair and coating/lining materials.

E. Surfaces shall be free of contaminants and loosely adhering or unsound concrete, and shall provide a dry, sound, uniform substrate suitable for the application of repair and coating/lining materials.

F. Surface preparation must achieve a clean and sound substrate in accordance with SSPC-SP13/NACE No. 6 “Surface Preparation of Concrete.”

1. Cleaning shall be performed using a high- pressure jet wash at a minimum of 3,500 psi water pressure to achieve acceptable surface preparation free from all biological growths, foreign material, existing coatings or paint, waxes, form release agents, curing compounds, efflorescence, sealers, salts, laitance, oil, grease, sludge, dirt, grit, dust, existing coatings, roots, and all other debris or contaminants.
2. The Contractor shall immediately notify the Construction Manager of any coatings that cannot be removed and, upon the approval of the Construction Manager, shall coarse sand the area(s) to rough up the surface sufficient to obtain and insure adequate bonding of the liner/repair materials.
3. Roots shall be removed by manually cutting them from inside the manhole.
4. Protrusions such as from sharp irregularities, fins, bulges, or concrete spatter shall be removed during surface preparation.
5. Unsound voids and other defects that are at or near the surface shall be exposed during surface preparation.
    a. All loose, unsound or defective concrete, mortar, brick, grout shall be removed.
    b. All concrete that is not sound shall be removed and so that only sound concrete remains.
6. Surface preparation shall yield sound alkaline concrete with minimum pH 9. Manufacturer shall be consulted for acceptable ranges.
7. A minimum ICRI profile of CSP 4 or higher shall be achieved.
8. When oil and grease, and/or soluble ionic materials such as chlorides, ferrous salts, and sulfates that remain on or within the substrate after cleaning or are still present, approved cleaners such as detergent, degreaser, or other chemical remover shall be used integrally with the high-pressure cleaning water if conditions dictate.

a. Continue to clean and rinse with water until contaminants are removed, including the cleaners.

G. The Contractor shall conduct a visual inspection of each manhole after it is cleaned.

1. All active hydrostatic leaks shall be plugged or sealed with an appropriate grout compatible with the lining as specified herein below. Injection grouting may be required to seal active leaks including existing leaks in invert channels and benches. All loose mortar and rubble of existing benches, walls and inverts shall be removed.

H. The Contractor shall prepare the manhole as necessary by reshaping and repairing benches, inverts and walls where required including smoothing out irregular shaped corbel and chimney sections prior to any spray application.

I. All interior surfaces shall be prepared as recommended by the lining system manufacturer. Minimum requirements of the Specification are as follows:

1. All cracks and voids must be repaired and filled with suitable non-shrinking cements, sealants or grouts, including all voids between existing sewer pipes and manhole walls as specified herein below. All patch repairs shall be smooth and even with the manhole wall.

2. All voids around existing manhole rungs, steps and anchors shall be filled.

3. All surfaces shall be suitably prepared for the required bonding of the liner as recommended by the manufacturer and acceptable to the Construction Manager.

J. Prior to lining, the Construction Manager shall inspect and approve the surface preparation work.

1. The Contractor shall notify the Construction Manager when the manholes are ready for inspection.

2. The manhole lining shall be completed immediately after the Construction Manager's inspection or the manhole may need to be re-cleaned prior to spraying to remove accumulated debris on walls and benches

K. The Contractor shall all dispose of any debris or resulting material in a manner and place suitable to the Owner.

3.05 ACTIVE LEAK CONTROL

A. When leaks are not readily identifiable upon cleaning operation, use blowers to dry interior for positive identification of leaks and weeping areas.

B. Hydraulic Cement

1. The work shall consists of hand applying a dry quick-setting cementitious mix designed to instantly stop running water or seepage in all types of concrete and concrete structures.

a. The Contractor shall apply material in accordance with manufacturers' recommendations.

2. The area to be repaired shall be clean and free of all debris.

3. Undercut all areas on which the hydraulic cement will be applied.

4. Preparation shall include enlarging small cracks and holes and avoiding V-shaped cuts.

5. Proper applications shall not require any special mixing of product or special curing requirements after application.

6. When mixing with a power tool, blend at relatively low speed and blend only the sufficient amount of material that can be placed within working time.

7. Place a generous amount of the dry quick-setting material to the active leak, with a smooth fast motion, maintaining external pressure, repeat until leak is stopped.

8. Press firmly the dry material or pre-mixed paste into place, maintaining the same amount of pressure until the material begins to harden and the leak is stopped.

9. Contractor may pre-mix with water, and allow initial set-up (gel-up) to accelerate the stiffness and then apply while still paste-like and pliable. Do not add water once it begins to set.

10. Continue until all active leaks cease. If areas have too much pressure or volume of water for hydraulic cement to be effective, chemical grout shall be used.

C. Chemical Grout

1. Chemical grouting applications shall include sealing a structure from infiltration/inflow prior to application of a coating or lining or other rehabilitation component or using the grout for sealing an entire section of the structure (usually due to water/soil voids or water table).

2. Application of materials shall be by injection method only.

3. Grout conditions shall be adjusted for catalyzing the reaction, inhibiting the reaction, lowering the freezing temperature the grout solution, adding fillers, providing strength or for inhibiting root growth according to the instructions of the grout manufacturer and in the specified quantities as recommended by the grout manufacturer.

4. Mixing and handling of all the chemical grout materials shall be in strict accordance with manufacturer's recommendations.

5. The Contractor shall first seal with concrete repair materials herein specified, all voids and cracks.

6. Injection holes shall be drilled through the structure at locations as per industry standards or where designated by the Construction Manager or repair need.

a. Grout shall be injected with the proper pump and pressures as with suitable ports and packers, if required.

b. Injection pressure shall not cause damage to the structure or surrounding surface.

c. Grout shall be injected through the lowest holes first until rejection or grout is visible at the next port or on the surface.

d. This procedure shall be repeated until the structure is sealed.

7. Grout travel shall be verified by observation of grout to defects or adjacent injection holes.

8. Provide additional injection holes, if necessary to ensure grout travel.

9. All excess chemical grout must be removed from the surface via mechanical grinding means and top patched with “Hydraulic cement” or “Specialty barrier protection” epoxy.

10. Chemical grout, shall be injected through the lowest holes first, working the material higher until the areas is sealed. Additional holes may be required to verify that the material has encompassed the entire outside of the manhole.

11. The injection holes shall be cleaned and patched as recommended by the manufacturer.

3.06 CRACK REPAIRS

A. Preparation shall include enlarging small cracks and holes and avoiding V-shaped cuts.

B. Follow material manufacturer technical data sheets (PDS) and application guidelines.

C. For shallow, wide or superficial crack repairs, or for cracks where epoxy can travel easily, inject a bead into cracks and keep material under pressure.

1. Remove access and clean with putty knifes.

2. Allow to cure.

D. For deeper injection needs, or narrow injection install the entry ports along crack. Seal the remainder of the crack from the surface, ensuring material won’t escape while under pressure.

1. Entry ports (also called port adapters) can be any tube like device that provides for the successful transfer of the epoxy resin under pressure into the crack.

2. Port spacing shall be 8 in. on center, with increased spacing at wider cracks.

3. Start the injection at the widest Section of a crack. Vertical cracks are typically injected from the bottom up.

a. Continue the injection under pressure until refusal or until travel to next port is visible.

b. Shaving or grinding off ports, then patching over ports may be required. Remove access and clean with putty knifes.

c. Allow to cure.

3.07 GENERAL CONCRETE REPAIR

A. Repair Mortar

1. Prior to the application of the repair mortar the walls shall be prepared with leaks and cracks repaired in accordance with Paragraph 3.07 through 3.09 above.

   a. Patching, repointing, filling, and repairing non-leaking holes, cracks, and spalls in concrete, shall be achieved through the use of materials specifically recommended by the manufacturer for this use, which have been formulated for vertical or overhead use.

   b. These materials shall not contain chlorides, gypsums, plasters, iron particles, aluminum powder, or gas-forming agents, nor shall it promote the corrosion of steel.

2. Repair mortar shall be applied to all sections of the manhole including the bench, the walls, the chimneys and invert channels.

3. The repair mortar shall be mixed according to the manufacturer's specifications.

4. Application may be by use of a hand trowel or by pump spraying.

   a. Apply material to a minimum uniform thickness of 3/8 inch.

   b. Trowel or brush to a finish that is consistent with Concrete Surface Profile (CSP) cards 3-5 from the International Concrete Repair Institute (ICRI).

   c. All applications shall be made as recommended by manufacturer's technical data sheets and/or application guidelines, utilizing proper equipment onto specified surfaces.

5. Follow mixing, application and handling instructions as written per materials product technical data sheets and SDS. Follow instructions as published by the material manufacturer, including all instruction sheets and/or PDS.

6. Surfaces to be applied, must be rinsed and soaked to achieve saturated-surface-dry (SSD), when required, necessary for the cementitious repair materials to bond and cure properly.

7. Once applied, take precautions to allow materials to remain moist and not over-dry while curing. Cover from direct sunlight, and/or keep moist coverings to prevent drying, loss of moisture and cracking.

8. For product requiring water addition, stay within manufacturer's recommended water-to-cement (w/c) ratio. Do not over use water to avoid a smooth finish while ensuring high mechanical properties while curing.

9. The mortar kits that come pre-proportioned (such as the specified epoxy-modified-mortar), must remain pre-portioned with no water added.

10. Either commence spraying or hand applying.

    a. If spraying, ensure material can be sprayed and utilize recommended equipment.

    b. If spraying, material must be back-troweled.

    c. The mortar shall harden quickly without any need for special curing. Execute finishing work by trowel immediately after applying or disbursing onto the substrate.

11. When troweling or back-troweling, make sure to create surface texture with trowel technique, a slight broom-finish is recommended to ensure surface profiling for acceptance of Structural Epoxy to adhere optimally.

    a. Except for the epoxy-modified-mortar specified, do not press hard and do not create an exaggerated finish, to avoid a loss of strength at the peaks and excessive material waste of coating material due to excess texturing.

    b. Some surface roughness can occur with a trowel-finish, if done so intentionally to not create a smooth finish.

    c. Most reparative cementitious solutions herein specified obtain early strength for a quick-return and/or recoat window for top coating. Check PDS for allowable time frames.

    d. Once initially cured, and before applying any coating/lining system materials, refer to material specifications for post-cure preparation and readiness instructions.

3.08 FLEXIBLE JOINT SEALING (INCLUDING MANHOLE CHIMNEY JOINT)

A. The work consists of hand applying or dispersing from a nozzle, an elastomeric material into movement or control joints where flexibility is required. This could also be naturally occurring movement induced cracks and other movement joints.

B. The certified applicator shall apply material in accordance with manufacturers' recommendations.

C. Execution

1. The area to be sealed must be clean and free of all debris.

2. Undercut all areas on which the elastomeric material will be applied.

3. Preparation shall include enlarging small cracks and avoiding V-shaped cuts.

4. Surface conditioner shall be used to clean and provide surface wetness and adhesion promoting facilitation.
    a. Apply a thin layer of surface conditioner by brush or roller to all inside edges of the crack or joint.
    b. Material must not be applied thin, apply and back roll, back brush without pooling, excessive wetness, as thin as possible.
    c. Material will evaporate quickly and leave behind a slight surface tackiness.
    d. Refer to surface conditioner PDS for recommended dry times and recoat windows prior to apply joint elastomeric material specified.

D. After surface conditioner dries, mix and apply.

1. For horizontal joints, a backing rod can be utilized if needed. Keep depth a minimum 3/8" (0.375 inch).
    a. Mix and pour material into joint.
    b. Allow to cure.
2. For vertical or overhead joint, apply paste-like mixed material by hand tools, such as trowel, spatula, or putty knife into the crack or joints.
    a. Allow to cure according to manufacturer's guidelines, refer to PDS.

3.09 EPOXY LINING

A. Execution

1. Manhole lining shall not be installed until all required mainline sewer rehabilitation and/or other manhole work is completed.
2. A complete watertight seal shall be provided at the pipe and manhole wall connections. The Contractor shall submit details of how watertight connections will be made to the Construction Manager for approval prior to performing any work.
3. Application procedures shall conform to the recommendations of the Structural Epoxy manufacturer, including material handling, mixing, safety, and application equipment.
4. If layering, top coating or additional coats of the Structural Epoxy shall occur as soon as the prior coat becomes initially set (dry-to-touch), to avoid long exposure time for subsequent surface contamination.
    a. Additional surface preparation procedures will be required if in between coats, surface contamination occurs.
5. Follow all published manufacturer recommended application methods, including best practices guidelines, PDS, and design guideline standards.
6. If spraying, the Contractor must be certified to spray by the manufacturer, verifying training and that the spray equipment is approved by the coating manufacturer.

a. Equipment shall be high pressure, heated plural component spray systems specifically designed to accurately ratio and condition the specified Structural Epoxy.

b. Equipment specifications must be approved prior to use.

c. Apply at a minimum thickness of 125 mils DFT (0.125 inches).

1) The minimum thickness must be a uniformed thickness from peak (of the surface profile) to ensures that the highest point(s) of the blast profile or deteriorated substrate are fully covered at the design thickness.

2) If material is filling valleys, this material will not serve for maximum film build. Therefore, should the profile or economics support utilizing a resurfacer first, consider before applying Structural Epoxy.

3) Structural Epoxy shall be applied with layering and overlapping patterns, whereas thinner initial tack coat(s) can serve as base coat(s), while allowing gelling (slight solidifying) of the initial layers in order to build subsequent higher build layers on top before reaching final thickness. This serves for better initial contact and wetting onto the surface for optimal adhesion, and barrier layering to assist with mitigation of outgassing and other transmission that may induce pinholing.

7. If trowel-applied, properly mix and apply materials to all specified surfaces by hand-applied methods with trowel or trowel-type tools.

a. Combine 2 gallons kits, Part B to Part A of the packaged, proportioned material, mix with a medium-speed, high power drill mixer for five (5) to eight (8) minutes until a homogenous blend is achieved. Make sure to allowing mixer to properly mix side walls and bottom of container.

b. Apply at a minimum thickness of 125 mils DFT (0.125 inches).

1) The minimum thickness must be a uniformed thickness from peak (of the surface profile). This ensures that the highest point(s) of the blast profile or deteriorated substrate are fully covered at the design thickness. If material is filling valleys, this material will not serve for maximum film build. Therefore, should the profile or economics support utilizing a resurfacer first, consider before applying Structural Epoxy.

2) Optional finishing: For aesthetics and knocking down trowel marks, allow product to start initial gel (circa 30 - 40 minutes at 77^{o}F) and spray with light amount of water and rub down to create a smooth, uniform finish. Should material be soft, allow longer initial set up.

8. Allow 24 hours (77^{o}F) to cure prior to returning to service for full immersion.

3.10 MANUFACTURER'S SERVICES

A. The Contractor shall require the protective coating manufacturer to furnish a qualified technical representative, certified by NACE or SSPC, to visit the site for technical support as may be necessary to resolve field problems attributable or associated with the manufacturer's products

B. The Contractor shall require material coating manufacturer to furnish the following services:

1. The manufacturer's representative shall be available to provide on-site instruction on the proper surface preparation, use, mixing, application and curing of the coating systems for the wet well to be rehabilitated under this Contract.
2. A site visit must be made after surface preparation and before any protective coatings are applied.
3. The manufacturer's representative shall verify that surface preparation is acceptable before the application of any repair mortars or protective linings.

3.11 INSPECTION AND TESTING

A. Field acceptance

1. Field acceptance of manhole lining shall be based on the Construction Manager's field inspection and evaluation of the appropriate installation and curing test data.
2. The lining shall provide a continuous monolithic surfacing with uniform thickness throughout the manhole interior.
3. If the thickness is not uniform or is less than specified, it shall be repaired or replaced at no additional cost to the Owner.
4. If the Construction Manager has to enter the manhole to inspect the work, the Contractor shall provide forced air ventilation, gas monitors, harnesses, lights, confined space entry, etc. for the Construction Manager to enter the manhole and perform the inspection in strict and complete accordance with OSHA requirements at no additional cost to the Owner.

B. Preparation of Test Samples

1. Samples shall be taken of the installed liner each day that the lining is installed in the following manner:

Number of Manholes Lined in One Day	Number of Samples Taken
1-5	1
6-10	2
11- 15	3
16 or more	4

2. Samples shall be taken at equally spaced intervals throughout the workday. The frequency of tests may be increased by the Construction Manager and performed by the Contractor at no additional cost to the Owner when the required tests indicate that the installed lining does not meet the Specification.

C. Strength & Bonding Testing Procedures

1 Samples shall be cube samples. A minimum of six (6) cubes shall be taken for each sample testing.

2 The samples shall be tested in accordance with the applicable ASTM standards to verify that the installed liner meets the compressive strength requirements specified herein and the lining manufacturer's published product data.

3 Tests shall include 7-day and 28-day strength tests (3 cubes for each time period per sample).

4 Shrinkage and bond strength tests shall be performed on each batch or lot of material shipped to the Contractor.

5 Testing shall be performed by an independent laboratory with all associated costs paid by the Contractor.

6 The test results shall be submitted to the Construction Manager immediately when available and no later than 30 days after lining installation.

D. Vacuum Testing

1. All manholes shall be vacuum tested when ALL manhole rehabilitation is completed. Manholes shall not be tested until at least 7 days after installation of lining.

2. Vacuum testing shall be performed in accordance with ASTM C1244.

3. The Construction Manager shall be present for all testing. The Contractor shall notify the Construction Manager 48 hours prior to testing.

4. The Contractor shall submit test reports of the testing which include: the project name, manhole tested, testing data (vacuum pressure, duration of test, etc.) and whether the manhole passed or failed the test. Test reports must be submitted citing the reason for failure noted on the report.

5. Any manhole failing the test shall be repaired and retested immediately by the Contractor at no additional cost to the Owner.

3.12 FINISHED LINING SYSTEMS

A. There shall be no groundwater infiltration or other leakage (active or previously active) through the manhole walls, benches, inverts or pipe connections at the manhole after it has been lined.

B. If leakage is detected, it shall be eliminated with an appropriate cement mortar, grout or sealant as recommended by the manufacturer and approved by the Construction Manager at no additional cost to the Owner.

C. Injection grouting may be required to stop leaks around or in invert channels, pipe connections and benches.

D. The Construction Manager's decision on defective lining shall be final.

E. If any lining is found to be defective after it has been installed or during the warranty period, it shall be repaired or replaced in a manner satisfactory to the Construction Manager and at no additional cost to the Owner.

F. Payment shall not be made for the installed lining until:

1. The manhole passes the vacuum test.

3.13 CLEAN-UP/RESTORATION

A. After the Epoxy manhole liner installation work has been completed and all testing accepted by the Construction Manager, the Contractor shall clean up the work area.

1. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.

a. The debris and liquids shall be disposed of properly in accordance with all applicable laws.

b. The local municipality may furnish a letter to the landfill stating the Contractor is authorized to dispose of the non-hazardous materials.

c. Debris and liquids type and quantities are to be tracked in the daily Contractor diary.

d. Hauling and disposal costs will be borne by the Contractor.

B. All surfaces which have been disturbed by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of the Contractor's operations.

C. Suitable materials and methods, acceptable to the Owner, shall be used for such restoration.

D. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

E. The cost for correcting damage resulting from the Contractor's actions shall be the responsibility of the Contractor.

F. Refer to Section 33 30 00, Sewer and Accessories, for additional requirements.

END OF SECTION

SECTION 33 05 10

ABANDONMENT OF SANITARY SEWERS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Abandonment in place of existing sanitary sewers, manholes, and force mains.

1.02 UNIT PRICES

A. Measurement for grout fill and abandonment of existing gravity sewers is on a linear foot basis for each diameter of sewer being abandoned. Measurement will be along the centerline of the sewer from centerline to centerline of manholes.

B. Measurement for grout fill and abandonment of sanitary sewer manholes is by each manhole abandoned in conformance with this Section.

C. Payment will be full compensation for all material, equipment, and labor required for complete abandonment grouting, including air venting, testing, temporary plugs, pipes and all incidentals.

D. No separate payment will be made for plugging and abandoning sanitary sewer force mains. Include the cost of such abandonment in related work.

E. Acceptability of grout material is based on achieving an average strength of at least 75 psi as defined in Paragraph 2.01B.1.

1.03 DEFINITIONS

A. Abandonment. Sanitary sewer abandonment consists of demolition and removal of any portion of manholes existing within the specified depth of the surface, and the abandonment in place of sewer lines and manholes as specified in this Section.

B. Flowable Fill. Flowable fill (abandonment grout) shall be a controlled low-strength material consisting of a fluid mixture of cement, fly ash, aggregate, water and with admixtures as necessary to provide workable properties. Placement of flowable fill may be by grouting techniques in sewer pipes or other restricted areas, or as mass placement by chutes or tremie methods in unrestricted locations with open access. The long-term hardened strength shall be within a specified range.

C. Ballast. Large aggregate either replaced with the voids subsequently filled with flowable fill injected by grouting method; or in areas with open access, placed individually and sequentially at the same time as the flowable fill placement.

D. Backgrouting. A secondary stage pressure grouting to ensure that voids have been filled within the abandoned sewer. Back grouting will only be required at critical locations indicated on the Drawings or if there is evidence of incomplete flowable fill placements.

1.04 SUBMITTALS

A. Submittals shall conform to requirements of all sections and provisions of these specifications.

B. Flowable fill mix design report:

1. Flowable fill type and production method.
2. Use of ballast. Provide percentage of ballast of the total placement and size limits for the ballast if fill is intended to be used with ballast.
3. Aggregate gradation of fill. The aggregate gradation of the mix (excluding ballast) shall be used as a pilot curve for quality control during production.
4. Fill mix constituents and proportions including materials by weight and volume, and air content but excluding ballast. Give types and amounts of admixtures including air entrainment or air generating compounds.
5. Fill densities and viscosities, including wet density at the point of placement.
6. Initial time of set.
7. Bleeding and shrinkage.
8. Compressive strength.

C. Technical information for equipment and operational procedures including projected slurry injection rate, grout pressure, method of controlling grout pressure, bulkhead and vent design, and number of stages of grout application.

D. Experience record for the proposed crew, showing a minimum of 5 similar projects using the proposed or similar equipment and methods.

E. At least 60 days prior to commencing any abandonment activities, submit a plan for abandonment, describing the proposed grouting sequence, bypass pumping requirements and plugging, if any, and other information pertinent to completion of the work.

PART 2 – MATERIALS

2.01 FLOWABLE FILL

A. Design Mix Criteria. Provide design of one or more mixes to meet the design

criteria and conditions for placement. Present the information required by Paragraph 1.04B in the mix design report including the following:

1. Cement: ASTM C150 Type I or II. Volume and weight per cubic yard of fill. Provide minimum cement content of 100 pounds per cubic yard.
2. Fly ash: ASTM C618 Class C or F. Volume and weight per cubic yard of fill. Provide minimum Fly ash content of 200 pounds per cubic yard.
3. Potable water: Volume and weight per cubic yard of fill. Amount of water determined by mix design testing.
4. Aggregate gradation: 100 percent passing the 3/8 inch sieve and not more than 10 percent passing the #200 sieve. The mix design report shall define a pilot gradation based on the following sieve sizes 3/8-inch, Nos. 4, 8, 16, 30, 50, 100 and 200. Do not deviate from the pilot gradation by more than +/-10 percentage points for any sieve for the production material.
5. Aggregate source material: Screened or crushed aggregate, pit or bank run fine gravels or sand, or crushed concrete. If crushed concrete is used, at least 30 percent of natural aggregate shall be added as necessary to provide workability.
6. Admixtures: Use admixtures meeting ASTM C494 and ASTM Cl07 as needed to improve pumpability, to control time of set, and reduce bleeding.
7. Fluidifier: Use a fluidifier meeting ASTM C397 as necessary to hold the solid constituents in suspension. Add a shrinkage compensator if necessary.
8. Performance additive: Use a flowable fill performance additive, such as Darafill or approved equal, to control the fill properties.

B. Flowable Fill Requirements

1. Unconfined compressive strength: minimum 75 psi at 56 days as determined based on an average of three tests for the same placement. Present at least three acceptable strength tests for the proposed mix design in the mix design report.
2. Placement characteristics: self-leveling.
3. Shrinkage characteristics: non-shrink.
4. Water bleeding for fill to be placed by grouting method in sewers: not to exceed 2 percent according to ASTM C940.
5. Minimum wet density: 90 pounds per cubic foot.

2.02 BALLAST

A. Ballast material: natural rock or concrete pieces with a minimum size equal to at least 10 times the maximum aggregate size of the flowable fill and a

maximum size of 24 inches. The maximum dimension shall not be more than 20 percent of the minimum dimension of the space to be filled.

B. Ballast composition: free of any regulated waste material.

2.03 PLUGS FOR FORCE MAINS

A. Grout Plugs: Cement-based dry-pack grout conforming to ASTM Cl 107, Grade B or C.

B. Manufactured Plug: Commercially available plug or cap specifically designed and manufactured to be used with the pipe being abandoned.

PART 3 – EXECUTION

3.01 PREPARATION

A. Have fill mix design reports and other submittals required by Paragraph 1.04 accepted by the Owner's Representative prior to start of placement. Notify the Owner's Representative at least 24 hours in advance of grouting with flowable fill.

B. Select fill placement equipment and follow procedures with sufficient safety and care to avoid damage to existing underground utilities and structures. Operate equipment at a pressure that will not distort or imperil any portion of the work, new or existing.

C. Clean sewer lines and video with closed circuit television to identify connections, locate obstructions, and assess the condition of the pipe. Locate previously unidentified connections, which have not been redirected and reconnected as a part of this project, and report them to the Owner's Representative. During placement of the fill, compensate for any irregularities in the sewer pipe, such as obstructions, open joints, or broken pipe to ensure no voids remain unfilled.

D. Perform demolition work prior to starting fill placement. Clean placement areas of sewers and manholes of debris that may hinder fill placement. Remove excessive amounts of sludge and any other substances that may degrade performance of the fill. Do not leave sludge or other debris in place if filling more than 2 percent of the placement volume. Dispose of waste material in compliance with Section 01 74 00 – Cleaning and Waste Management.

E. Remove free water prior to starting fill placement.

3.02 EQUIPMENT

A. Mix flowable fill in an automated batch plant and deliver it to the site in ready-mix trucks. Performance additives may be added at the placement site if

required by mix design.

B. Use concrete or grout pumps capable of continuous delivery at the planned placement rate.

3.03 DEMOLITION OF ABANDONED SANITARY SEWER MANHOLES, PIPELINE STRUCTURES AND FORCE MAINS PRIOR TO ABANDONMENT

A. Remove manhole frames and covers and any castings from other existing pipeline structures. Deliver these castings to the Owner's storage yard. Alternatively, salvaged castings may be used upon approval by the Owner's Representative for construction of new manholes on this project.

B. Demolish and remove precast concrete adjustment rings and corner section, or brick and mortar corbel and chimney, or other pipeline structure, to a minimum depth of 4 feet below finished grade. The structure may be removed to a greater depth, but not deeper than 18 inches above the crown of the abandoned sewer.

C. If the adjacent sewer lines are not to be filled, place temporary plugs in each line connecting to the manhole in preparation for filling the manhole.

D. Excavate overburden from force mains to be abandoned at the locations indicated on the Drawings. Cut the existing force main, if necessary, to provide an end surface perpendicular to the axis of the pipe and suitable for the plug to be installed. Remove any force main piping material remaining outside of the segment to be abandoned.

3.04 INSTALLATION

A. Abandon sewer lines by completely filling the sewer line with flowable fill. Abandon manholes and other structures by filling with flowable fill, together with ballast as applicable, within the depth of structures left in place.

B. Place flowable fill to fill the volume between the manholes as completely as practicable. Continuously place flowable fill from manhole to manhole with no intermediate pour points, but not exceeding 500 feet in length.

C. Have the filling operation performed by experienced crews with equipment to monitor density of the flowable fill and to control pressure.

D. Temporarily plug sewer lines which are to remain m operation during pouring/pumping to keep the lines free of flowable fill.

E. Pump flowable fill through bulkheads constructed for placement of two 2-inch PVC pipes or use other suitable construction methods to contain the flowable fill in the lines to be abandoned. These pipes will act as injection points or vents for placement of flowable fill.

F. Place flowable fill under pressure flow conditions into a properly vented open system until flowable fill emerges from the vent pipes. Pump flowable fill with sufficient pressure to overcome friction and to fill the sewer from the downstream end, to discharge at the upstream end.

G. Inject flowable fill through replaced ballast using grouting equipment and a series of grout pipes discharging at the bottom of the placement, allowing the fill to rise through the ballast effectively filling all voids. Alternatively, sequentially place individual pieces of ballast at the same time as flowable fill is placed. Do not fill with ballast more than 50 percent of the volume at any level to prevent nesting and void formation.

H. Remediate placement of flowable fill which does not fill voids in a sewer, in manhole or other structures, or where voids develop due to excessive shrinkage or bleeding of the fill by using pressure grouting either from inside the sewer or from the surface.

I. Plug each end of force mains being abandoned.

J. Force main abandonment

1. Clean the inside surface of force mains at least 12 inches from the ends, as necessary, to achieve a firm bond and seal the grout plug or manufactured plug to the pipe surface. Similarly, clean and prepare the exterior pipe surface if a manufactured cap is to be used.
2. When using a grout plug, place a temporary plug or bulkhead approximately 12 inches inside the pipe. Fill the pipe end completely with dry-pack grout mixture.
3. When using a manufactured plug or cap, install the fitting, as recommended by the manufacturer's instructions, to form a watertight seal.

K. Backfill to the surface, above the pipe or structures left in place, with flowable fill in restricted areas, compacted bank run sand in unrestricted areas to be paved or select fill in unrestricted areas outside of pavement. Place and compact backfill, other than flowable fill, in compliance with these specifications.

L. Collect and dispose of excess flowable fill material and other debris in accordance with all sections of these specifications.

3.05 FIELD QUALITY CONTROL

A. Provide batch plant tickets for each truck delivery of flowable fill. Note on the

tickets addition of admixtures at the site.

B. Check flow characteristics and workability of the fill as the placement proceeds.

C. Obtain at least three test cylinders for each placement area for determination of 56 day compressive strength and bleeding. The acceptance of the placement will be based on the average strength of the three tests.

D. Record the volume of ballast together with the flowable fill placement for the same space to demonstrate that voids have been filled.

3.06 PROTECTION OF PERSONS AND PROPERTY

A. Provide safe working conditions for employees throughout demolition and removal operations. Observe safety requirements for work below grade.

B. Maintain safe access to adjacent property and buildings. Do not obstruct roadways, sidewalks or passageways adjacent to the work.

END OF SECTION

SECTION 33 05 13.13

MANHOLE ADJUSTMENT

PART 1– GENERAL

1.01 SUMMARY

A. Manhole adjustment.

PART 2 – PRODUCTS

2.01 MATERIALS

A. All materials shall be as specified in Section 33 30 00 of these Specifications.

PART 3 – EXECUTION

3.01 GENERAL

A. Final manhole cover level shall be flush with final road surface.

B. For outfalls, manhole cover level shall be approximately 24 inches above ground level unless otherwise directed by the Construction Manager.

C. Safety: Pay particular attention to the requirements for confined space entry and the use of gas monitors and ventilation systems.

3.02 ADJUSTING UP TO 3 INCHES

A. Remove manhole cover and clean all rust and debris from seating areas with wire brush or other abrasive means to ensure seating areas are completely clean.

B. Take measurements to determine exact height of risers to be used.

C. Add appropriately sized steel risers to ring to raise cover up to 3 inches in height. If using plastic risers, use combinations of 1-inch or 1½ -inch risers.

D. Replace manhole cover.

3.03 ADJUSTING GREATER THAN 3 INCHES AND LESS THAN 12 INCHES

A. Remove manhole cover and clean all rust and debris from seating areas with wire brush or other abrasive means to ensure seating areas are completely clean.

B. Take measurements to determine exact height of adjustment required.

C. Check for utility locates. If there are any missing utility locates, do not excavate, contact the Construction Manager immediately.

D. For any excavation work around utilities, perform hand digging until all marked utilities have been exposed and secured.

E. For manholes located in paved areas, saw cut a 60-inch by 60-inch square around manhole cover.

F. Excavate all material up to a minimum of 10 inches deep around manhole within 60-inch by 60-inch square area.

G. Remove manhole frame and cover to expose cone.

H. Add an appropriate number of pre-cast concrete spacers to cone.

I. If brick layers are found, remove brick and replace with pre-cast concrete spacers.

J. Use at least ¾-inch of non-shrink grout between spacers.

K. Replace manhole frame and seal with at least ¾-inch non-shrink grout.

L. For roadways, backfill using crusher run or other approved material. Compact in 6-inch layers using mechanical tamper, compacted up to 10 inches below ground surface.

3.04 ADJUSTING FOR 12 INCHES AND GREATER.

A. Remove manhole cover and clean all rust and debris from seating areas with wire brush or other abrasive means to ensure seating areas are completely clean.

B. Take measurements to determine exact height of adjustment required. Determine what combination of manhole risers, pre-cast concrete spacers, and steel or plastic riser rings will be utilized to achieve required adjustment. Obtain approval from Engineer prior to initiating adjustment work.

C. Check for utility locates. If there are any missing utility locates, do not excavate, contact the Construction Manager immediately.

D. For any excavation work around utilities, perform hand digging until all marked utilities have been exposed and secured.

E. For manholes located in paved areas, saw cut a 60-inch by 60-inch square around manhole cover.

F. Excavate all material around manhole within 60-inch by 60-inch square area to the depth required for the adjustment, using the method of trench stabilization recommended for the specific soil types, depth, and general site conditions per reference material provided as part of the competent person certification.

G. Remove manhole frame, cover, and cone to expose manhole.

H. Add an appropriate number of manhole risers and pre-cast concrete spacers.

I. Seal all joints on the inside with non-shrink grout. Use at least ¾-inch of non-shrink grout between spacers.

J. If brick layers are found, remove brick and replace with pre-cast concrete spacers.

K. Replace manhole frame and seal with at least ¾-inch non-shrink grout.

L. For roadways, backfill using crusher run or other approved material. Compact in 6-inch layers using mechanical tamper, compacted up to 10 inches below ground surface.

3.05 GENERAL CLEAN UP AND RESTORATION

A. In paved areas, after final backfill and compaction, coat the vertical wall faces of the cut pavement with a solution of Portland cement and water mixed to a consistency of heavy paint.

B. Fill the top 10 inches of the excavation with Class “A” high early strength Portland cement that has been dyed to match the surrounding pavement.

C. Before leaving the job site, the area should be thoroughly cleared of all surplus material, debris and tools.

D. Submit completed work order form.

END OF SECTION

SECTION 33 05 23

BORE AND JACK CASINGS

PART 1 – GENERAL

1.01. SUMMARY

A. The work covered by this Section includes furnishing all labor, materials and equipment required to bore and jack casings and to properly complete pipeline construction as described herein and/or shown on the Drawings.

B. Work shall include, but not limited to: bore and receiving pits excavation, sheeting, shoring, plating and safety barriers for the protection of workers, traffic, and the general public.

1. In general, the work shall include carrier pipe, steel pipe casing, excavation, backfill, restoration of site, sheeting, grout, brickwork, earth augers, jacking machine, welder and other accessories necessary for a complete installation as specified or directed.

C. Supply all materials and perform all work in accordance with applicable American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI) or other recognized standards.

1. Latest revisions of all standards are applicable.
2. If requested by the Construction Manager, submit evidence that manufacturer has consistently produced products of satisfactory quality and performance over a period of at least two years.

1.02. SUBMITTALS

A. Submit shop drawings, product data, and experience in accordance with the requirements of Section 01 33 23 of these Specifications.

B. Material Submittals: The Contractor shall provide shop drawings and other pertinent specifications and product data as follows:

1. Shop drawings for casing pipe showing sizes and connection details.
2. Design mixes for concrete and grout.
3. Casing Spacers.

C. Experience Submittals

1. Boring and jacking casings is deemed to be specialty contractor work.
2. If the Contractor elects to perform the work, the Contractor shall provide evidence as required by the General Conditions.

a. A minimum of five continuous years of experience in steel casing construction is required of the casing installer.

b. Evidence of this experience must be provided with the shop drawings for review by the Construction Manager.

D. The Contractor shall submit for approval, all working drawings and schedules of procedure proposed to be followed in the execution of boring and jacking operations.

1. Schedules shall set forth the sequence of the various operations together with the time proposed to begin and complete the phases of the work.

1.03. STORAGE AND PROTECTION

A. All materials shall be stored and protected in accordance with the manufacturer's recommendations and as approved by the Construction Manager.

PART 2 – PRODUCTS

2.01. CASING PIPE

A. Steel Pipe:

1. Pipe shall be new and unused.

2. The casing shall be made from steel plate having a minimum yield strength of 35,000 psi.

3. The steel plate shall meet the chemical requirements of ASTM A139, Grade B.

4. The thicknesses of casing shown in Table 1 below are minimum thicknesses.

a. Actual thicknesses shall be determined by the casing installer, based on an evaluation of the required forces to be exerted on the casing when jacking.

b. Any buckling of the casing due to jacking forces shall be repaired at no additional cost to the Owner.

5. The diameters of casing shown in Table 1 below and shown on the Drawings are minimum.

a. Larger casings, with the Construction Manager's approval, may be provided at no additional cost to the Owner, for whatever reasons the Contractor may decide, whether they be casing size availability, line and grade tolerances, soil conditions, etc.

TABLE 1				
Pipe Diameter, inches	Bell OD Inches	Casing Diameter, inches	Wall Thickness, inches	
			Under Highways	Under Railroads
6	9.19	16	0.250	0.250
8	11.33	18	0.250	0.375
10	13.56	20	0.250	0.375
12	15.74	22	0.375	0.375
14	21.43	28	0.375	0.375
16	23.70	30	0.375	0.406
18	25.82	32	0.375	0.406
20	29.88	36	0.375	0.469
24	34.34	42	0.500	0.469
30	38.30	48	0.500	0.500

2.02. CASING SPACERS

A. Shell

1. Material: Minimum 14 gauge T-304 stainless steel.
2. Surfaces to be treated to reduce chemical reactivity.

B. Risers

1. Material: Minimum 10 gauge T-304 stainless steel.
2. Height shall be such that the pipe does not float within the casing.

C. Fasteners

1. Material: T-304 Stainless steel.

D. Liner

1. Material: PVC.
2. Thickness: 0.09-inch.
3. Hardness: 85-90 durometer.

E. Runners

1. Tensile Strength (ASTM D638): Minimum 3,500 psi.
2. Width: Minimum 2 in.
3. Runners shall be attached to stainless steel risers which shall be properly welded to the shell.
4. The height of the runners shall be such that the pipe does not float within the casing.

F. Casing spacers shall be as manufactured by:

1. Cascade Waterworks Manufacturing Company.
2. Pipeline Seal and Insulator, Inc.
3. Advance Products and Systems, Inc.
4. Or approved equal.

2.03. CASING END SEALS

A. The ends of the casing shall be sealed with brick bulkheads using brick and mortar.

2.04. GROUT

A. Grout may be used for filling the void between the casing pipe and the carrier pipe.

B. Cement shall conform to ASTM C 150, Type I or Type II.

C. Grout shall have a minimum compressive strength of 100 psi attained within 24 hours.

2.05. CARRIER PIPE

A. Carrier pipes shall meet requirements as specified in Sections 33 30 00, 33 31 00, 33 32 00 and 33 33 00 of these Specifications.

2.06. SURFACE SETTLEMENT MARKERS

A. Surface settlement markers within pavement areas shall be P.K. nails.

B. Surface settlement markers within non-paved areas shall be wooden hubs.

2.07. EQUIPMENT

A. A cutting head shall be attached to a continuous auger mounted inside the casing pipe.

B. Jacks for forcing the casing pipe through the roadbed shall have a jacking head constructed in such a manner as to apply uniform pressure around the ring of the pipe.

C. The pipe to be jacked shall be set on guides, braced together to properly support the section of the pipe and direct it to the proper line and grade. In general roadbed material shall be excavated just ahead of the pipe.

D. On casing pipe for pipelines over 60 feet in length, the installation equipment shall include a steering head and a grade indicator.

E. The steering head shall be controlled manually from the bore pit.

F. The grade indicator shall consist of a water level attached to the casing which would indicate the elevation of the front end of the casing or some other means for grade indication approved by the Construction Manager.

PART 3 – EXECUTION

3.01. GENERAL

A. The Contractor shall proceed with the work in such a manner as will permit regular transaction of business by the roadway owner and/or property owner without delay or danger of life or property and shall place necessary barricades, warning signs, signal lights, and if necessary, watchmen for the protection of the public.

B. All excavated material will be placed near the top of the working pit and disposed of as required. Use of water or other fluids will be permitted only to the extent necessary for lubrication. Jetting will not be permitted.

C. Contractor shall jack a steel casing pipe as indicated on the approved design, using a special earth auger machine. The casing shall be jacked to the line and grade indicated on the approved design.

D. All jacking/augering operations must be performed in compliance with the rules and regulations of the Fulton County Department of Transportation, Georgia Department of Transportation or other authorities having jurisdiction.

E. Any sheeting placed for the jacking/auguring operation must be completely removed by the Contractor prior to backfill.

F. When the bore pit excavation and/or jacking/auguring operation occurs along existing rights-of-way, care must be taken to ensure all work is performed within the right-of-way, or arrangements must be made with the owner of the affected private property to permit any encroachment on the private property.

G. All such arrangements shall be made in writing and a copy provided to the Construction Manager prior to beginning the excavation.

H. The Contractor shall be fully responsible for protecting against surface subsidence, damage or disturbance to adjacent property and facilities from his construction methods.

1. If loose material is encountered and cave-ins occur or are anticipated, all jacking/augering shall be suspended, shoring provided, and all voids filled or pressure grouted.
2. Supplemental measures and alternative methods must receive the Owner's approval before jacking/augering operation re-commences.
3. Any settlement or upheaval of the existing roadway pavements during the boring and jacking operation, and throughout the warranty period for the overall project, shall be repaired/restored by the Contractor immediately upon notification by the Owner of the pavement failure.

I. Interpretation of soil investigation reports and data, investigating the site and determination of the site soil conditions prior to bidding is the sole responsibility of the Contractor.

1. Any subsurface investigation by the Bidder or Contractor must be approved by the appropriate authority having jurisdiction over the site.
2. Rock and/or water, if encountered, shall not entitle the Contractor to additional compensation.

J. Casing construction shall be performed so as not to interfere with, interrupt or endanger roadway surface and activity thereon, and minimize subsidence of the surface, structures, and utilities above and in the vicinity of the casing.

1. Support the ground continuously in a manner that will prevent loss of ground and keep the perimeters and face of the casing, passages and shafts stable.
2. The Contractor shall be responsible for all settlement resulting from casing operations and shall repair and restore damaged property to its original or better condition at no cost to the Owner.

K. Face Protection: The face of the excavation shall be protected from the collapse of the soil into the casing.

L. Casing Design: Design of the bore pit and required bearing to resist jacking forces is the responsibility of the Contractor.

1. The excavation method selected shall be compatible with expected ground conditions.
2. The lengths of the casing shown on the Drawings are the minimum lengths required.
3. The length of the casing may be extended for the convenience of the Contractor at no additional cost to the Owner.

4. Due to restrictive right-of-way and construction easements, boring and jacking casing lengths less than the nominal 20 foot length may be necessary.

M. Roadway Crossings

1. The Contractor shall be held responsible and accountable for the coordinating and scheduling of all construction work within the roadway right-of-way.
2. Work along or across the roadway department rights-of-way shall be subject to inspection by such roadway department.
3. All installations shall be performed to leave free flows in drainage ditches, pipes, culverts or other surface drainage facilities of the roadway, street or its connections.
4. No excavated material or equipment shall be placed on the pavement or shoulders of the roadway without the express approval of the roadway department.
5. In no instance will the Contractor be permitted to leave equipment (trucks, backhoes, etc.) on the pavement or shoulder overnight.
6. Construction materials to be installed, which are placed on the right-of-way in advance of construction, shall be placed in such a manner as not to interfere with the safe operation of the roadway.

3.02. MAINTAINING TRAFFIC AND PUBLIC SAFETY

A. All working operations of the Contractor, his subcontractors, and/or their agents or employees must be subordinated to the free and unobstructed use of the highway and structures encountered in the execution of jacking and boring operations.

B. The Contractor shall proceed with the work in such a manner as will permit regular transaction of business by commercial operations adjacent to the project site without delay or danger to persons or property, permit free access to and from private residences, and will allow the safe flow of traffic and pedestrians around the work site.

C. The Contractor shall employ the use of barricades, barriers, warning signs, signals, lights, and if necessary, watchmen, for the protection of the general public.

D. The Contractor, when directed by Construction Manager, shall suspend all operations relating to boring and jacking until necessary safety precautions have been met.

3.03. GROUNDWATER CONTROL

A. The Contractor shall control the groundwater throughout the construction of the casing.

B. Methods of dewatering shall be at the option and responsibility of the Contractor. Maintain close observation to detect settlement or displacement of surface facilities due to dewatering.

1. Should settlement or displacement be detected, notify the Construction Manager immediately and take such action as necessary to maintain safe conditions and prevent damage.

C. When water is encountered, provide and maintain a dewatering system of sufficient capacity to remove water on a 24 hour basis keeping excavations free of water until the backfill operation is in progress.

1. Dewatering shall be performed in such a manner that removal of soil particles is held to a minimum.

2. Dewater into a sediment trap and comply with requirements specified in Section 31 25 00 of these Specifications.

3.04. SAFETY

A. Provide all necessary bracing, bulkheads and shields to ensure complete safety to all traffic, persons and property at all times during the work. Perform the work in such a manner as to not permanently damage the roadbed or interfere with normal traffic over it.

B. Observe all applicable requirements of the regulations of the authorities having jurisdiction over this site. Conduct the operations in such a manner that all work will be performed below the level of the roadbed.

C. Perform all activities in accordance with the Occupational Safety and Health Act of 1970 (PL-596), as amended, applicable regulations of the Federal Government, OSHA 29CFR 1926 and applicable criteria of ANSI A10.16-81, “Safety Requirements for Construction of Tunnel Shafts and Caissons”.

3.05. SURFACE SETTLEMENT MONITORING

A. Provide surface settlement markers, placed as specified and as directed by the Construction Manager.

1. The Contractor shall place settlement markers outside of pavement area, along the centerline of the casing at 20 foot intervals and offset 10 feet each way from the centerline.

2. Markers shall also be placed at each shoulder of the roadway, at each edge of pavement, at the centerline of the pavement and at 10 and 25 feet in each direction from the centerline of the casing.

3. Tie settlement markers to bench marks and indices sufficiently removed as not to be affected by the casing operations.

B. Make observations of surface settlement markers, placed as required herein, at regular time intervals acceptable to the Construction Manager.

1. In the event settlement or heave on any marker exceeds 1 inch, the Contractor shall immediately cease work and using a method approved by the Construction Manager and the authority having jurisdiction over the project site, to take immediate action to restore surface elevations to that existing prior to start of casing operations.

C. Take readings and permanently record surface elevations prior to start of dewatering operations and/or shaft excavation.

1. The following schedule shall be used for obtaining and recording elevation readings:

a. All settlement markers, once a week;

b. All settlement markers within 50 feet of the casing heading, at the beginning of each day; more frequently at the Construction Manager's direction if settlement is identified.

c. Make all elevation measurements to the nearest 0.01 foot.

D. The Contractor shall cooperate fully with jurisdictional personnel. Any settlement shall be corrected by, and at the expense of, the Contractor.

E. Report any settlement and horizontal movement immediately to the Construction Manager and take immediate remedial action.

3.06. BORING AND JACKING

A. Shaft

1. Conduct boring and jacking operations from a shaft excavated at one end of the section to be bored.

a. Where conditions and accessibility are suitable, place the shaft on the downstream end of the bore.

2. The shaft shall be rectangular and excavated to a width and length required for ample working space.

a. If necessary, sheet and shore shaft properly on all sides. Shaft sheeting shall be timber or steel piling of ample strength to safely withstand all structural loadings of whatever nature due to site and soil conditions.

b. Keep preparations dry during all operations. Perform pumping operations as necessary.

3. The bottom of the shaft shall be firm and unyielding to form an adequate foundation upon which to work.

a. In the event the shaft bottom is not stable, excavate to such additional depth as required and place a gravel sub-base or a concrete sub-base if directed by the Construction Manager due to soil conditions.

B. Jacking Rails and Frame

1. Whenever possible, the pipe shall be jacked from the low or downstream end. At each end of the casing pipe, the void between the carrier pipe and casing shall be sealed with brick and mortar.

2. Set jacking rails to proper line and grade within the shaft. Secure rails in place to prevent settlement or movement during operations. The jacking rails shall cradle and hold the casing pipe on true line and grade during the progress of installing the casing.

3. Place backing between the heels of jacking rails and the rear of the shaft. The backing shall be adequate to withstand all jacking forces and loads.

4. The jacking frame shall be of adequate design for the magnitude of the job. Apply thrust to the end of the pipe in such a manner to impart a uniformly balanced load to the pipe barrel without damaging the joint ends of the pipe.

C. Boring and jacking of casing pipes shall be accomplished by the dry auger boring method without jetting, sluicing or wet boring.

D. Auger the hole and jack the casing through the soil simultaneously.

E. Bored installations shall have a bored-hole diameter essentially the same as the outside diameter of the casing pipe to be installed. Any voids which develop during the installation operation shall be filled with pressure grout.

F. Execute boring ahead of the casing pipe with extreme care, commensurate with the rate of casing pipe penetration.

1. Boring may proceed slightly in advance of the penetrating pipe and shall be made in such a manner to prevent any voids in the earth around the outside perimeter of the pipe.

2. Make all investigations and determine if the soil conditions are such as to require the use of a shield.

G. As the casing is installed, check the horizontal and vertical alignment frequently. Make corrections prior to continuing operation.

H. Any casing pipe damaged in jacking operations shall be repaired, if approved by the Construction Manager, or removed and replaced at Contractor's own expense.

I. Lengths of casing pipe, as long as practical, shall be used except as restricted otherwise.

1. Joints between casing pipe sections shall be butt joints with complete joint penetration, single groove welds, for the entire joint circumference, in accordance with AWS recommended procedures.

2. Prior to welding the joints, the Contractor shall ensure that both ends of the casing sections being welded are square.

J. The Contractor shall prepare a contingency plan which will allow the use of a casing lubricant, such as bentonite, in the event excessive frictional forces jeopardize the successful completion of the casing installation.

K. Once the jacking procedure has begun, it shall be continued without stopping until completed, subject to weather and conditions beyond the control of the Contractor.

L. Care shall be taken to ensure that casing pipe installed by boring and jacking method will be at the proper alignment and grade.

M. The Contractor shall maintain and operate pumps and other necessary drainage system equipment to keep work dewatered at all times.

N. Adequate sheeting, shoring and bracing for embankments, operating pits and other appurtenances shall be placed and maintained to ensure that work proceeds safely and expeditiously.

1. Upon completion of the required work, the sheeting, shoring and bracing shall be left in place, cut off or removed, as designated by the Construction Manager.

O. Trench excavation, all classes and type of excavation, the removal of rock, muck, debris, the excavation of all working pits and backfill requirements of Section 31 23 00 are included under this Section.

P. All surplus material shall be removed from the right-of-way and the excavation finished flush with the surrounding ground.

Q. Grout backfill shall be used for unused holes or abandoned pipes.

R. Any replacement of carrier pipe in an existing casing shall be considered a new installation, subject to the applicable requirements of these Specifications.

3.07. VENTILATION AND AIR QUALITY

A. Provide, operate and maintain for the duration of casing project a ventilation system to meet safety and OSHA requirements.

3.08. ROCK EXCAVATION

A. In the event that rock is encountered during the installation of the casing pipe which, in the opinion of the Construction Manager, cannot be removed through the casing, the Construction Manager may authorize the Contractor to complete the crossing by a method established in a change order.

B. At the Contractor's option, the Contractor may continue to install the casing and remove the rock through the casing at no additional cost to the Owner.

3.09. INSTALLATION OF PIPE

A. After construction of the casing is complete and has been accepted by the Construction Manager, install the carrier pipe in accordance with the Drawings and Specifications.

B. Care shall be exercised at all times to maintain tight, fully seated joints in the carrier pipe. The carrier pipe shall be fully supported by pre-fabricated casing spacers when feasible.

C. Check the alignment and grade of the casing and prepare a plan to set the carrier pipe at proper alignment, grade and elevation, without any sags or high spots.

D. The carrier pipe shall be held in the casing pipe by one of the following methods:

1. The carrier pipe shall be held in the casing pipe by the use of hardwood blocks spaced radially around the pipe and secured together so that they remain firmly in place.

    a. The spacing of such blocks longitudinally in the casing pipe shall not be greater than 10 feet or as recommended by the pipe manufacturer.

2. The pipe shall be supported within the casing by use of casing spacers sized to limit radial movement to a maximum of 1 inch.

    a. Provide a minimum of two casing spacers per nominal length of pipe. Casing spacers shall be attached to the pipe at maximum 9 to 10 foot intervals or as recommended by the pipe manufacturer.

E. Fill the void between the carrier pipe and casing pipe with grout. Measures shall be taken by the Contractor to prevent floatation and other movement of the pipe as the grout is filling the void.

F. At each end of the casing pipe, the void between the carrier pipe and casing shall be sealed with 4 inches of brick and mortar.

3.10. SHEETING REMOVAL

A. Remove sheeting used for shoring from the shaft and off the job site. The removal of sheeting, shoring and bracing shall be done in such a manner as not to endanger or damage either new or existing structures, private or public properties and also to avoid cave-ins or sliding in the banks.

3.11. FREE BORING

A. Where permitted and directed by the Construction Manager, the Contractor shall use a special earth auger machine to install the pipe by the free bore method.

1. The allowed free bore method will be dry auger boring, without jetting, sluicing, or wet boring.

B. The diameter of the free bore shall not exceed the pipe bell outside diameter or the pipe barrel outside diameter plus 1 inch, whichever is greater.

1. If the annular space between the earthen hole and the carrier pipe exceeds six inches, the Contractor shall fill such space either by pressure grouting or pumping in a flowable fill to eliminate possible settlement.

C. The Contractor shall be responsible for any settlement of the surface (roadway, driveway, or otherwise) caused by the free bore construction activities.

D. Where ordered to use the free bore method to install a segment of pipe, the Contractor may elect to install the pipe by the conventional bore and jack casing method instead.

E. If the Contractor elects to free bore and an acceptable installation does not result for any reason, the Contractor shall install a casing pipe by the bore and jack method at no additional cost to the Owner.

F. At no time shall free bores in excess of forty (40) feet and for pipe larger than 12-inch be permitted.

G. The Contractor may elect to free bore other portions of the project in lieu of open cut installation. However, no additional payment for free bore will be made if the Contractor exercises this option.

3.12. DIRECTIONAL DRILLING

A. Where ordered by the Construction Manager, the Contractor shall install the pipe by directional drilling.

B. The directional drilling method consists of drilling a small diameter pilot hole within the designated tolerances followed by enlargement of the hole to accommodate the ductile iron carrier pipe to be installed.

C. The Contractor shall provide all materials and equipment required, including but not limited to drilling equipment, water pumps, hoses, fittings, storage tanks, filters, hay bales, silt fences, drilling fluids including containment, collection, cleaning and disposal of, fuel and lubricants, bentonite and related mixing equipment, hydrostatic testing equipment and materials, side booms, cranes, backhoes, trucks, and other equipment or materials necessary to load and unload pipe, and to support and smoothly transition the pipe while being pulled into the reamed hole.

D. The Contractor shall submit to the Construction Manager a detailed installation plan including operational sequences, details of the guidance or grade and alignment control system, and a plan and profile of the bore path.

1. The bore path shall ensure that the pipe joints do not deflect more than 50 percent of the manufacturer’s recommended maximum deflection for the ductile iron pipe.

E. The drilling operation shall be conducted in a manner to eliminate the discharge of water, drilling mud, and cuttings to areas not involved in the construction process.

1. The Contractor shall immediately contain and clean-up any inadvertent returns.
2. The Contractor shall also provide equipment and procedures to maximize the recirculation and reuse of drilling mud to minimize waste disposal.
3. Proper disposal of water, drilling fluids, drilling mud, cuttings and muck is the Contractor's responsibility.

F. Ductile iron pipe and fittings, inspection and testing shall be as specified in Section 33 33 00.

END OF SECTION

SECTION 33 30 00

SEWER AND ACCESSORIES

PART 1 – GENERAL

1.01. SCOPE

A. This Section describes products to be incorporated into sewers and accessories and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.

B. General: Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.

1.02. QUALIFICATIONS

A. If requested by the Construction Manager, submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least ten years.

1.03. SUBMITTALS

A. Complete product data and engineering data including shop drawings shall be submitted to the Construction Manager in accordance with the requirements of Section 01 33 23 of these Specifications.

B. When requested, the Contractor shall furnish the Construction Manager with lists, in duplicate, of all pieces of pipe and fittings received on the Project, including copies of shipping documents from the manufacturer and/or supplier.

C. Said lists shall indicate the serial or mark number, weight, class, length, size, and description of each typical piece received.

D. The Contractor shall submit, in conjunction with the construction progress schedule, a schedule of deliveries for materials. The Contractor shall coordinate material shipments with the Owner and the material suppliers.

1.04. TRANSPORTATION AND HANDLING

A. The Contractor shall maintain communication with the material suppliers and the Construction Manager as necessary, to keep informed as to scheduled shipment, and upon delivery of materials, the Contractor shall proceed without delay to unload such materials.

B. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all

times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification.

C. Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front loader. Do not use material damaged in handling. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior coatings or internal lining of the pipe.

D. Lined pipe shall be handled and transported with such care as to prevent damage to linings.

E. Upon receipt of materials from the manufacturer, the Contractor shall make an inspection of such materials.

F. Check and certify the bill of lading, noting any discrepancies.

G. Obtain a proper memorandum signed by the agent of the carrier for any shortage in the shipment or for any damaged materials received.

H. All bills of lading and any memorandum for shortage or damage of material in the shipment shall be promptly submitted to the Construction Manager.

I. The Contractor shall be responsible for distribution of all materials as required to complete the Work.

J. Materials delivered to the Contractor shall be in the custody of the Contractor from the time of receipt by the Contractor of such materials from the carrier until final acceptance of the completed Work.

K. The Contractor shall be responsible for any loss or damage to materials.

1.05. STORAGE AND PROTECTION

A. Store all pipe which cannot be distributed along the route. Make arrangements for the use of suitable storage areas. Inform Owner and Construction Manager of the location, street address, of the storage area.

B. Stored materials shall be kept safe from damage. The interior of all pipe, fittings, valves and other appurtenances shall be kept free from dirt or foreign matter at all times. Valves shall be drained and stored in a manner that will protect them from damage by freezing.

C. Pipe shall not be stacked higher than the limits recommended by the manufacturer.

D. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. At least two rows of timbers shall be placed between tiers and chocks, affixed to each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipes in adjacent tiers.

E. Store joint gaskets in a cool location, out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

F. Mechanical-joint bolts shall be handled and stored in such a manner that will ensure proper use with respect to types and sizes.

G. All tools, materials, machinery and equipment required for the Work may be stored in a compact, neat, stock-piled manner adjacent to the work site, in a suitable location, and in such a manner as to cause the least inconvenience to the affected property owners, ensure traffic safety, and so as not to endanger the general public in any way.

H. All active, existing fire hydrants must be kept unobstructed and accessible at all times.

I. All water and gas valves, and underground power and telephone manholes must be left uncovered by such storing of materials.

1.06. QUALITY ASSURANCE

A. Product manufacturers shall provide the Construction Manager with written certification that all products furnished comply with all applicable provisions of these Specifications. All materials which fail to conform to these Specifications shall be rejected.

B. If ordered by the Construction Manager, each pipe manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of five days during initial pipe installation.

C. After delivery to the site, any materials which have been damaged in transit or are unsuitable for use in the Work shall be rejected and removed from the site.

PART 2 – PRODUCTS

2.01. GENERAL

A. For gravity sewer installations with no live load, located below grade and not along streams or river banks, the standard pipe shall be green DR 25 PVC for pipe sizes 8-inch to14-inch and depths 3 feet to 8 feet.

B. For gravity sewer installations with no live load, located below grade and located along stream and river banks, the standard pipe shall be HDPE Ductile Iron Pipe Size (DIPS) DR17 for diameters 8-inch to 48-inch and depths 3 feet to 11 feet.

C. For gravity sewer installations with live loads HS20/25, or pipe located at a depth of 9 feet or greater and not along stream and river banks, the standard pipe shall be green DR18 PVC for pipe sizes 8-inch to 60-inch.

D. For pressure pipe applications (force mains) regardless of depth and live load requirements and not along river banks and streams the standard pipe shall be green DR18 PVC for diameters 8-inch to 60-inch.

2.02. DUCTILE IRON SEWER PIPE (DIP)

A. See Specification Section 33 33 00, Ductile Iron Pipe.

2.03. PVC SEWER PIPE

A. See Specification Section 33 32 00, PVC Pipe and Fittings.

2.04. HDPE SEWER PIPE

A. See Specification Section 33 31 00, HDPE Pipe and Fittings.

2.05. VALVES

A. Isolation valves for sewer force mains shall be eccentric plug valves.

B. See Specification Section 33 30 65, Plug Valves.

2.06. VALVE BOXES (VB) AND EXTENSION STEMS

A. All buried valves shall be equipped with valve boxes and covers.

1. The valve boxes shall be cast iron two-piece screw type with drop covers. Valve boxes shall have a 5 ¼ inch inside diameter.
2. Valve box covers shall weigh a minimum of 13 pounds.
3. The valve boxes shall be adjustable to 6 inches up or down from the nominal required cover over the pipe.
4. Valve boxes shall be of sufficient length that bottom flange of the lower belled portion of the box is below the valve operating nut.
5. Ductile or cast iron extensions shall be provided as necessary.
6. Covers shall have “SEWER VALVE” or “SEWER” cast into them.
7. Valve boxes shall be manufactured in the United States.

B. All valve boxes shall have a concrete collar, minimum 9 inches thick.

1. The collar shall be square or round and sized 24 inches square or 24 inches in diameter.
2. Precast collars may be used, provided that they are grouted in place to the valve box.
3. The box is to be flush with finished grade.
4. The edge of the valve box is to be ½-inch above the edge of the concrete collar.

C. Where the depth of cover is more than 5-feet, the Contractor shall provide suitable, permanently installed valve stem extensions and guides which have been approved by the Construction Manager prior to fabrication and placement.

1. All valves shall be furnished with Type 316 stainless steel extension stems, as necessary, to bring the operating nut to within 24-inches of the top of the valve box.

2. Connection to the valve shall be with a wrench nut coupling and a set screw to secure the coupling to the valve's operating nut.

3. The coupling and square wrench nut shall be welded or pinned to the extension stem and shall have a centering ring.

4. Extension stems shall be minimum 1-inch diameter.

5. Extension stems shall be equal to Trumbull Industries, M & H Valve, or Penn-Troy Manufacturing/Troy Valve.

2.07. VALVE MARKERS (VM)

A. The Contractor shall provide a concrete valve marker as detailed on the Drawings for each valve installed outside paved areas.

1. The markers shall be Class A concrete of DOT specifications, 4 inches square by 5 feet long, and shall be of the same construction as that of highway right-of-way markers.

2. The words "SEWER VALVE" shall be cast vertically into the marker beginning 2 inches from the top of the marker.

2. There shall also be a 1-¼ inch brass plug cast into the marker 1inch below the letter "E" of the word "VALVE", which shall be stamped in the field by the Contractor, after installation, with the distance, in feet, from the valve marker to the valve box.

4. The markers shall be installed as close to the right-of-way line opposite the valve as is possible, with the brass plug facing the valve.

5. The marker shall be located so as to avoid damage by traffic.

6. The top of the marker shall generally be set 24 inches above finished grade. The marker may be somewhat lower in areas where it may be considered obtrusive, such as lawns, however, at no time shall the marker be installed at less than 18" above finished grade.

7. Valve markers shall be in accordance with County standards.

8. In addition to concrete valve marker where street curbs are installed a saw cut ½ inch deep "V" notch on top of curb adjacent to water valve location is required.

2.08. PRECAST CONCRETE SECTIONS

A. Precast concrete sections shall meet the requirements of ASTM C478 and ASTM C76, latest revision, Class II, Wall B, Type II Portland cement.

B. The minimum compressive strength of the concrete in precast sections shall be 4,000 psi.

C. Reinforcing steel shall conform to ASTM A615, including supplementary requirements, and shall be Grade 60 except that bars to be welded shall be Grade 40 or ASTM A706.

D. Pre-cast concrete sections shall have a minimum 28-day cure time before delivery to the site.

E. The minimum wall thickness shall be one-twelfth of the inside diameter of the base, riser or the largest cone diameter, or 8 inches minimum, whichever is larger. Additionally, the wall thickness shall be sufficient for the proper installation of the rubber boots.

F. The minimum inside diameter of manholes shall be 48 inches with an opening of 24 inches at the top of the cone.

G. Transition slabs which convert bases larger than four feet in diameter to four-foot diameter risers shall be designed by the manhole manufacturer to carry the live and dead loads exerted on the slab.

H. Seal joints between precast sections by means of rubber O-ring gaskets or flexible butyl rubber sealant.

1. Butyl rubber sealants shall meet the requirements of AASHTO M-198. Sealant shall be pre-formed type with a minimum nominal diameter of 1-inch.

2. Butyl rubber sealant shall be equal to Kent Seal No. 2 or Concrete Sealants CS202.

I. In flood plains and locations vulnerable to high rates of inflow and infiltration, manholes shall be lined on the inside with a protective liner approved by the Owner.

J. Drop manholes, manholes with a force main discharge connection and any other manholes that are susceptible to large amounts of hydrogen sulfide shall be lined on the inside with a protective liner approved by the Owner.

K. The manhole table shall have a flow channel made to conform in shape and carrying capacity to that of the sewers.

L. Eccentric manhole cones are required for manhole frame and covers.

2.09. GRADE RINGS:

A. Composite Manhole Ring.

B. EJ Infra-Riser or approved equal.

C. Material: Composite of recycled rubber, nylon fiber and polyurethane prepolymer.

D. Density: 64.2 lbs/cu. ft., ASTM D3574, Test A.

E. Durometer Hardness: 77A +/- 5 points, ASTM D2240.

F. Tensile Strength: 304 psi (not less than 145 psi), ASTM D412.

2.10. BRICK AND MORTAR:

A. Brick shall be whole and hard burned, conforming to ASTM C32 Grade MS.

B. Mortar shall be made of one part Portland cement and two parts clean sharp sand.

C. Cement shall be Type 1 and shall conform to ASTM C150. Sand shall meet ASTM C144.

2.11. MANHOLE STEPS:

A. Reinforced Plastic Steps:

B. Manhole steps of polypropylene molded around a steel rod shall be equal to # PS-1 or #PS-1-PF of M.A. Industries. Inc.

C. ASTM C478, Section 16 Manhole Steps and Ladders.

D. Manhole steps shall only be installed where specified. Manholes steps are typically not required and will only be allowed when specified.

2.12. SAFETY PLATFORMS

A. Safety platforms are required on all manholes equal to or greater than 20 feet in depth.

B. Safety platforms shall only be installed where specified.

2.13. RUBBER BOOTS:

A. All pipes entering a manhole must be sealed by a rubber boot

B. Provide preformed rubber boots and fasteners equal to A-Lok, Z-Lok, Kor-N-Seal or Press Seal Gasket Corporation.

C. Boots may be mechanically attached to the manhole or cast into the walls of the manhole.

2.14. CASTINGS:

A. The manhole cover shall be factory imprinted to read: FULTON COUNTY SEWER

B. Cast Iron Castings - Paved Areas (Non-bolted):

1. Cast iron manhole frames and covers shall meet the requirements of ASTM A 48 for Class 30 gray iron and all applicable local standards. All castings shall be tough, close grained, smooth, and free from blow holes, blisters, shrinkage, strains, cracks, cold shots and other imperfections.
2. No casting will be accepted which weighs less than 95 percent of the design weight.
3. Shop drawings must indicate the design weight and provide sufficient dimensions to permit checking.
4. All castings shall be thoroughly cleaned in the shop and given two coats of approved bituminous paint before rusting begins.
5. Manhole frames and covers shall be as shown on the Standard Details.
6. All frames and covers shall have machined horizontal bearing surfaces.
7. All manholes located in paved areas shall have standard frames and covers except where specifically shown otherwise on the Drawings.
8. Only solid manhole covers may be used for sanitary sewers.

C. Cast Iron Castings - Paved Areas (Bolt Down):

1. Cast iron manhole frames and covers shall meet the requirements of ASTM A 48 for Class 30 gray iron and all applicable local standards. All castings shall be tough, close grained, smooth, and free from blow holes, blisters, shrinkage, strains, cracks, cold shots and other imperfections.
2. No casting will be accepted which weighs less than 95 percent of the design weight.
3. Shop drawings must indicate the design weight and provide sufficient dimensions to permit checking.
4. All castings shall be thoroughly cleaned in the shop and given two coats of approved bituminous paint before rusting begins.
5. Manhole frames and covers shall be as shown on the Standard Details.
6. All frames and covers shall have machined horizontal bearing surfaces.
7. All manholes located in paved areas shall have standard frames and covers except where specifically shown otherwise on the Drawings.

8. Watertight covers in paved areas shall be bolt down type and shall be equipped with four 1/2 inch stainless steel bolts and a 1/8 inch red rubber or rubber O ring gasket.
9. Covers shall be rotatable and interchangeable.
10. Bolt holes shall be bored through so that debris entering the bolt hole will fall into the manhole.
11. Bolt holes shall have the full 360 degree circle within the cover's radius when bored through the cover.
12. Only solid manhole covers may be used for sanitary sewers.

D. Cast Iron Castings - Unpaved Areas

1. For all manholes located in unpaved areas, manhole cover and frame shall be manufactured from ductile iron in accordance with ISO 1083.
2. Covers and frames shall be hinged and incorporate a 90 degree blocking system to prevent accidental closure. The hinge box shall include a self-cleaning, dual wiper infiltration plug.
3. Covers shall be one man operable using standard tools and shall be capable of withstanding a test load of 120,000 lbs.
4. Frames shall be circular with a 24” clear opening and shall include a 360º mechanically attached, C-shaped elastomer seating gasket for infiltration control and traffic shock.
5. Covers and frames must have at least five years of successful history in a minimum of five thousand installations and be manufactured by an ISO 9000 certified manufacturer.
6. The frame depth shall not exceed 4 inches, and the flange shall incorporate bedding slots, bolt holes and lifting eyes.
7. All components shall be black coated. Frame weight: 73 lbs. Cover weight: 122 lbs. Total weight 195 lbs.

E. Composite Castings

1. All composite moldings shall consist of a thermosetting resin matrix blended and/or combined with reinforcing fiber rovings, short fiber filaments, or equivalent nonmetallic reinforcing structure(s).
    a. The thermosetting resin matrix shall be a polyester, vinyl ester, or a blend of these.
    b. The moldings shall be true to pattern in form and dimension and free from cracks, pores, knit-lines, or other defects in locations affecting their strength and value for the service intended.
    c. Before the moldings are removed from the molding operation, they shall be thoroughly deflashed and cleaned at the parting lines, holes, notches and all exposed edges.

2. Composite frames must have a wall thickness of at least 0.75 inches in sections exposed to traffic and potential traffic wheel impact.

3. If using a lock, bolt, or latch, these must be independent of the method used to open the cover to ensure the cover can be opened in the event of lock failure.

4. Molding Process

    a. Covers and frames shall be compression molded under high pressures (>0.5 tons/sq inch of x-y surface area) and high temperatures (>200 degrees F).

    b. Metal reinforcements or metal hinges molded within the composite shall not be permitted. Small non-stress bearing pieces of metal may be encapsulated.

    c. Composite covers and frames shall be molded in the USA.

5. Testing and performance requirements

    a. Testing shall be performed in accordance with the following inspection criteria unless otherwise specified.

        1) The manufacturer/supplier shall be responsible for carrying out all of the required tests and inspections.

        2) All testing shall be conducted in the United States.

        3) The manufacturer/supplier shall maintain complete records of all such tests and inspections.

        4) All testing shall be paid for by the manufacturer/supplier.

    b. All covers shall be capable of withstanding a minimum traffic load of 40,000 lbs, tested in accordance with AASHTO M-306

        1) The Supplier of covers shall submit a test report from an accredited independent testing laboratory. The test report shall document a successful proof load test of 40,000 lbs. for 60 seconds using a 9-inch x 9-inch plate.

        2) There shall be no cracks or permanent deformation greater than 1/8 inch.

        3) The test report shall fully disclose the AASHTO M-306 test procedures and type of test equipment used and be illustrated with pictures showing the test plate, equipment used and pictures of the top and bottom of the lid.

    c. Load test:

        1) A load of 40,000 lbs shall be concentrated on a 9"x 9" block with rubber or fiber backing pad for one minute.

        2) During the load testing process, visible cracks or delamination will be cause for rejection (popping noises during this test are normal for composites and do not indicate failure).

3) When load is removed, Permanent Set (Deflection) of more than 1/8 inch measured at center of load area will be cause for rejection.

4) All testing shall be conducted on a NIST calibrated and Certified load test machine.

d. Ultraviolet resistance:

1) ASTM G 154 Cycle I for 1000 hrs.

2) Specimens shall be tested for ultimate flexural strength (ASTM D790), retaining at least 75% of control values for load and deflection at failure.

e. Coefficient of Friction:

1) Shall be greater than 0.6 when tested in accordance to ASTM C 1028.

f. Notched Izod Impact:

1) Composite raw material impact results shall be greater than 5 ft.-lbs/inch when tested in accordance to ASTM D256.

6. Components for locking systems below the cover exposed to the sewer environment shall be made of noncorrosive materials such as nonmagnetic, 316 stainless steel or a polymer.

7. Covers shall be the types and shall be imprinted as shown on the plans or standard details.

8. Markings

a. Covers and Frames shall have the following molded into the substrate of the cover:

1) Name (or Abbreviation) Molder

2) Country of Origin

3) Molding Date

4) Indication that Material is Non-metallic

9. The covers shall be black in color and have the words SANITARY SEWER molded into the lid in 1-¾ inch raised letters.

10. The covers shall be secured to the frames with four type 316 socket head cap screws. The cap screws shall be coated with a resin-bonded, thermally cured, dry-film lubricant, black in color.

11. The coating shall be 1 mil thick and have a coefficient of friction of 0.05 - 0.10. Cap screws shall be retained to cover by type 316 stainless tooth-lock washers.

12. The frames shall be molded with four stainless threaded inserts to receive the coated stainless steel cap screws. The frame shall have a groove for a neoprene gasket.

13. All covers shall be capable of withstanding a fatigue analysis in accordance with EN 124-1: 2015 for a C250 rating.
    a. The Supplier shall submit a test report from an independent testing laboratory which has been accredited by the American Association for Laboratory Accreditation.
    b. The test report shall document no cracks being present after subjected to 100,000 cycles of 20,682 lbs. (92KN), applied by a 9-inch x 9-inch square plate.
14. All covers shall be capable of passing a water infiltration test in accordance with FACTA Specification for Fabricated Access Covers current edition.
    a. The Supplier of covers shall submit a test report from an accredited independent testing laboratory.
    b. The cover shall be tested in a specially designed fixture where it is face-down with 3.94 inches of water above it for 24 hrs.
    c. After the test period, leakage shall not exceed 0.169 oz/minute.
15. Warranty
    a. Material Warranty: A written guarantee of 20 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the cover and frame material.
    b. Workmanship Warranty: The Contractor shall guarantee his work for a warranty period of 3 years from the date of final acceptance and shall cover the cost of replacing the cover and frame and freight to project site should the cover and frame have any defects in material or workmanship.
    c. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract.
    d. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.
16. Frames and covers shall be manufactured by Composite Access Products (CAP) or approved equal.

2.15. MISCELLANEOUS ACCESSORIES

A. Manhole Riser Rings

1. All final grade adjustment of manhole cover and frame assemblies shall be completed with riser rings. The contractor shall utilize flat and sloping units to match the required slope and or grade of the structure.
2. All adjustment for matching road grade shall be made utilizing a molded indexed slope ring.

3. The complete riser ring system utilizing shall consist of the riser rings, sealed to the manhole structure, to the cover and frame, and to one another by means of an approved butyl sealant.

4. The manhole adjusting rings shall be molded from high-density polyethylene as defined in ASTM Specification D-4976.

5. The adjustment rings shall be molded from 100% recycled material.

6. The plastic rings shall be manufactured utilizing the injection molding process as defined by SPE (Society of Plastic Engineers).

7. The adjustment rings shall be tested to assure compliance with impact and loading requirements per the ASSHTO Standard Specification for Highway Bridges.

8. Installation shall be per manufacture's recommendations only.

9. The annular space between the individual rings and cone basin and the rings and cover frame shall be sealed per manufacturer’s instruction utilized with ASTM C990 approved butyl sealant.

10. Warranty

    a. Material Warranty: A written guarantee of 30 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the riser ring material.

    b. Workmanship Warranty: The Contractor shall guarantee his work for a warranty period of 3 years from the date of final acceptance and shall cover the cost of replacing the riser rings and freight to project site should the riser rings have any defects in material or workmanship.

    c. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract.

    d. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

11. All riser rings shall be as manufactured by LADTECH, Inc. or approved equal.

B. Flexible Adapter Couplings:

1. Couplings for pipe sizes 15 inches in diameter and less shall be elastomeric plastic sleeves designed to connect pipes of dissimilar materials. Adapters shall provide a positive seal against infiltration and exfiltration and remain leak-proof and root-proof up to 4.3 psi. The adapter manufacturer shall provide all stainless steel clamps and required accessories.

2. Couplings shall be products of Fernco and shall be installed in accordance with the manufacturer's recommendations.

2.16. ELECTRONIC MARKERS

A. Electronic markers shall be buried with utilities to serve as a locating device.

B. Electronic markers shall be the “Ball” type for a depth up to 4 feet and the “Full Range” type for depths greater than 4 feet.

C. Each marker shall be color coded in accordance with APWA standards and produce an industry specific frequency.

D. Each marker shall contain a passive antenna that requires no internal power source.

E. Markers shall be of water resistant polyethylene shells and impervious to minerals, chemicals and underground temperature extremes.

F. Electronic markers shall be compatible with 3M Dynatel 1420 EMS-iD Marker Locator. Contractor shall supply one Marker Locator for use during installation and shall turn over Locator to County upon project completion.

G. Markers shall be equal to 3M EMS 1423 XR/ID for wastewater service.

2.17. CONCRETE

A. Concrete shall have a compressive strength of not less than 3000 psi with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5 inches.

B. For job mixed concrete, submit the concrete mix design for approval by the Construction Manager.

C. Ready mixed concrete shall be mixed and transported in accordance with ASTM C94.

D. Reinforcing steel shall conform to the requirements of ASTM A615, Grade 60.

2.18. RETAINER GLANDS

A. All restrained ductile iron pipe and fittings shall be manufactured restrained joint as specified in Section 33 33 00. Retainer glands shall only be installed on MJ valves and where allowed by Construction Manager.

B. Retainer glands shall be provided at all mechanical joints, including fittings, valves, hydrants and other locations as shown on the Drawings.

C. Anchorage: Where retainer glands are installed or allowed by Construction Manager, the valves, plugs, caps, tees and bends deflecting 11 ¼ degrees or more shall be provided with one of the following two forms of restraint:

1. Retainer glands plus concrete thrust blocking (3,000 psi concrete thrust block sized to withstand line pressures of 300 psi and soil bearing pressures of 2,000 psf)

2. Retainer glands plus rodding to concrete thrust collar (3,000 psi concrete collar and tie rods sized to withstand line pressures of 300 psi and soil bearing pressures of 2,000 psf)

D. Retainer glands for ductile iron pipe shall be manufactured in the U.S.A and equal to:

1. Megalug Series 1100, as manufactured by EBAA Iron.
2. Uni-Flange Series 1400, as manufactured by Ford Meter Box Company,
3. Stargrip Series 3000, as manufactured by Star Pipe Products,
4. Sigma One LOK Series SLD as manufactured by Nappco-Sigma.
5. Or approved equal.

2.19. DETECTION TAPE

A. Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket.

B. Tapes shall be color coded in accordance with APWA color codes with the following legends: “CAUTION WASTEWATER MAIN BURIED BELOW”.

1. Color is green for wastewater mains and the color may be solid or striped.
2. Tape shall be permanently printed with no surface printing allowed.
3. Tape width shall be a minimum of 2 inches when buried less than 10 inches below the surface.
4. Tape width shall be a minimum of 3 inches when buried greater than 10 inches and less than 20 inches.

C. Detection tape shall be equal to Lineguard Type III Detectable or Allen Systems Detectatape or approved equal.

2.20. SPECIAL COATINGS

A. Applications

1. Below grade (buried) or where little to no surface preparation can be performed on piping or structural steel.

B. Coating Materials

1. Petrolatum based mastic or wax based wrapping tapes
2. Coating System Manufacturer
   a. Carboline
      1) First Coat - Carbowrap Priming Paste
      2) Finish Coat - Tape A, B, or C (temp. dependent)

b. Denso

1) First Coat - Denso Paste

2) Finish Coat - Densyl Tape

c. Trenton

1) First Coat - Waxtape Primer

2) #1 Wax Tape

PART 3 – EXECUTION

3.01. EXISTING UTILITIES AND OBSTRUCTIONS

A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the Owner.

B. The Contractor shall call the Utilities Protection Center (UPC) (800-282-7411) as required by Georgia law (O.C.G.A. §§ 25-9-1 through 25-9-13) and all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site, at least 72 hours (three business days) prior to construction, to verify the location of the existing utilities.

C. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.

1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law.

2. Field utility locations are valid for only ten days after original notice. The Contractor shall ensure, at the time of any excavation that a valid utility location exists at the point of excavation.

3. Expose the facility to verify its true location and grade for a distance of at least 200 feet in advance of pipeline construction to verify its true location and grade.

4. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.

5. Avoid utility damage and interruption by protecting it with means or methods recommended by the utility owner.

6. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any.

7. The Contractor shall provide the Construction Manager an updated copy of the log bi-weekly, or more frequently if required.

D. Conflict with Existing Utilities:

1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed sewer does not permit safe installation of the sewer by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility.
    a. The Contractor may change the proposed alignment of the sewer to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement and complies with regulatory agency requirements after a written request to and subsequent approval by the Construction Manager.
    b. Where such relocation of the sewer is not approved by the Construction Manager, the Contractor shall arrange to have the utility, main, or service relocated.
2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed sewer does not permit the crossing without immediate or potential future damage to the utility, main, service, or the sewer.
    a. The Contractor may change the proposed grade of the sewer to avoid vertical conflicts if the changed grade provides minimum required capacity, maintains adequate cover and complies with regulatory agencies requirements, after written request to and subsequent approval by the Construction Manager.
    b. Where such relocation of the sewer is not approved by the Construction Manager, the Contractor shall arrange to have the utility, main, or service relocated.

E. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

F. Water, Sewer and Storm Drain Separation:

1. Sewers shall be laid least 10 feet laterally edge to edge from existing or proposed water mains.
    a. Where the sewer crosses a water main, the top of sewer pipe must be at least 18 inches below the bottom of the water main.
    b. Where 18 inches clear vertical separation cannot be maintained, the sewer pipe shall be mechanical joint DIP.
    c. Where possible, a full joint of sewer pipe shall be centered over the water main. Any deviation shall be requested in writing to the Construction Manager.
2. Where sewer lines cross under storm drains, the sewer shall be laid such that the top of the sewer is at least 12 inches below the bottom of the storm drain. Where the vertical separation is less than 12 inches, the sewer pipe shall be mechanical joint DIP.

3. No water main shall be permitted to pass through or come in contact with any part of a manhole.

4. There shall be a minimum 5 feet horizontal separation between parallel gravity and/or force mains

3.02. CONSTRUCTION ALONG HIGHWAYS, STREETS, AND ROADWAYS

A. Install pipe lines and appurtenances along highways, streets, and roadways in accordance with the applicable regulations of, and permits issued by, the Georgia Department of Transportation, Fulton County, and the City having jurisdiction, with reference to construction operations, safety, traffic control, road maintenance and repair.

B. The Contractor shall prepare a Traffic Control Plan and submit the plan to the Construction Manager at least 14 days prior to on-site work.

C. The Traffic Control Plan shall include all anticipated lane closures, placement of traffic control devices, barricades, lights, flagmen etc. to clearly show how traffic flow and safety will be maintained throughout the Project.

D. Traffic Control:

1. The Contractor shall:

a. Provide, erect and maintain all necessary barricades, suitable and sufficient lights and other traffic control devices,

b. Provide qualified flagmen where necessary to direct traffic. Flagmen shall be certified by a Georgia DOT approved flagman training program.

c. Take all necessary precautions for the protection of the work and the safety of the public.

2. Construction traffic control devices and their installation shall be in accordance with the current Manual on Uniform Traffic Control Devices for Streets and Highways.

3. Placement and removal of construction traffic control devices shall be coordinated with the Georgia Department of Transportation, Fulton County and the City having jurisdiction, a minimum of 48 hours in advance of the activity.

4. Placement of construction traffic control devices shall be scheduled ahead of associated construction activities.

a. Construction time in street right-of-way shall be conducted to minimize the length of time traffic is disrupted.

b. Construction traffic control devices shall be removed immediately following their useful purpose.

c. Traffic control devices used intermittently, such as “Flagmen Ahead”, shall be removed and replaced when needed.

5. Existing traffic control devices within the construction work zone shall be protected from damage.
    a. Traffic control devices requiring temporary relocation shall be located as near as possible to their original vertical and horizontal locations.
    b. Original locations shall be measured from reference points and recorded in a log prior to relocation.
    c. Temporary locations shall provide the same visibility to affected traffic as the original location.
    d. Relocated traffic control devices shall be reinstalled in their original locations as soon as practical following construction.
6. Construction traffic control devices shall be maintained in good repair, and shall be clean and visible to affected traffic for daytime and nighttime operation. Traffic control devices affected by the construction work zone shall be inspected daily.
7. Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background.
    a. Construction sign panels shall meet the minimum reflective requirements of the Georgia Department of Transportation, Fulton County and the City having jurisdiction.
    b. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.
8. Channelization devices shall be positioned preceding an obstruction at a taper length as required by the current Manual on Uniform Traffic Control Devices for Streets and Highways, as appropriate for the speed limit at that location.
    a. Channelization devices shall be patrolled to insure that they are maintained in the proper position throughout their period of use.

E. Construction Operations:

1. Perform all work along highways, streets and roadways to minimize interference with traffic.
2. Stripping: Where the pipe line is laid along road right-of-way, strip and stockpile all sod, topsoil and other material suitable for right-of-way restoration.
3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.

4. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.

5. Construction operations shall include cleanup and utility exploration.

F. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off the pavement in a timely manner.

G. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

H. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences, property corners, cultivated trees and shrubbery, manmade improvements, subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.

I. Maintaining Highways, Streets, Roadways and Driveways:

1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the Work.

2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates.

a. The edges of running plates shall have asphalt placed around their periphery to minimize vehicular impact.

b. The backfill above the pipe shall be compacted, as specified elsewhere up to the existing pavement surface to provide support for the steel running plates.

3. Furnish a road grader or front-end loader for maintaining highways, streets, and roadways. Make the grader or front-end loader available at all times.

4. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the Work.

3.03. PIPE DISTRIBUTION

A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.

B. Pipe may not be strung along the project within existing highway rights-of-way, unless specifically directed to do so by the Construction Manager, and only then after receiving permission from the road authority which has jurisdiction.

C. No pipe shall be strung further along the route than 500 feet beyond the area in which the Contractor is actually working without written permission from the Owner.

D. The Owner reserves the right to reduce this distance to a maximum distance of 200 feet in residential and commercial areas based on the effects of the distribution to the adjacent property owners.

E. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities.

F. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.

G. No distributed pipe shall be placed inside drainage ditches.

H. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

3.04. LOCATION AND GRADE

A. The Drawings show the alignment and grade of the sewer and the position of manholes and other appurtenances. The slope shown on the profile is the slope of the invert of the pipe.

B. Prior to clearing and grubbing, construction staking shall be performed. The Construction Manager will provide a temporary bench mark along the sewer main route and at all other locations where the alignment of the sewer changes significantly

C. From the information on the Drawings and the survey points found on the Project site, the Contractor shall perform all surveys necessary for the establishment of the horizontal and vertical alignment of the sewer.

D. Construction Staking

1. The base lines for locating the principal components of the Work are shown on the Drawings.

a. Base lines shall be defined as the line to which the location of the sewer is referenced, including but not limited to, edge of pavement, road centerline, property line, right-of-way or survey line.

b. The Contractor shall be responsible for performing all survey work required for constructing the sewer, including the establishment of base lines and any detail surveys needed for construction.

1) This work shall include the staking out of permanent and temporary easements to insure that the Contractor is not deviating from the designated easements.

2. The level of detail of survey required shall be that which the correct location of the sewer can be established for construction and verified by the Construction Manager.

    a. Where the location of components of the sewer are not dimensioned, the establishment on the location of these components shall be based upon scaling these locations from the Drawings with relation to readily identifiable land marks such as survey reference points, power poles, manholes, etc.

E. Reference Points:

1. The Contractor shall take all precautions necessary, which includes, but is not necessarily limited to, installing reference points, in order to protect and preserve the centerline or baseline established by the Construction Manager.

2. Reference points shall be placed, at or no more than three feet, from the outside of the construction easement or right-of-way.

    a. The location of the reference points shall be recorded in a log with a copy provided to the Construction Manager for use prior to his verifying reference point locations.

    b. Distances between reference points and the manhole centerlines shall be accurately measured to the nearest 0.01 foot.

3. The Contractor shall give the Construction Manager reasonable notice that reference points are set. The reference point locations must be verified by the Construction Manager prior to commencing clearing and grubbing operations.

F. Cut Sheets:

1. Cut sheets shall be utilized for basis of payment and confirming that the profile is as shown on the Drawings.

2. Prior to beginning installation of any section of the gravity sewer, prepare cut sheets from field run ground elevations and submit them to the Construction Manager for approval.

3. The survey, from which cut sheets are prepared, may be performed prior to or after clearing and grubbing operations. The surveyor shall obtain an elevation on each bench mark shown on the Drawings and provide this information to the Construction Manager.

4. No installation of the sewer shall commence prior to approval of the cut sheets.

5. Submittal of cut sheets shall be in accordance with Section 01 33 23 of these Specifications.

6. Cut sheets shall provide the station (to the nearest 1 foot) and the elevation (to the nearest 0.1 foot) at maximum 100 foot intervals, plus at each change in slope of the ground and at each manhole centerline.

7. The cut sheet shall also show the invert elevation of the sewer at the corresponding sewer station.

8. From a straight line interpolation of the data, the Contractor shall calculate and record the station of each point where there is a change in the cut brackets indicated on the Bid form.

9. The Contractor shall calculate and record the length of the sewer between each change in cut bracket.

10. The Contractor shall also indicate the pipe material and class as well as the type of bedding.

11. The slope of the sewer shall also be indicated between manholes.

12. At least one offset hub or temporary bench mark shall be provided at each manhole. Its elevation and the resulting cut from the hub to the manhole invert shall also be shown on the cut sheets.

G. Multiple construction sites shall not be permitted without written authorization from the Construction Manager for each site. As a minimum, cut sheets between construction sites shall be submitted and approved before multiple construction sites will be permitted.

H. The Contractor shall be responsible for any damage done to reference points, base lines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, base lines, center lines and temporary bench marks as a result of the operations.

I. Construction Verification Survey allowance: The Construction Verification Survey cash allowance is solely for the use of the Owner for verification of the Contractor's reference points, centerlines and work performed.

J. The presence of this cash allowance in no way relieves the Contractor of the responsibility of installing reference points, centerlines, temporary bench marks, providing as-built drawings, or verifying that the work has been performed accurately.

3.05. LAYING AND JOINTING PIPE AND ACCESSORIES

A. Force mains, valves and appurtenances shall be installed before the installation of the subbase course or paving or any other utilities except gravity sewer lines.

B. Lay all pipe and fittings to accurately conform to the lines and grades established by the Engineer.

C. Pipe Installation:

1. Proper implements, tools and facilities shall be provided for the safe performance of the Work.

a. All pipe, fittings and valves shall be lowered carefully into the trench by means of slings, ropes or other suitable tools or equipment in

such a manner as to prevent damage to sewer materials and protective coatings and linings.

b. Under no circumstances shall sewer materials be dropped or dumped into the trench.

2. All pipe, fittings, valves and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Construction Manager, who may prescribe corrective repairs or reject the materials.

3. All lumps, blisters and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and free from dirt, sand, grit or any foreign materials before the pipe is laid. No pipe which contains dirt shall be laid.

4. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing or other materials shall be left in the pipe at any time.

5. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

6. Pipe laying shall commence at the lowest manhole unless otherwise directed and proceed upstream without interruption. Pipe shall be laid so that the spigot ends (if any) point in the direction of flow to prevent bedding material from entering the joint.

7. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted.

8. Provide electronic marker for all force mains.

a. Electronic markers shall be installed in an interval of every 100 linear feet and as needed to establish a change in direction or as directed by the Construction Manager.

b. Electronic marker shall be equal to 3M Dynatel 1423 XR/ID and shall be compatible with 3M Dynatel 1420 EMS-ID Marker Locator System.

D. Alignment and Gradient:

1. Lay pipe straight in alignment and gradient or follow true curves, where shown on the Drawings, as nearly as practicable. Do not deflect any joint more than the maximum deflection recommended by the manufacturer.

2. Maintain a transit, level and accessories on the job to lay out angles and ensure that deflection allowances are not exceeded.

3. The Contractor shall check the invert elevation at each manhole and the pipe invert elevation at least three times daily, start, mid-day and end of day. Elevations shall be checked more frequently if more than 100 feet of

pipe is installed in a day or if the pipe is being constructed at minimum slope.

4. The Contractor shall check the horizontal alignment of the sewer at the same schedule as for invert elevations.

E. Expediting of Work: Excavate, lay the pipe, and backfill as closely together as possible as determined by the Construction Manager.

F. Do not leave unjointed pipe in the trench overnight. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress.

G. Backfill and compact the trench as soon as possible after laying and jointing is completed.

H. If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either push-on, mechanical joint, restrained joint or as approved by the Construction Manager.

I. Joint Assembly:

1. Joints shall be assembled in accordance with the manufacturer's recommendations,
2. Suitable means shall be used to force the spigot end of the pipe into the bell without damage to the pipe and its jointing materials and without disturbing the previously laid pipe and joints.
3. The Contractor shall inspect each pipe joint within 1,000 feet on either side of main line valves to insure 100 percent seating of the pipe spigot, except as noted otherwise.
4. Each restrained joint shall be inspected by the Contractor to ensure that it has been “homed” 100 percent.
5. The Contractor shall internally inspect each pipe joint to insure proper assembly for pipe 24-inches in diameter and larger after the pipe has been brought to final alignment.

J. Cutting Pipe:

1. Whenever a pipe requires cutting to fit the line or bring it to the required location, the work shall be performed in a manner so as to leave a smooth end at right angles to the axis of the pipe. Jointing of a field cut pipe shall be made in accordance with the manufacturers’ instructions.
2. Only push-on or mechanical joint pipe shall be cut.
3. Cut ductile iron pipe using an abrasive wheel saw.
4. Cut PVC and HDPE pipes using a suitable saw as recommended by the pipe manufacture.
5. Remove all burrs and smooth the end before jointing.

6. The Contractor shall cut the pipe and bevel the end, as necessary, to provide the correct length of pipe necessary for installing the fittings, valves, accessories and closure pieces in the correct location.

K. Lining Repair: Repair linings and recoat spigot ends of cut pipe with lining and bituminous coating as herein before specified in of this Section and as specified below:

L. Remove all burrs and areas of loose lining materials by sanding or scraping to bare metal.

M. Remove oil and lubricants used during field cutting.

N. Lining shall be stripped back a minimum of 1 inch from the spigot end into well adhered lined areas.

O. Roughen 1 to 2 inches of good lining with a rough grade (40 grit) emery paper, rasp or small chisel, to allow an overlap between new and existing lining.

P. Apply lining repair material in the number of coats required to match the thickness requirements as herein before specified in this Section and in accordance with the manufacturer's recommendations.

Q. The open end of uncompleted pipe lines shall be provided with a temporary stopper carefully fitted so as to keep dirt, animals, and other substances from entering. This stopper shall be maintained in position at all times when pipe laying is not actually in progress.

R. Polyethylene Encasement: Installation shall be in accordance with AWWA C105 and the manufacturer’s instructions. All ends shall be securely closed with tape and all damaged areas shall be completely repaired to the satisfaction of the Construction Manager.

3.06. VALVE AND FITTING INSTALLATION

A. All valves shall be set accurately and carefully to the lines and grades given on the Drawings, or as directed, and shall be joined to the pipe utilizing such approved joints as herein before specified.

B. Prior to installation, valves shall be inspected for direction of opening, number of turns to open, freedom of operation, tightness of pressure-containing bolting and test plugs, cleanliness of valve ports and especially seating surfaces, handling damage and cracks.

C. Defective valves shall be corrected or held for inspection by the Construction Manager. Valves shall be closed before being installed.

D. Valves, fittings, plugs and caps shall be set and joined to the pipe in the manner specified in this Section for cleaning, laying and joining pipe, except that 12-inch and larger valves shall be provided with special support, such as treated timbers,

crushed stone, concrete pads or a sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve.

E. Valves shall be installed in the closed position.

F. A valve box shall be provided on each underground valve.

G. They shall be carefully set, centered exactly over the operating nut and truly plumbed.

H. The valve box shall not be in direct contact with the bonnet of the valve and shall be supported in such a manner as not to transmit shock, stress, or load directly to the valve.

I. The bottom flange of the lower belled portion of the box shall be placed below the valve operating nut.

J. This flange shall be set on brick, so arranged that the weight of the valve box and superimposed loads will bear on the base and not on the valve or pipe.

K. Extension stems shall be installed where depth of bury places the operating nut in excess of 24-inches beneath finished grade so as to set the top of the operating nut 24-inches below finished grade.

L. The valve box cover shall be flush with the surface of the finished area or such other level as directed by the Construction Manager.

M. In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.

N. A valve marker shall be provided for each underground valve.

O. Unless otherwise detailed on the Drawings or directed by the Construction Manager, valve markers shall be installed 6-inches inside the right-of-way or easement, and buried to a depth of 30-inches.

P. In addition to a concrete valve marker where street curbs are installed, a saw cut ½" deep "V" notch on top of curb adjacent to the water valve location is required.

Q. A precast concrete vault shall be installed for 24-inch valves and larger.

3.07. SPECIAL COATINGS

A. Surface Preparation

1. Remove loose scale, rust, dirt, excessive moisture, or frost from the surface in accordance with SSPC SP-2 (Hand Tool Cleaning).

B. Application

1. All surfaces shall be hand rubbed or brushed with a priming paste recommended by the CSM. Sharp projections such as threads, irregular contours, or badly pitted areas shall receive a liberal amount of priming paste to ensure maximum protection of metal throughout.

2. On irregular shaped surfaces, i.e., nuts, bolts, flanges, valves, etc., the Contractor shall use either of the following systems recommended by the CSM.

a. Apply recommended mastic by hand in sufficient quantity to build an even contour over entire surface. The Contractor shall pay particular attention to ensure that folds and air pockets within the mastic layer are thoroughly pressed out prior to subsequent application of tape. OR

b. An extra layer of tape shall be cut and carefully molded around sharp projections, nuts, bolts, etc., before final application of tape, in order to meet specified system thickness.

3. Tape shall be spirally wrapped with a 55 percent overlap and sufficient tension and pressure to provide continuous adhesion without stretching the tape. Edges of tape must be continuously smoothed and sealed by hand during wrapping. On vertical application, contractor shall begin at bottom and proceed upward creating a weatherboard overlap.

4. System Thickness

a. Smooth contours shall have a minimum thickness of 50 mils while nuts, bolts, and sharp projections shall be 100 mils.

5. Tape

a. Number and types of tape wraps shall be in accordance with the CSM's written instructions.

3.08. MANHOLE AND PRECAST CONCRETE PRODUCT CONSTRUCTION

A. Construct manholes at locations and as shown on the Drawings.

B. Precast Concrete: Handle sections carefully to prevent cracking or chipping. Provide uniform bedding of the bottom section to prevent uneven loading. Install gaskets and joint sealants in accordance with manufacturer's recommendations to produce a watertight structure.

C. All manholes shall have a minimum of 12 inches #57 stone bedding.

D. Grade Rings:

1. Apply a continuous strip, 5/16 inch – 3/8 inch thick, of polyurethane joint sealer/adhesive on the top surface of the concrete structure or brick course. Place on a diameter 1 inch smaller than the outside or inside diameter of the adjustment riser.

2. Position the riser in place, ensuring it is centered over the top surface of the concrete structure or brick course of the manhole structure.

3. Apply a second continuous strip 5/16 inch – 3/8 inch thick of polyurethane joint sealer/adhesive on the top surface of the riser 1" smaller than the outside or inside diameter of the frame.

4. Center the frame of the manhole over the structure opening. Place bottom of frame onto adjustment riser. Press down, applying firm pressure to the frame to create a tight seal with the sealant and adjustment riser.

E. Brick: Bed the bottom and sides of every brick in mortar. Apply a smooth coat of mortar, 3/4 inch thick, on the inside and outside of manhole.

F. Pipe Connections: Seal the connection between the pipe and the manhole as follows:

1. Pipe 36 Inch Diameter and Less: Connect pipe to precast concrete manholes by a rubber boot provided in a cored or precast hole of the proper diameter.

2. Pipe 42 Inch Diameter and Larger: Construct manhole collars as shown on the Drawings after the pipe has been sealed into the manhole.

3. If rubber boots are damaged, replace Type I boots with a new boot and repair Type II boots by constructing a manhole collar.

4. If preformed openings must be enlarged or altered, or if new openings must be made in the field, minimize the amount of material removed to provide closely matched surfaces for grouting.

G. Inverts: Form channels as shown on the Drawings, rounded, and troweled smooth. Maintain consistent grade through the invert.

1. Inverts shall be constructed with the same radius as the effluent pipe.

2. Invert walls shall be constructed to a height corresponding to the spring-line of the influent and effluent pipes with smooth rounded walls.

3. All inverts must be grouted 360 degrees around rubber boots.

4. Inverts formed with a half pipe are NOT allowed.

H. Top Elevations:

1. Where manholes are constructed in paved areas the top surface of the frame and cover shall conform to the crown and grade of the existing adjacent pavement.

2. Adjustment to final grade in paved areas shall be provided by means of brick coursing not to exceed four (4) common brick (12 inches maximum) in height with Portland cement joints.

3. Where manholes are constructed in non-pavement areas the frame shall be factory cast into the concrete cone. The top surface of the frame and cover shall have bolt-down lids with a watertight gasket.

4. Manholes in wooded or unmaintained areas shall be a minimum of 24 inches above ground level unless otherwise shown on the Drawings or directed by the Construction Manager. .

5. Manholes in maintained grassy areas may be flush with the ground.

6. Manholes on sloped ground in un-maintained areas shall be a minimum of 24 inches above ground level on the uphill side of the manhole unless otherwise shown on the Drawings or directed by the Construction Manager.

I. Drop Connections: Manholes requiring drop connections are shown on the Drawings

1. Construct drop connections of mechanical joint Class 350 DIP and diameter size as the upstream sewer and in accordance with the details shown on the Drawings.

2. All outside 90 degree elbows shall have a thrust block poured below the elbow.

J. Frames and Covers:

1. The cast iron frame for the manhole cover shall be set at the required elevation and properly anchored to the masonry

2. Unless frame and cover is at grade, the frame shall be cast into the cone section.

K. Seal all manhole joints and lift holes, both inside and out, with grout. Between precast sections, this is in addition to joint sealant.

L. Invert Elevations: The invert elevations shown on the Drawings shall be for the invert at the centerline of the precast concrete manhole. Prior to setting the laser or other vertical alignment control system for the sewer upstream of the manhole, the Contractor shall verify the elevation of the sewer installed at the manhole. Should the elevation differ from that shown on the Drawings, the Contractor shall take the following corrective action:

1. If the sewer is laid at negative grade, the Contractor shall remove and reinstall the sewer at the correct grade at no additional cost to the Owner.

2. If the sewer is laid at a grade less than that shown on the Drawings, thus reducing the sewer's capacity, the Owner may require the sewer to be removed and re-laid at the correct grade at no additional cost to the Owner. As a minimum, the grade to the next upstream manhole shall be adjusted such that the next upstream manhole shall be set at the correct elevation.

3. If the sewer is laid at a grade greater than that shown on the Drawings, and if the Contractor can show that there are no conflicts with upstream existing utilities or obstructions, the Contractor shall adjust the grade of the next upstream manhole such that the next upstream manhole shall be set at the correct elevation.

a. If such an adjustment, in the Construction Manager's opinion, is substantial, the grade adjustment shall be spread over multiple sections of the sewer.

b. If such an adjustment, in the Construction Manager's opinion, significantly reduces the sewer's capacity, the Construction Manager may require the Contractor to remove and relay that portion of the sewer laid at the improper grade.

M. Doghouse Manholes

1. For doghouse manholes, the existing pipe shall not be cut without authorization of the Construction Manager.

2. The Construction Manager must be present when existing pipe is cut for the doghouse or cut-in manholes.

N. Steps

1. The uppermost step shall be built into the concrete not over 12 inches below the top of the manhole dome/cone and these steps shall be continued in alignment downward along the interior vertical side of the manhole to a point no lower than the crown of the largest sewer.

2. Spacing of steps shall not exceed 12 vertical inches.

3. Steps shall not descend over any pipe connection into the manhole, unless approved by the Construction Manager.

4. Steps shall only be installed where specified. Manhole steps are typically not allowed.

O. Manholes shall be constructed such that their walls are plumb.

P. Manhole Cores

1. The Contractor shall be responsible for performing manhole cores.

2. The core must not be backfilled until approved by e Construction Manager.

3. Failure, for any reason, to have the Construction Manager approve the core will cause all work to be halted until the cored manhole is excavated and the rubber boot exposed.

4. Cores for future development or future tie-ins are only allowed when installed with a rubber boot, one full joint of 6-inch ductile iron, HDPE or PVC pipe, based on bury depth conditions, and a mechanical joint plug.

5. A miscored manhole section shall be replaced unless a variance has been approved by the Construction Manager. A miscore is defined as:

a. Cored into the barrel section joint.

b. Cored into the poured table.

c. Offset or misdirection of core.

6. A minimum of 12 inches separation is required between all manhole cores.

Q. Pre-Cast Barrel

1. All lift holes shall be fully sealed with grout and troweled smooth inside and out.

2. All joints shall be grouted inside and out.

3.09. THRUST RESTRAINT

A. Thrust Collars: Collars shall be constructed as shown on the Drawings. Concrete and reinforcing steel shall meet the requirements specified in Article 2.14 of this Section. The welded-on collar shall be attached to the pipe by the pipe manufacturer.

B. Concrete Collars: Construct collars as shown on the Drawings. Concrete and reinforcing steel shall meet the requirements specified in Division 3 of these Specifications.

3.10. INSPECTION AND TESTING FOR GRAVITY SEWER

A. The Construction Manager will make periodic job site visitations without advance notice to the Contractor. However, it is the responsibility of the Contractor to contact the Construction Manager during each phase of the installation for inspections and/or re-inspections.

B. The Construction Manager will visually inspect the project for acceptable system installation such as invert work, gravel, pipe type, grout, etc.

C. Final approval of a project will not be granted by the Owner until all inspections are conducted with no defects noted and all appropriate documents have been received and accepted by the Construction Manager.

D. Clean and test lines before requesting final acceptance. Where any obstruction is met, clean the sewers by means of rods, swabs, or other instruments. When requested by the Construction Manager, flush out lines and manholes before final inspection.

E. Alignment: Pipe lines shall be straight and show a uniform grade between manholes. Correct any discrepancies discovered during inspection.

F. Pipe joints for sewers 30-inches in diameter and larger shall be air tested individually. The joint tester assembly shall be placed over the joint and shall pressurize the joint area to 4 psi. The pressure shall not drop more than 2 psi in 10 seconds. The joint tester assembly shall be equal to Cherne Industries, Inc.

G. Watertightness: All sewers constructed shall be tested for watertightness to the maximum extent feasible. Infiltration tests and exfiltration tests shall be performed on all new sewers constructed as indicated below, except for those new sewers constructed which have active services tied into it as the pipe is being installed. In such cases the watertightness of the sewers less than or equal to 24-inches shall be based on a visual inspection, and for sewers 30-inches and larger based on the

individual joint test as specified herein. All visible leaks, including those found via television inspection, shall be repaired.

1. Infiltration Tests:
   a. Install suitable weirs in manholes selected by the Construction Manager to determine the leakage of ground water into the sewer. The maximum length of line for each infiltration test shall be 3,000 feet.
   b. Measure leakage only when all visible leaks have been repaired and the ground water is two feet above the top of the pipe.
   c. Install weir for a minimum of four hours before measuring flow.
   d. If leakage in any section of the sewer line exceeds 100 gpd/inch diameter/mile, locate and repair leaks. Repair methods must be approved by the Construction Manager.
   e. After repairs are completed, re-test for leakage.
   f. Furnish, install, and remove the necessary weirs, plugs, and bulkheads required to perform the leakage tests.
   g. Weirs shall be V-notch type equal to Pollard (800) 437-1146.
2. Exfiltration Tests: Use when groundwater is less than two feet above the top of the pipe.
   a. Low-Pressure Air Test: Only sewer diameters less than or equal to 24 inches.
   b. Prior to air testing, the section of sewer between manholes shall be thoroughly cleaned and wetted.
   c. Immediately after cleaning or while the pipe is water soaked, the sewer shall be tested with low-pressure air.
   d. At the Contractor's option, sewers may be tested in lengths between manholes or in short sections (25 feet or less) using inflatable balls pulled through the line from manhole to manhole.
   e. Air shall be slowly supplied to the plugged sewer section until internal air pressure reaches approximately 4.0 psi. After this pressure is reached and the pressure allowed to stabilize (approximately two to five minutes), the pressure may be reduced to 3.5 psi before starting the test.
   f. If a 1.0 psi drop does not occur within the test time, then the line has passed the test.
   g. If the pressure drops more than 1.0 psi during the test time, the line is presumed to have failed the test, and the Contractor will be required to locate the failure, make necessary repairs, and retest the line.
   h. Minimum test time for various pipe sizes and types is as follows:

Nominal Pipe Size, inches	T (Time Min/100) Feet
	DIP, PVC [1]
6	5.7
8	7.6
10	9.4
12	11.3
15	14.2
18	17.0
21	19.8
24	22.8

[1] Source: ASTM F1417

3. Required test equipment, including inflatable balls, braces, air hose, air source, timer, rotameter as applicable, cut-off valves, pressure reducing valve, 0-15 psi pressure gauge, 0-5 psi pressure gauge with gradations in 0.1 psi and accuracy of ± two percent, shall be provided by the Contractor. Testing equipment shall be equal to Cherne Air-Loc Testing Systems.

4. Low Pressure Air Testing:

   a. At the option of the Owner, low pressure air testing may be performed in lieu of infiltration/exfiltration test.

   b. Testing shall be performed in accordance with Uni-Bell PVC Pipe Association Publication UNI-B 06 - "Recommended Low-Pressure Air Testing of Installed Sewer Pipe."

5. The Contractor shall keep records of all tests made. Copy of such records will be given to the Construction Manager. Such records shall show date, line number and stations, operator, and such other pertinent information as required by the Construction Manager.

6. The Contractor is cautioned to observe proper safety precautions in performance of the air testing. It is imperative that plugs be properly secured and that care be exercised in their removal. Every precaution shall be taken to avoid the possibility of over-pressurizing the sewer line.

H. Deflection Test:

1. Test PVC gravity sewer for excessive deflection by passing a mandrel through the pipe. Deflection of the pipe shall not exceed the following:

Nominal Pipe Diameter (inches)	Maximum Allowable Deflection
≤ 12	5%
15 to 30	4%
> 30	3%

2. The mandrel size shall be based upon the maximum possible inside diameter for the type of pipe being tested, taking into account the allowable manufacturing tolerances of the pipe.

    a. The mandrel shall have an odd number of legs, or vanes, with a quantity of such equal to or greater than nine. The legs of the mandrel shall be permanently attached to the mandrel.

    b. A mandrel with variable sizes shall not be allowed.

    c. The mandrel shall be constructed of steel aluminum or other material approved by the Construction Manager, and shall have sufficient rigidity so the legs of the mandrel will not deform when pulling through a pipe.

    d. The mandrel dimensions shall be checked by the Construction Manager before use by the Contractor.

3. Excavate and install properly any section of pipe not passing this test. Re-test until results are satisfactory.

4. This test shall be performed twice:

    a. Once within the first 30 days of installation, and

    b. Once during final inspection, but no sooner than 30 days after pavement and backfill is done, at the completion of the contract.

I. Closed Circuit Television: The interior of the gravity sewers shall be subjected to a post-installation televised inspection.

J. The audio/video tape shall provide an audio description to what is being viewed; provide a continuous running footage indicator between manholes and be prepared in the presence of the Construction Manager.

K. Prior to Final Acceptance the Owner shall be provided with one copy of the TV inspection report and video file showing the entire length of gravity sewer being tested.

L. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type joint, roundness and distance between manholes.

M. Any pipe found to be cracked, leaking, misaligned, bellied or otherwise defective shall be removed and replaced.

N. Manholes: Prior to testing manholes for watertightness, all lift holes shall be plugged with a non-shrink grout, all joints between precast sections shall be properly sealed and all pipe openings shall be temporarily plugged and properly braced.

1. Vacuum Tests: The manhole, after proper preparation as noted above, shall be vacuum tested prior to backfilling.

    a. The test head shall be placed at the inside of the top of the cone section and the compression head inflated to 40 psi to effect a seal between the vacuum base and the manhole structure.

b. Connect the vacuum pump to the outlet port with the valve open. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off.

c. With the valves closed, the time in seconds shall be measured for the vacuum to drop to 9 inches.

d. The manhole shall pass if the time in seconds is greater than that specified in the table below.

e. If the manhole fails the initial test, necessary repairs shall be made with non-shrink grout while the vacuum is still being drawn.

f. Retesting shall proceed until a satisfactory test is obtained. Vacuum testing equipment shall be equal to that as manufactured by P.A. Glazier, Inc.

Minimum Test Times for Various Manhole Diameters and Depths			
	Diameter (feet)		
Depth (feet)	4	5	6
8	20	28	33
10	25	33	41
12	30	39	49
14	35	48	57
18	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

3.11. INSPECTION AND TESTING FOR FORCE MAIN

A. Prior to acceptance of the force main, the Contractor shall test the force main in accordance with the requirements of these Specifications.

B. Force mains shall be subjected to a minimum test pressure equal to 150 percent of the total dynamic head or 100 psi, whichever is greater, for a minimum of two hours. The test shall be performed using potable water.

1. Use of a fire Hydrant requires a fire hydrant meter to be rented from the local water authority.

C. The entire force main pressure test must be witnessed and approved by the Construction Manager or his representative. The test shall be performed from the check valve to the discharge manhole. No leakage will be allowed.

D. To schedule a test, the Contractor shall notify the Construction Manager at a minimum of 48 hours in advance.

E. The Construction Manager will determine the test pressure and gauge location.

F. Contractor shall remove, valve off, or otherwise protect any equipment that might be damaged by the pressures used in the test. All piping shall be securely anchored prior to the test.

G. Pipe laid in trenches shall be backfilled. Joints, fittings and valves may be left exposed to be examined during the test.

H. Before applying the test pressure, all air shall be expelled from the pipe through installed air release valves. If combination air release valves are not available at high points, Contractor shall make necessary taps and insert plugs after the test has been completed. Prior approval must be obtained from Fulton County before making the taps.

I. The approval of the force main installation and pressure test by the Construction Manager shall become a part of the overall pump station/force main system approval.

J. Contractor shall bear the complete cost of the test including temporary plugging and blocking, water usage and the repair of all leaks.

K. If a section of the force main fails the pressure test Contractor will be required to pay a re-inspection fee as determined by the Construction Manager prior to each additional retest required.

3.12. PROTECTION AND RESTORATION OF WORK AREA

A. General:

1. Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.
2. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.
3. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly.
    a. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed.
    b. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage.
    c. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
4. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.

5. The Construction Manager shall be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.

B. Man-Made Improvements: Protect, or remove and replace with the Construction Manager's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the work. Fences crossing easements shall be gated.

C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Construction Manager. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.

D. Cutting of Trees: Do not cut trees for the performance of the Work except as absolutely necessary.

E. Protect trees that remain in the vicinity of the work from damage from equipment.

F. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system.

G. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman.

H. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor.

I. No stumps, wood piles, or trash piles will be permitted on the work site. The Contractor may chip and grind vegetation and spread over the disturbed area if approved by the County.

J. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the project in accordance with the applicable codes and rules of the appropriate county, state and federal regulatory agencies.

K. Swamps and Other Wetlands:

1. The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures which alter the original topographic features within the easement.

2. All temporary construction or alterations to the original topography shall incorporate measures to prevent erosion into the surrounding swamp or wetland.

3. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area. All materials of construction and other non-native materials shall be disposed by the Contractor.

4. The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between portions of a swamp, wetland or stream which may be temporarily divided by construction.

5. The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.

END OF SECTION

SECTION 33 30 10

SEWER SERVICE CONNECTIONS

PART 1 – GENERAL

1.01 SCOPE

A. The work covered by this Section shall consist of furnishing and installing service connections to sewer mains and manholes, of the size and type shown on the Drawings and specified herein.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Connection of service lines or risers to sewer main shall be by means of standard tees, wyes or as indicated on the Drawings.

B. The cleanout shall be sealed with a threaded cap set in a service box.

C. Service pipe shall be of the same material and quality as the main sewer main.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Installation of sewer service connection lines shall be in accordance with Section 33 30 00 of these Specifications.

B. Connections may enter the system either at a manhole, or at the main with wyes or tees.

C. All Service Connections entering a manhole must be cored and sealed with a rubber boot.

D. The minimum pipe size for tie-in to any manhole or main shall be 6-inch.

E. Bedding for service connections shall be the same as the sewer main.

F. Service connections shall be made at the top or from the side at 45 degrees of the sewer main using 6-inch diameter pipe as shown on the Drawings.

G. Under no circumstances shall service connections be made by knocking a hole in the sewer main or manhole, inserting the lateral pipe and sealing with grout.

H. The service connection shall extend from the sewer main to the edge of the permanent easement or right-of-way and be plugged with a vertical cleanout of the same material.

I. Cleanouts shall be installed on service laterals at the edge of the public right-of-way or easement, at changes in direction greater than 45-degrees and every 75 feet.

J. Riser connections shall be required when the sewer main is 10 feet or more below finished grade, unless otherwise directed by the Construction Manager. Clean out riser pipe shall terminate at 4 inches above ground surface.

K. If the service connection ends in rock, the Contractor shall excavate the rock an additional 10 feet beyond the plugged end.

L. Service Connection end locations shall be clearly marked by permanent markers approved by the County and shall be installed within the public right-of way or easement to facilitate locating of the sewer service lateral in accordance with the requirements of the Georgia Utility Facilities Protection Act.

1. Markers shall be a minimum 6 foot length 4 x 4 post painted safety day-glow green in conformance with OSHA Standards.

M. Service Connections shall be plugged with mechanical plug for low pressure air testing.

N. During the warranty or bonded period, the Contractor may add a Service Connection that was omitted by cutting out a section of the main and installing a full wye.

O. Record the location and elevation of the wye connection and cleanout on a copy of the Contract Drawings to be submitted as Record drawings and on the report form provided by the County.

END OF SECTION

SECTION 33 30 65

PLUG VALVES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. This Section specifies eccentric plug valves for services in the wastewater systems. Unless specified otherwise, the valves shall be manually operated.
2. Refer to Section 33 30 00 for additional requirements.

B. Type:

1. Plug valves shall be non-lubricated, resilient-seated, eccentric valves.
2. Valve pressure ratings, body flanges and wall thicknesses shall be in full conformance with ANSI B16.1, latest revision.
3. All valves furnished under this specification shall be suitable for installation in vaults or direct burial as specified. Unless otherwise specified, all valves shall conform to ANSI/AWWA C517.

C. Design and Performance Requirements:

1. Valve shall be able to withstand a 500 psi pressure test without being damaged.

1.02 REFERENCES

A. This section contains references to the following documents.

1. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.
2. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
3. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids).
4. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

5. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

B. References

1. ASTM A126 Class B "Gray Iron Castings for Valves, Flanges and Pipe Fittings"
2. ASME B16.1 "Pipe Flanges and Flanged Fittings"
3. AWWA C517 “Resilient-Seated Cast-Iron Eccentric Plug Valves”
4. AWWA C111 "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings"

1.03 SUBMITTALS

A. Action Submittals:

1. Procedures: Section 01 33 00.
2. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
   a. Check marks (✓) shall denote full compliance with a paragraph as a whole.
   b. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation.
   c. The Construction Manager shall be the final authority for determining acceptability of requested deviations.
   d. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications.
   e. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.
3. Affidavit of compliance, as required by AWWA C517.
4. Catalog information, sectional views showing internal details, dimensions, weights, and bills of material detailing construction materials for the each size and Type valve. This information shall be in sufficient detail to demonstrate compliance with this Section and any related specification.
5. Installation drawings depicting the arrangement of each valve.

B. Informational Submittals:

1. Procedures: Section 01 33 00
2. Submit detailed product data and descriptive literature to include dimensions and materials of construction.
3. Certified test records.
   a. Certification shall be by an officer of the manufacturing corporation.
4. Provide shop drawings to show installation arrangement of major component assemblies and instructions.
5. Manufacturer's Installation Certification Form 43 05 11-A specified in Section 01 99 90.

1.04 QUALITY ASSURANCE

A. Supplier shall have been manufacturing eccentric plug valves for a period of at least ten years. At the Construction Manager's request, supplier shall provide a list of installations involving equipment of similar size and application.

B. Valves and actuators shall be warranted by the manufacturer for defects in materials and workmanship for a period of two years (24 months) from date of final acceptance.

C. Each valve and actuator shall be assembled, adjusted and tested as a unit by the valve manufacturer.

1.05 FACTORY TESTS

A. Plug valves shall be subjected to hydrostatic and leakage tests in accordance with ANSI/AWWA C517.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Acceptable manufacturers are listed below. The manufacturer's standard product may require modification to conform to specified requirements:

1. DeZurik
2. Val-Matic
3. Or approved equal

B. All valves shall be manufactured in the U.S.A.

2.02 MANUFACTURE

A. General

1. Plug valves shall be non-lubricated, resilient-seated, eccentric valves.
2. Pressure ratings shall be 175 psi on valve sizes through 12-inch and 150 psi for 14-inch and larger.
3. Valve pressure ratings, body flanges and wall thicknesses shall be in full conformance with ANSI B16.1, latest revision.
4. Valves shall seal leak-tight against full rated pressure in both directions.
5. Valve seats shall be tested to provide leak tight shut-off to 175 psi for valves through twelve (12) inch with pressure in either direction.
6. In addition, every valve shall be given a certified hydrostatic shell test and seat test, with the plug open, to a pressure twice that of the pressure ratings specified above to demonstrate overall pressure integrity of the valve body. Test reports shall be available upon request by the Construction Manager.
7. Plug valves shall conform to the latest revision of ANSI/AWWA C517-05.
8. All materials shall be new.
9. Valves and operators shall have seals on all shafts and gaskets on valve actuator covers to prevent the entry of water. Actuator mounting brackets shall be totally enclosed and shall have gasket seals.
10. Plug valve and connecting pipe shall have the capability to be pigged without the use of special equipment.
11. A valve key for plug valves shall be provided to the Owner for each force main.

B. Body:

1. Bodies and covers shall be Cast Iron ASTM A126 Class B or Ductile Iron ASTM A536 Grade 65-45-12.
2. At a minimum, valves measuring 4 inches to 12 inches in diameter shall have 175 psig bodies, and valves measuring 14 inches and greater in diameter shall have 150 psig bodies.
3. Ports shall be rectangular and 100% port.
4. For specific installation locations where the Total Dynamic Head (TDH) plus the surge pressure exceeds the minimum pressure ratings above, Class 250 flat face flanged ends and a 400 psi (for 3-inch to 12-inch valves) or 300 psi (for 14-inch and greater valves) valve body shall be provided.

C. Plug:

1. Shall be solid one piece, Cast Iron ASTM A126 Class B or Ductile Iron ASTM A536 Grade 65-45-12.
    a. Two-piece plugs or plugs with internal cavities shall NOT be acceptable.
2. The plug shall have a cylindrical seating surface eccentrically offset from the center of the shaft.
3. Valves shall be furnished with resilient elastomer faced plugs, suitable for use with wastewater.
    a. Plug facing shall be composed of either EPDM or Neoprene.
    b. Plug facings composed of natural rubber, Viton, or Nitrile shall NOT be acceptable.
4. Plug shall not contact the seat until at least 90% closed.
5. Spherical shaped plugs are not acceptable.

D. Seats:

1. Valve seats shall be in accordance with AWWA C517, latest revisions.
2. Valve Seats on the body shall be 1/8” thick welded overlay of not less than 95% pure nickel.
    a. Seat shall be at least 1/2-inch wide, 1/8-inch thick through entire width and raised.
    b. The raised surface shall be completely covered with nickel to insure that the resilient plug face contacts only the nickel seat.
3. Alternatively, valve seats shall be replaceable 316 stainless steel seats.
4. Seats composed of thermosetting epoxy or fusion bonded nylon shall NOT be acceptable.
5. Screwed-in seats shall NOT be acceptable.

E. Bearings:

1. Radial shaft bearings shall be permanently lubricated, sleeve-type, sintered, oil-impregnated bearings:
    a. Type 316 stainless steel for sizes 4-inch to 18-inch.
    b. ASTM A-743, Grade CF-8M for sizes 20-inch to 36-inch.
    c. Bronze in accordance with ASTM B-127.
    d. Non-metallic radial shaft bearings shall NOT be acceptable.
2. Thrust bearings/washers shall be composed of Type 316 stainless steel, Teflon, Nylon 11, or Nylatron.

F. Shaft Seals:

1. Adjustable packing shall be Acrylonitrile-Butadiene (NBR) multiple V-ring type, with a packing gland follower.
2. Packing gland shall permit inspection, adjustment or complete replacement of packing without disturbing any part of the valve or actuator assembly, except the gland follower.
3. Shaft seals shall be self-adjusting.
4. Non-adjustable packing or packing requiring actuator removal to replace the packing shall not be acceptable.
5. All shaft seal hardware shall be 316 stainless steel.

G. End Connections:

1. End connections shall meet or exceed the latest revisions of AWWA C517 and other applicable standards.
2. All buried valves shall have mechanical joint ends conforming to ANSI/AWWA C111/A21.11.
3. All exposed valves measuring 4 inches in diameter and larger shall have Class 125 flat face flanged ends, at a minimum, conforming to ANSI B16.1 or ANSI/AWWA C110/A21.10.

H. Interior Valve Lining

1. All interior ferrous surfaces of the plug valve that will have contact with wastewater, except the valve seating surfaces, shall be coated with a factory applied, fusion bonded or thermosetting epoxy coating in accordance with AWWA C550, latest revision.
2. Coating shall be holiday-free with a minimum thickness of twelve (12) mils DFT.
3. Surfaces shall be clean, dry and free from rust, oil and grease before coating.

2.03 MANUAL OPERATORS

A. General:

1. Manual operators shall be designed in accordance with AWWA C517 and shall have a plug position indicator designating the opened and closed positions of the valve.

B. Manual Operators

1. All valves larger than 6-inch shall be installed with worm gear actuators. The actuator shaft and gear quadrant shall be supported on bronze bearings.
    a. Valves shall be equipped with traveling nut, self-locking type operators designed, manufactured and tested in accordance with AWWA C517.

b. All gearing shall be enclosed in a cast iron housing with outboard seals to protect the bearings and other internal components.

c. The actuator shaft and gear quadrant shall be supported on permanently lubricated bronze bearings

2. Plug valves installed in valve vaults, except where indicated otherwise, shall have mechanical gear actuators with handwheel operators designed for submerged service.

a. Actuator shall clearly indicate valve position for above-ground and valve vault installations.

b. Actuator mounting brackets for submerged service shall be totally enclosed and shall have gasket seals.

c. All exposed valve nuts, bolts, springs, washers and the like shall be Type 316 stainless steel.

3. Exposed valves 6 inches in diameter and smaller shall have manual lever operators, unless otherwise specified or noted on the Drawings.

4. Exposed valves 8 inches in diameter and larger shall be manually hand wheel operated through totally enclosed worm gear actuators, unless otherwise specified or shown on the Drawings.

5. Manual operators for plug valves mounted above 6 feet from the operating floor shall be equipped with worm gear chain wheel actuators.

6. All buried valves shall be provided with totally enclosed worm gear actuators, 2-inch square AWWA operating nuts, extension stems and valve boxes.

a. Buried actuators shall be 90% grease filled.

b. Input shaft and fasteners shall be stainless steel.

c. Actuator mounting brackets shall be totally enclosed.

d. Buried valve operators shall be extended to within 6 inches of grade.

7. Gear actuators shall be designed to produce the required operating torque with a maximum rim pull of 80 pounds on a hand wheel and with a maximum input of 150 foot-pounds on 2-inch operating nuts.

8. Actuator shall be capable of withstanding an over-torque without damage up to 300 foot-pounds for handwheel operators or up to 450 foot-pounds for 2-inch nut operators.

9. All valves shall be provided with mechanical travel stops for the open and close positions and shall rotate 90 degrees from fully open to fully close.

10. The seat end shall be clearly indicated on the valve exterior relative to half of the body containing the plug/seat interface.

C. Valves shall be either directly cast with, or provided with an attached corrosion-resistant nameplate, stating, at a minimum, the following:

1. Valve serial number

2. Manufacturer
3. Size
4. Maximum shutoff pressure
5. Design pressure rating.

2.04 PAINTINGS AND OTHER COATINGS

A. All valves, where not constructed of brass or bronze, or of finished steel, shall be coated at the point of manufacture in accordance with the AWWA Standard Specifications for Painting Ductile or Cast Iron Water Pipes and Fittings.

B. Resilient seated valves shall only be provided with a bonded epoxy coating.

C. Machined surfaces shall be given a suitable coating of grease or other protective material.

2.05 PRODUCT DATA

A. Affidavits of compliance with AWWA C517 shall be provided in accordance with Section 01 33 00.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Below grade plug valves shall be installed horizontally with right angle operators pointing up to allow operation from grade.

B. Valves shall be installed as specified and in accordance with manufacturer's written recommendations.

1. For horizontal installations, the plug valve shall be installed so that the plug face is pointing upwards when the valve is open and the plug face is facing the pump when the valve is closed.
2. For vertical installations, the plug valve shall be installed so that the plug face is pointing to the side when the valve is open and the plug face is pointing upwards when the valve is closed.

C. The installation and initial operation shall be certified on Form 43 05 11-A specified in Section 01 99 90.

3.02 TESTING

A. Test in accordance with Class B, AWWA C517 Section 5.2 testing requirements modified as follows:

1. The leakage test shall be performed at a pressure of 250 psi

2. The hydrostatic test shall be performed at a pressure of 500 psi

3. Proof of design tests shall be performed and certification of such proof of design test shall be provided to the Construction Manager.

B. Upon completion of installation, the valves shall be pressure tested to demonstrate a leak-free closure.

3.03 MANUFACTURER'S SERVICES

A. Plug valve supplier shall provide one (1) day of field/start-up services by the manufacturer's factory personnel.

END OF SECTION

SECTION 33 31 00

HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

PART 1 – GENERAL

1.01. SUMMARY

A. Section Includes:

1. High density polyethylene (HDPE) pipe and fittings.
2. Fusion joints.
3. Testing.

B. Pipe Description

1. Pipe Supplier shall furnish high density polyethylene (HDPE) pipe and fittings conforming to all applicable standards and procedures as referenced in this Specification, and meeting all applicable testing and material properties as described by the applicable standards referenced in this specification or as required within this specification.

1.02. GENERAL.

A. For gravity sewer installations with no live load, located below grade and along stream and river banks, the standard pipe shall be HDPE Ductile Iron Pipe Size (DIPS) DR17 for diameters 8-inch to 48-inch and depths 3 feet to 11 feet.

1.03. QUALITY ASSURANCE

A. References:

1. This section contains references to the following documents. They are a part of this section to the extent referenced in this specification. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.
2. In the event of a conflict between the requirements of this section and those of the referenced documents, the requirements of this specification shall prevail.
3. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the time of construction.
4. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there

are no replacement documents, the last version of the document before it was discontinued.

5. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

6. It is incumbent upon the Contractor to have a working familiarity with the following ASTM Standards:

Reference	Title
ANSI/AWWA C901	*Polyethylene (PE) Pressure Pipe and Tubing, ¾-in. (19 mm) through 3 in. (76 mm), for Water Service*
ANSI/AWWA C906	*Polyethylene (PE) Pressure Pipe and Fittings, 4 in. through 65 in. (100 mm through 1,650 mm), for Waterworks*
ASTM C923	*Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals*
AWWA M55	*PE Pipe–Design and Installation*
ASTM D1603	*Standard Test Method for Carbon Black in Olefin Plastics*
ASTM D2321	*Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications*
ASTM D2774	*Standard Practice for Underground Installation of Thermoplastic Pressure Piping*
ASTM D3035	*Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter*
ASTM D3261	*Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing*
ASTM D3350	*Standard Specification for Polyethylene Plastics Pipe and Fittings Materials*
ASTM D4218	*Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique*
ASTM F585	*Standard Guide for Insertion of Flexible Polyethylene Pipe Into Existing Sewers*
ASTM F714	*Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter*
ASTM F1055	*Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing*
ASTM F1290	*Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings*
ASTM F1417	*Standard Practice for Installation Acceptance of Plastic Non-Pressure Sewer Lines Using Low-Pressure Air*

Reference	Title
ASTM F1962	*Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings*
ASTM F2164	*Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure*
ASTM F2206	*Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE)*
ASTM F2620	*Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings*
ASTM F2786	*Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Gaseous Testing Media Under Pressure (Pneumatic Leak Testing)*
NSF/ANSI 61	*Drinking Water System Components–Health Effects*
PPI TR-4	*PPI Listing of Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe*
PPI TR-46	*Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High Density Polyethylene Pipe*

B. Manufacturer Requirements

1. High density polyethylene (HDPE) pipe and fittings shall be manufactured in accordance with the following standards:
   a. ASTM D3035 – ½ in through 24-in pipe
   b. ASTM F714 – 3-in through 54-in pipe
   c. AWWA C901 – ¾-in. (19 mm) through 3 in. (76 mm) pipe and tubing
   d. AWWA C906 – 4 in. (100 mm) through 65 in. (1,650 mm) pipe and fabricated fittings
   e. ASTM D3261 – butt fusion fittings, saddles and flange adapters
   f. ASTM F1055 – electrofusion couplings and saddles.
   g. ASTM F2206 – fabricated fittings

C. Fusion Technician Requirements

1. Each Fusion Technician shall be separately qualified to make each type of fusion joint. Fusion joint types are butt fusion, saddle fusion and electrofusion.
   a. Qualification to make one type of fusion joint shall not qualify a Fusion Technician to make a different type of fusion joint.

2. Each Fusion Technician making butt fusion joints shall be qualified to make butt fusion joints in accordance with ASTM F2620.

   a. Qualification shall have occurred not more than 12 months before performing fusion joining on site in accordance with this Specification.

   b. Qualification shall be a documented demonstration of proficiency by making joints in accordance with ASTM F2620 that are proved to be satisfactory by destructive testing in accordance with ASTM F2620.

3. Each Fusion Technician making saddle fusion joints shall be qualified to make saddle fusion joints in accordance with ASTM F2620.

   a. Qualification shall have occurred not more than 12 months before performing on-site fusion joining in accordance with this specification.

   b. Qualification shall be a documented demonstration of proficiency by making joints in accordance with ASTM F2620 that are proved to be satisfactory by destructive testing in accordance with ASTM F2620.

4. Each Fusion Technician making electrofusion fitting joints shall be qualified to make electrofusion fitting joints in accordance with ASTM F1290 and the electrofusion fitting manufacturer's recommended procedure.

   a. Qualification shall have occurred not more than 12 months before performing on-site fusion joining in accordance with this specification.

   b. Qualification shall be a documented demonstration of proficiency by making joints in accordance with ASTM F1290 and the electrofusion fitting manufacturer's recommended procedure that are proved to be satisfactory by destructive testing in accordance with ASTM F1290 and the electrofusion fitting manufacturer's recommended procedure.

D. Approved Suppliers

1. Pipe and fitting suppliers shall be approved by the Owner.

   a. The following pipe manufacturers are approved:

      1) WL Plastics,

      2) Chevron Phillips Chemical Dricsopipe

      3) Northern Pipe Products

      4) JM Eagle

      5) Or approved equal

b. The following fitting manufacturers are approved:

1) WL Plastics,

2) Chevron Phillips Chemical Dricsopipe

3) Northern Pipe Products

4) JM Eagle

5) Or approved equal

E. Contractor shall furnish samples and material tests for compliance with this specification from an independent laboratory to verify the required physical properties and characteristics of supplied materials in accordance with the applicable ASTM Specification.

1. A certificate shall be furnished by the manufacturer, upon request, for all material furnished under this specification.

2. Polyethylene plastic pipe and fittings that do not meet any of the requirements of this Specification will be rejected.

3. The Owner will pay for tests on pipe material which meets specification requirements. Contractor shall pay for failed tests and re-testing of failed materials

F. Warranty

1. Material Warranty

a. A written guarantee of 10 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the pipe and fittings material.

b. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.

2. Workmanship Warranty

a. The Contractor shall guarantee the Work is free from defects in material and workmanship for a period of 3 years from the final acceptance.

b. The warranty shall cover the costs to repair or replace items including, but not be limited to, all gravity sewers, force mains, manholes, appurtenances, trenches, roadways, landscaping, other areas disturbed by the construction of the project and freight to project site, should these items have any defects in material or workmanship.

c. In addition to the standard pipe warranty, the fusing contractor shall provide in writing a three-year warranty from the date of installation acceptance covering defects in fusion joining workmanship that requires remaking defective butt fusion, saddle

fusion or electrofusion joints. The warranty shall also include freight to project site, formation, installation and pressure testing.

d. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the installer of warranty responsibility for the full warranty term.

3. Deficiencies related to material and workmanship shall be repaired by Contractor to the satisfaction of the Construction Manager.

4. No bell clamps or wrap around corsets are allowed as a means of repair on new pipelines.

5. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

6. If required, Contractor and pipe manufacturer representatives may participate in inspections to determine such deficiencies.

7. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract.

8. The Contractor shall be responsible for repairs to any trench settlements caused by leaking pipe, fittings, etc. He shall promptly furnish and place fill to original grade.

9. Should any leaks or trench settlement occur under the new pavement, the Contractor will be held responsible for the cost of all repairs, including pavement replacement.

10. Within the guarantee period, where no loss of customer service or property damage is involved, the Contractor shall begin work on requested repairs or corrective measures with 24 hours following notification by Owner.

11. If property damage or loss of customer service is involved, the Contractor shall begin work with four (4) hours of notification by Owner.

12. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

G. Submittals

1. Complete product data and engineering data shall be submitted to the Construction Manager in accordance with the requirements of Section 01 33 23 of these Specifications.

2. The following information shall be submitted by pipe and fitting suppliers:

a. Name of the pipe manufacturer and a list of the piping and quantities to be provided by manufacturer.

b. Name(s) of fitting manufacturer(s) and lists of fittings and quantities to be provided by manufacturer.

c. Pipe and fitting product data indicating conformance with this Specification, applicable standards, and warranty provisions,

including written documentation regarding any intended variance from this specification and applicable standards.

d. Projected Initial and long term deflection calculations based on site conditions.

1) Deflection being defined as a decrease in the vertical diameter of a pipe.

2) The value ΔY (%) is the average long-term vertical deflection of the pipe and is the final expected change in vertical diameter divided by the nominal pipe diameter, expressed as a percentage.

e. At the time of shipment, the supplier shall provide certified documentation of pipe and fitting conformance with this Specification and applicable pipe and fitting standards specified herein.

3. The following information shall be submitted by Fusion Providers.

a. Documentation that each Fusion Technician has met requirements for joining proficiency for each type of fusion joint performed by the Fusion Technician under this Specification.

b. Documentation of conformance with this Specification and applicable standards, including written documentation regarding any intended variance from this Specification and applicable standards.

1) This will include fusion joint warranty information and recommended project specific fusion parameters, including criteria logged and recorded by data logger.

c. The following AS-RECORDED DATA is required from the Contractor and/or Fusion Provider:

1) Fusion reports for each fusion joint performed on the project, including joints that were rejected.

2) Submittals of the Fusion Technician's joint reports are required as requested by Construction Manager.

3) Specific requirements of the Fusion Technician's joint report shall include:

a) Pipe or fitting size and DR or pressure class rating

b) Fusion equipment size and identification

c) Fusion Technician Identification

d) Job Identification Number

e) Fusion Number

f) Fusion joining parameters

g) Ambient Temperature

PART 2 – PRODUCTS

2.01. PIPE AND FITTINGS

A. General

1. All pipe and fittings shall be manufactured in ductile iron pipe sizes (DIPS) in accordance with the following Standards.

a. ANSI/AWWA C906 - “Polyethylene Pipe and Fittings, 4 in. (100 mm) through 63 in. (1,575 mm) for Water Distribution”.

b. ASTM D3035 - “Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter”.

c. ASTM F714 - “Standard Specification for Polyethylene (PE) Pipe (SDR-PR) Based on Outside Diameter”.

d. ASTM F2619 - “Standard Specification for High Density Polyethylene (PE) Line Pipe”.

e. ASTM F2206 - “Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock or Block Stock”.

f. ASTM D3261 - “Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing”.

g. ASTM F1055 - “Standard Specification for Electrofusion Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing”.

B. PE4710 Pipe and Fitting Material (Compound):

1. Pipe and fittings shall be made from the resin meeting the requirements of the PPI material designation PE 4710.

2. PE4710 material (compound) shall conform to material requirements specified in ASTM F714 for pipe and ASTM D3261 for fittings as applicable for the pipe or fitting.

3. PE4710 material (compound) shall meet the requirements of ASTM D3350 and shall meet or exceed a cell classification of 445574 per ASTM D3350.

4. PE4710 material (compound) shall have a hydrostatic design stress (HDS) rating for water at 73°F (23°C) of not less than 1600 psi that shall be listed in PPI TR-4 in the name of the pipe manufacturer.

5. PE4710 material (compound) shall have a hydrostatic design basis (HDB) rating at 140°F (60°C) of not less than 1000 psi that shall be listed in PPI TR-4 in the name of the pipe manufacturer for all force main, reclaimed water, and irrigation water service systems.

6. PE4710 pipe and fitting material (compound) in PE4710 pipe and fittings shall contain color and ultraviolet (UV) stabilizer meeting the requirements of Code C or E per ASTM D3350.
    a. Code C material shall contain 2 to 3 percent carbon black to provide indefinite protection against UV degradation when material from the pipe is tested in accordance with ASTM D1603 or ASTM D4218.
    b. Code E material used for coextruded OD color stripes or a coextruded ID color layer shall contain sufficient UV stabilizer to protect the pipe against UV degradation for at least 24 months of unprotected outdoor exposure.
    c. Coextruded color PE compound material shall be PE4710 pipe material compound, varying only by color and UV stabilizer.
7. The pipe and fittings shall contain no recycled compound except for clean rework materials derived from pipe production by the same manufacturer.
8. Clean rework materials are acceptable as part of a blend with new material for the production of new pipe provided that the rework material is the same PE4710 material designation as the new material (compound) to which it is added.
9. Finished products containing rework material shall meet the requirements this Specification.

C. PE4710 Pipe

1. HDPE pipes shall have 125 Pressure Class Rating with DR 17.
    a. The minimum pressure rating shall be 200 psi.
2. HDPE pipe shall have plain ends for butt fusion.
3. The pipe shall be homogeneous throughout and free of visible cracks, holes, voids, foreign inclusions or other defects that may affect the wall integrity.
4. Permanent identification of piping service shall be provided by co-extruding longitudinal green, lavender or purple stripes into the pipe outside surface.
    a. The striping material shall be the same material as the pipe material except for color.
    b. Stripes printed or painted on the outside surface shall not be acceptable.
5. The nominal pipe diameter shall be specified on the Drawings. The DR (dimension ratio) and the pressure rating of the pipe shall be as noted on the Drawings.
6. HDPE pressure pipes may be deflected subject to approval by the Construction Manager.

a. The following table shows maximum deflection based upon the allowable strain of the pipe wall.

b. Potential flow restrictions, surge and other non-trench stability and pipe strain issues may reduce the values shown here per the Construction Manager's recommendations.

c. The bend radius multiplier determines the minimum radius of the pipe curvature and is calculated by multiplying the outside diameter of the pipe by the multiplier from the appropriate DR used.

d. Bending radius allowed by the manufacturer can vary. Verify the multiplier with the manufacturer. In no case shall the radius be less than 125% of the manufacturer's permitted multiplier

HDPE pipe Dimension Ratio (DR)	Allowable deflection (percent)	Bend Radius Multiplier
32.5	8.1	50
26.0	6.5	45
21.0	5.2	40
19.0	4.7	37.5
17.0	4.2	32.5
15.5	3.9	30
13.5	3.4	27.5
11.0	2.7	25

7. Nominal straight lengths of 3-inch and larger pipe shall be 40 feet or 50 feet.

8. Nominal coil lengths of 4-inch and smaller pipe shall be 500 feet. Longer or shorter coils such as 800 feet for 4-inch pipe, 1000 feet for 3-inch pipe, or 2000 feet for 2-inch or smaller pipe shall be acceptable.

   a. Pipe shall be black with a light reflective interior color to allow for easier/better viewing for television inspection.

9. Pipe shall be permanently marked using heated indent printing in accordance with ASTM F714 as applicable for the pipe size including:

   a. Nominal size and sizing system, such as DIOD

   b. DR 17

   c. Standard Designation, ASTM F714, material designation, and pressure rating or pressure class for water at 73°F.

      1) Marking the Standard Designation on the pipe shall serve as the manufacturer's certification that the pipe has been manufactured, sampled and tested and has been found to comply with the requirements of the standard.

2) The ASTM D3035 or ASTM F714 pipe pressure rating for water at 73°F shall be "PE4710 PRXXX" where XXX = pressure rating in psi

3) The AWWA C901 pipe pressure class for water at 73°F shall be "PE4710 PCXXX" where XXX = pressure class in psi.

4) The AWWA C906 pipe pressure class for water at 73°F shall be "PE3408 PCXXX[3]" where XXX = pressure class in psi.

d. Extrusion production-record code.

e. Manufacturer's Trademark or trade name.

D. PE4710 Fittings

1. PE4710 butt fusion, saddle fusion, electrofusion and fabricated fittings shall be manufactured from PE4710 material (compound) in accordance with this Specification.

2. All fittings shall be tested in accordance with AWWA C906.

3. PE4710 fittings shall comply with the following Standards:

a. ASTM D3261 for molded butt fusion and saddle fusion fittings, flange adapters and MJ adapters.

b. ASTM F2206 for fabricated butt fusion fittings.

c. ASTM F1055 for electrofusion fittings.

4. PE4710 fittings shall comply with the marking requirements of the following Standards:

a. ASTM D3261 for molded butt and saddle fusion fittings, flange adapters and MJ adapters.

b. ASTM F2206 for fabricated butt fusion fittings

c. ASTM F1055 for electrofusion fittings.

5. Fabricated Fittings

a. Fittings shall be manufactured and tested in accordance with ASTM F2206 and so marked.

b. Fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock or molded fittings.

c. Fittings shall be rated for internal pressure service at least equal to the full service pressure rating of the mating pipe.

d. Fittings shall be tested in accordance with AWWA C906.

[3] Per AWWA C906, PE3408 marking and PE3408 PCXXX is required. Pipe may be manufactured using PE4710 material (compound) that is listed in PPI TR-4 as meeting PE3408 requirements.

6. PE4710 fittings shall have pressure class ratings not less than the pressure class rating of the pipe to which they are joined.

7. Plain end butt fused fittings shall be used when joining polyethylene materials.

8. Saddles fittings for connecting laterals to the sewer shall be electrofusion or strap-on sewer saddles.

   a. Strap-on sewer saddles shall be used only where it is not possible to use electrofusion saddles.

   b. The saddles shall be equipped for joining with a casketed hub, or plain outlet for mechanical couplings or electrofusion couplings joining.

9. Mechanical fittings shall be used only when joining polyethylene materials to different piping materials and approved by the Construction Manager.

10. The fittings shall be homogeneous throughout and free of visible cracks, holes, voids, foreign inclusions or other defects that may affect the wall integrity.

2.02. FUSION JOINTS

A. Unless otherwise specified, PE4710 pipe and fittings shall be assembled in the field with butt fusion, saddle fusion or electrofusion joints in accordance with the following Standards:

1. ASTM F2620 and the pipe manufacturer's recommended procedure (WL Plastics WL101) shall be observed for butt fusion and saddle fusion joints.

2. ASTM F1290 and the electrofusion fitting manufacturer's recommended joining procedure shall be observed for electrofusion joints.

B. Field butt fusion, saddle fusion and electrofusion joints shall be made by Fusion Technicians that are qualified in accordance with this Specification to make the specific fusion joint type.

C. Field fusion joints shall be recorded and documented in accordance with this Specification.

2.03. CONNECTIONS AND FITTINGS FOR PRESSURE APPLICATIONS

A. General

1. Connections shall be defined in conjunction with the linking of project piping, as well as the tie-ins to other piping systems.

B. Mechanical Fittings

1. Mechanical fittings used with polyethylene pipe shall be specifically designed for, or tested and found to be acceptable for, use with polyethylene pipe.
2. Acceptable mechanical fittings for use with PE4710 pipe and fittings shall be mechanical fittings that are qualified by the mechanical fitting manufacturer for use with HDPE pipe and fittings.
3. Mechanical fittings for use with HDPE pipe shall provide restraint against longitudinal separation that is inherent to the design of the joint.
4. Mechanical joints that do not provide restraint against pull-out or push-off are prohibited.
5. Mechanical connections to non-HDPE devices and appurtenances shall be by bolted flange adapter or MJ adapter.
6. Flange adapter and MJ adapter connections shall be assembled, installed and tightened in accordance with flange adapter or MJ adapter manufacturer's instructions.
7. Flange bolt tightening shall be in accordance with PPI TN-38.
8. Where PE4710 pipe is connected to gasketed mechanical/flange joint fittings or appurtenances, the connection shall be made by butt fusing a PE4710 MJ/flange Adapter to the PE4710 pipe and connecting the PE4710 MJ/flange Adapter to the mechanical joint/flange fitting or appurtenance.

C. Gasketed, Push-On Fittings

1. Gasketed push-on fittings shall be fitted with external mechanical restraints that span across the joint and are assembled in accordance with restraint manufacturer's instructions.
    a. Thrust blocking does not provide acceptable restraint and is prohibited.
    b. Where plain-end PE4710 pipe is assembled with push-on fittings, the PE4710 pipe end shall be fitted with electrofusion restraints so that external mechanical restraint may be secured to the PE4710 pipe.

D. Sleeve-Type Couplings

1. Sleeve-type mechanical couplings shall be manufactured for use with HDPE pipe, and shall be restrained as indicated on the Drawings and in these Specifications.
2. Unrestrained sleeve-type couplings are prohibited.

E. Expansion and Flexible Couplings

1. Expansion-type mechanical couplings are prohibited.

F. Connection Hardware

1. Bolts and nuts for buried service shall be made of non-corrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21.11, regardless of any other protective coating.

2.04. CONNECTIONS FOR NON-PRESSURE SEWER APPLICATIONS

A. General

1. The following connections are to be used in conjunction with tie-ins to other non-pressure sewer piping and structures, and shall be as indicated on the Drawings.

B. Sleeve-Type Couplings:

1. Sleeve-type mechanical couplings shall be manufactured for use with solid-wall non-pressure HDPE pipe, and may be restrained or unrestrained as indicated on the Drawings and in these specifications.

C. Connection Hardware

1. Bolts and nuts for buried service shall be made of non-corrosive high strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21, regardless of any other protective coating.

D. Connection to Non-Pressure Manholes and Structures

1. Non-pressure PE4710 pipe and fittings shall be connected to manholes and other structures to provide a leak-free, properly graded flow into or out of the manhole or structure.
2. Connections to existing manholes and structures shall be as specified and shown on the Drawings.
    a. For a cored or drilled opening provide a flexible, watertight connection that meets and/or exceeds ASTM C923.
    b. For a knock out opening, provide a watertight connection (waterstop or other method) meeting the material requirements of ASTM C923 that is securely attached to the pipe with stainless steel bands or other means.
    c. Grout opening in manhole wall with non-shrink grout. Pour concrete collar around pipe and outside manhole opening.
3. Connections to a new manhole or structure shall be as specified and shown on the Drawings.
    a. A flexible, watertight gasket per ASTM C923 shall be cast integrally with riser section(s) for all precast manhole and structures.
    b. Drop connections shall be required where shown on Drawings.

c. Grout internal joint space with non-shrink grout.

PART 3 - EXECUTION

3.01. DELIVERY AND OFF-LOADING

A. General

1. All piping shall be bundled or packaged for transportation by commercial carrier to the site.
2. Before off-loading, pipe shall be inspected for damage.
   a. Any pipe damaged in shipment shall be assessed and either accepted or rejected as directed by the Construction Manager.
   b. The pipe supplier shall be notified of rejected pipe within 7 days of delivery at the site.
   c. Rejected pipe shall be quarantined for disposition.
3. Each pipe shipment shall be checked for quantity and proper pipe size, color and type.
4. Pipe shall be off-loaded and handled in accordance with the pipe manufacturer's instructions and AWWA M55.

3.02. HANDLING AND STORAGE

A. Pipe lengths should be placed and stored on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer.

B. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.

C. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal.

1. Care shall be exercised when handling the pipe so as not to cut, gouge, scratch or otherwise abrade the piping in any way.
2. Use of hooks, chains, wire rope or any other handling device which creates the opportunity to damage the surface of the pipe is strictly prohibited.

D. Covering or shading of PE4710 pipe and fittings against exposure to ultraviolet light from sunlight is not required.

3.03. FUSION PROCESS

A. General

1. Butt and saddle fusion of PE4710 pipe and fittings shall be in accordance with ASTM F2620 and the manufacturer's recommended joining procedure.

2. Electrofusion of PE4710 pipe and fittings shall be performed in accordance with ASTM F1290 and the electrofusion fitting manufacturer's recommended procedure.

3. PE4710 pipe and fittings shall be fused by qualified fusion technicians, as documented by the fusion provider. Training records for qualified fusion technicians shall be available to Construction Manager upon request.

4. As each fusion joint is constructed, pressure, time and temperature parameters shall be recorded and logged by an electronic monitoring device (data logger) affixed to the fusion machine. Joint data shall be submitted as part of the As-Recorded information, in accordance with this specification.

5. Butt fusion machines shall incorporate the following properties, including the following elements:

    a. Heat Plate – Heat plates and the non-stick coatings on heating surfaces shall be in good condition without heating surface gouges or scratches. The non-stick coating shall be intact, clean and free of any contamination. Heater controls and temperature indicators shall function properly, and electrical cords and connections shall be in good condition. The heat plate shall maintain a uniform and consistent temperature on all areas of the heating surfaces on both sides of the heat plate.

    b. Carriage – Carriage shall travel smoothly with no binding at less than 50 psi for hydraulic fusion machines. Clamps shall be in good condition with proper inserts for the pipe size being fused.

    c. General Machine – Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.

    d. Data Logger – The current version of the pipe supplier's recommended and compatible software shall be used. Protective case shall be utilized for the hand held wireless portion of the unit. Data logger operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.

6. Other equipment specifically required for fusion processes shall include the following:

    a. Pipe rollers shall be used to support pipe to either side of the butt fusion machine and provide for vertical and lateral pipe alignment straight through the butt fusion machine.

    b. A protective enclosure that provides for full machine motion of the clamps, heat plate, fusion assembly and carriage shall be provided for fusion in inclement and/or windy weather. Pipe ends shall be covered or blocked where open pipe ends could allow prevailing winds to blow through the pipe.

c. Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.

B. Joint Recording

1. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine that shall register and/or record the parameters required by the manufacturer and these specifications. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.

C. Any joint that extrudes more than 1/8-inch shall be trimmed to less than 1/8-inch before installation.

3.04. INSTALLATION

A. Bedding for HDPE pipes shall be minimum Class "B" as specified in Section 31 23 00 of these Specifications.

B. The PE4710 pressure pipe and fittings shall be installed such that PE4710 pipe curvature is not less than the minimum bending radius recommended by the pipe manufacturer.

C. Direct burial installation of PE4710 pressure pipe shall be in accordance with ASTM D2774 and the pipe manufacturer's recommendations.

D. Direct burial installation of PE4710 non-pressure pipe shall be in accordance with ASTM D2321 and the pipe manufacturer's recommendations.

E. Installation of PE4710 pipe by horizontal directional drilling shall be in accordance with ASTM F1962 or PPI TR-46 and the pipe manufacturer's recommendations.

F. Installation of PE4710 pipe by sliplining or insertion within a casing or host pipe shall be in accordance with ASTM F585 and the pipe manufacturer's recommendations.

G. Tracer Wire – All PE4710 piping shall be installed with a continuous, insulated TW, THW, THWN, or HMWPE insulated copper, 10 gauge or thicker wire for pipeline location purposes by means of an electronic line tracer.

1. The wires shall be installed along the entire length of the pipe.

2. Sections of wire shall be spliced together using approved splice caps and waterproof seals. Twisting the wires together is not acceptable.

3.05. MAKING CONNECTIONS TO NON-PE4710 PIPING SYSTEMS

A. Approximate locations for non-PE4710 piping systems are shown on the Drawings or detailed in the specifications. Prior to making connections into existing piping systems, the Contractor shall:

1. Verify the actual field location, size, piping material and service of non-PE4710 piping systems.
2. Obtain all required non-PE4710 piping manufacturer(s) approved fittings (i.e., saddles, sleeve type couplings, flanges, tees, etc., as shown).
3. Have installed all temporary pumps and/or pipes in accordance with established connection plans.
4. Have on hand pipe stoppers, blind flanges or other devices to seal a valve or appurtenance that fails to seal properly.
    a. When applied to pressure rated valves or appurtenances, all such devices shall be pressure rated equal to or greater than the pressure rating of the valve or appurtenance to which they are attached.

B. Where PE4710 pipe connects in-line to unrestrained gasketed push-on piping, the end of the PE4710 pipe shall be anchored in-line within 10 feet of the connection to restrict longitudinal movement of the PE4710 pipe.
1. The PE4710 pipe shall be fitted with a PE4710 wall anchor or electrofusion flex restraints.
2. The PE4710 wall anchor or electrofusion flex restraints shall be encased in reinforced concrete that is sufficient to withstand Poisson effect longitudinal loads in accordance with AWWA M55 In-Line Anchoring..

C. Unless otherwise approved by the Construction Manager, new piping systems shall be completely assembled and successfully tested prior to making connections to non-PE4710 piping systems.

3.06. PIPE SYSTEM CONNECTIONS

A. Pipe connections shall be installed per applicable standards and regulations, as well as per the connection manufacturer’s recommendations and as indicated on the Drawings.

B. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer’s recommendations.

3.07. TRACER WIRE TESTING

A. Upon completion of installation by direct burial, sliplining, directional boring or pipe bursting, the Contractor shall demonstrate that the tracer wire is continuous and unbroken through the entire run of the pipe.
1. Demonstration shall include full signal conductivity (including splices) when energizing for the entire run in the presence of the Owner or Construction Manager.
2. If the wire is broken, the Contractor shall repair or replace it. Pipeline installation will not be accepted until the tracer wire passes a continuity test.

3.08. TESTING

A. General

1. Testing shall comply with all local building codes, statutes, standards, local jurisdiction, and laws.
2. Segments of the pipe may be tested separately in accordance with standard testing procedure, as approved by the Owner and Construction Manager.
3. **No leakage shall be allowed.**

B. Hydrostatic Leakage Testing For Pressure Piping

1. Hydrostatic leakage testing shall comply with ASTM F2164. Joint leakage and any defective materials and/or workmanship shall be repaired or replaced by the Contractor at no additional cost to the Owner.
2. Pneumatic (compressed air) leakage testing of PE4710 pressure piping is prohibited.

C. Leakage Testing For Non-Pressure Piping

1. Non-pressure piping such as sewers shall be tested for excessive leakage in accordance with ASTM F1417.
2. Joint leakage and any defective materials and/or workmanship shall be repaired or replaced by the Contractor at no additional cost to the Owner.

D. Circularity Tests

1. Where required by the Construction Manager, pipes may be tested at ground surface for circularity before installation and welding commences.
2. Circularity will be checked by pulling a closed cylindrical mandrel through the polyethylene pipe.
3. The mandrel's outside dimension shall be sized to permit no more than 5.0 percent deflection.
4. The percent deflection shall be established from the base inside diameter of the pipe.
    a. If the internal beading of the fused joints for the pipe is not required to be removed, the mandrel shall account for this clearance as well.
5. The mandrel shall be approved by the Construction Manager prior to use.
6. The mandrel shall be at least three times the diameter of the pipe in length and not greater than inside diameter of pipe minus 2 millimeters.
7. Lines that permit safe entry may allow other deflection test options, such as direct measurements.
8. Pipes will be rejected which have greater than 5% deformation due to thermal softening.

3.09 INSPECTION

A. Furnish to Owner copies of the Manufacturer's Sworn Certificate of Inspection and Testing of all HDPE pipe and HDPE fittings provided on the Work.

B. All HDPE pipe and fittings will be subject to inspection and approval by Construction Manager after delivery of material to the site. Do not use broken, cracked, misshaped, imperfectly coated, unsatisfactory, or otherwise damaged pipe or fittings.

C. Such inspection by Construction Manager does not relieve the Contractor of full responsibility for the material installed.

END OF SECTION

SECTION 33 32 00
PVC PIPE AND FITTINGS

PART 1 – GENERAL

1.01 SCOPE

A. This section specifies PVC pipe, PVC fittings and gaskets.

B. General:

1. Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI) or other recognized standards. Latest revisions of all standards are applicable.

C. This Specification designates general requirements for DR 25 gravity and DR 18 pressure unplasticized polyvinyl chloride (PVC) plastic pipe with integral bell and spigot joints for the conveyance of wastewater.

1.02 QUALIFICATIONS

A. If requested by the Construction Manager submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

B. Acceptable manufacturers

1. J. M. Eagle
2. Approved equal

1.03 SUBMITTALS

A. Complete product data and engineering data shall be submitted to the Construction Manager in accordance with the requirements of Section 01 33 23 of these Specifications.

B. The following information shall be submitted by pipe and fitting suppliers:

1. Name of the pipe manufacturer and a list of the piping and quantities to be provided by manufacturer.
2. Name(s) of fitting manufacturer(s) and lists of fittings and quantities to be provided by manufacturer.
3. Pipe and fitting product data indicating conformance with this Specification, applicable standards, and warranty provisions, including written documentation regarding any intended variance from this specification and applicable standards.

4. Projected Initial and long term deflection calculations based on site conditions.
    a. Deflection being defined as a decrease in the vertical diameter of a pipe.
    b. The value ΔY (%) is the average long-term vertical deflection of the pipe and is the final expected change in vertical diameter divided by the nominal pipe diameter, expressed as a percentage.
5. At the time of shipment, the supplier shall provide certified documentation of pipe and fitting conformance with this Specification and applicable pipe and fitting standards specified herein.

1.04 QUALITY ASSURANCE

A. Product manufacturers shall provide the Construction Manager with written certification that all products furnished comply with all applicable provisions of these Specifications.

B. If ordered by the Construction Manager, the pipe manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of five days during initial pipe installation.

C. Upon request by the Construction Manager, the Contractor shall furnish samples for material tests by the Owner's independent laboratory demonstrating compliance with this Specification to verify the required physical properties and characteristics of supplied materials. The Owner shall pay for tests on pipe samples that meet specification requirements. Contractor shall pay for failed tests and re-testing of failed materials.

D. Hydrostatic Proof Testing

1. Each standard and random length of pipe is tested to two times the rated pressure of the pipe for a minimum of 5 seconds. The integral bell shall be tested with the pipe.

E. Quick Burst Test

1. Randomly selected samples tested in accordance with ANSI/UL 1285 shall withstand, without failure, the pressures listed below when applied for 60-70 seconds. This test is performed on pipe sizes less than 30".

F. Flattening Test

1. There shall be no evidence of splitting, cracking, or breaking when the pipe is tested as follows:
    a. Specimens of pipe, a minimum of 6 in. (150 mm) long, shall be flattened between parallel plates in a suitable press until the distance between the plates is 40 percent of the OD of the pipe.

b. The rate of flattening shall be uniform and such that the compression is completed within 2 to 5 minutes. There shall be no evidence of splitting, cracking or breaking.

G. Drop Impact Test

1. A 6" length section of pipe shall be subjected to impact from a free falling Tup.

   a. 20-lb Tup A and flat plate holder B for 4-inch to15-inch".

   b. 20-lb or 30-lb Tup B and flat plate holder B for 18-inch to 36-inch

   c. In accordance with ASTM D2444, “Standard Practice for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)”.

PIPE SIZE (inch)	IMPACT (ft/lbs)
4	150
6 – 8	210
10 – 36	220

2. There shall be no visible evidence of shattering or splitting when energy is imposed.

TESTING REQUIREMENTS FOR AWWA C900

TEST	AWWA C900				
	80 psi	100 psi	125 psi	165 psi	235 psi
SHORT TERM BURST TEST (psi) less than 30"	255	315	400	535	755
EXTRUSION QUALITY OF PVC PIPEBY ACETONE IMMERSION TEST METHOD ASTM D2152	20 min	20 min	20 min	20 min	20 min
FLATTENING TEST Tests extrusion quality and ductilityunder slow loading conditions (Flattening Capability)	40% of OD between theplates within2-5 min	40% of OD between theplates within2-5 min	40% of OD between theplates within2-5 min	40% of OD between theplates within2-5 min	40% of OD between theplates within2-5 min
HYDROSTATIC PROOF TEST (each piece) (psi)	160	200	250	330	470

PART 2 – PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) PIPE

A. General

1. PVC pipe shall be utilized where shown on the Drawings, specified or directed by the Construction Manager.

a. For gravity sewer installations with no live load located below ground and not along streams banks and rivers the standard pipe shall be DR 25 PVC for pipe sizes 8-inch to 14-inch and depths 3 feet to 8 feet.

b. For gravity sewer installations with live loads of HS20/25 or pipe located at a depth of greater than 8 feet and not along stream banks and rivers, the standard pipe shall be CIOD DR18 PVC (235 psi pressure class) for pipe sizes 8-inch to 60-inch.

c. For pressure pipe applications (force mains) regardless of depth and live load requirements and not along river banks and streams, the standard pipe and fittings shall be CIOD DR18 PVC (235 psi pressure class) for diameters 8-inch to 60-inch.

d. The pipe shall be colored green for in-ground identification as sewer pipe.

B. Materials

1. This pipe shall meet the requirements of AWWA Standard C900 “Polyvinyl Chloride (Pvc) Pressure Pipe and Fabricated Fittings, 4 In. through 60 In. (100 Mm Through 1,500 Mm)”.

2. All pipe shall be made from quality PVC resin, compounded to provide physical and mechanical properties that equal or exceed cell class 12454 for pressure pipes and 12454 or 12364 for gravity pipes as defined in ASTM D1784.

C. Pipe

1. DR 25 Gravity pipes shall meet the requirements of the following Standards:

a. ASTM D3034-21, “Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings” for pipes 4-inch through 15-inch.

b. ASTM F679 “Standard Specification for Polyvinyl Chloride (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings”, PS115, for pipes 18-inch through 48-inch.

c. ASTM D2321-20, “Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications” for depths of cover up to twelve feet and for pipe diameters up to fifteen.

d. Pipe joints shall be integral bell conforming to ASTM D3212-20, “Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals”.

e. Joint shall be tested in accordance with ASTM D3212 under 25 feet of head pressure and 22 inches Hg vacuum.

2. DR 18 pressure pipes shall meet the requirements of the following Standards:

a. AWWA C900-16, “Polyvinyl Chloride (Pvc) Pressure Pipe And Fabricated Fittings, 4-in. Through 60-in. (100 Mm through 1,500 Mm)”.

b. Pipe joints shall be integral bell conforming to ASTM D3139-19, “Standard Specification For Joints For Plastic Pressure Pipes Using Flexible Elastomeric Seals”.

c. Pipe shall be of the 235 psi pressure class.

d. The bell section shall be designed to be at least as hydrostatically strong as the pipe barrel and meet the requirements of AWWA C900 DR 18.

3. Gaskets for all pipes shall EPDM, NBR or SBR as selected by the Owner and shall conform to the requirements of ASTM F477-14(2021), “Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe”.

a. Gaskets shall be factory assembled and securely locked in place to prevent displacement during assembly.

4. Standard laying lengths shall be 20 feet for all sizes.

D. Fittings

1. For sizes 8-inch and less in diameter, fittings shall be molded in one-piece with no solvent welded joints. Minimum socket depths shall be as specified in ASTM D 3034, Table 2.

2. For sizes 10-inch and larger in diameter, fittings shall be fabricated from pipe conforming to ASTM D 3034 using solvent welding.

3. No field fabrication of fittings will be allowed. All such fabrication shall be performed at the factory and the fittings shall be delivered ready for use.

E. Thrust Restraint

1. Provide restraint at all points where hydraulic thrust may develop.

2. Where specified or as directed, plugs, caps, tees, and bends deflecting 11¼ degrees or more shall be restrained.

3. Restrained joint pipe and fittings shall be restrained, at a minimum, to the restraint lengths specified on the Drawings with one (1) of the following methods:

a. Restrained joint pipe and fittings:

1) Certa Lok as manufactured by Napco or approved equal.

b. Restrained harnesses:

1) Series 1900 for DR 18 235 psi CIOD pipes as manufactured by EBBA Iron or approved equal.

2) Series 2600 for CIOD fittings as manufactured by EBBA Iron or approved equal.

3) Harness shall conform to the following:

a) The combination of the restraint(s) and fasteners shall have a pressure rating to the full pressure rating of the pipe.

b) The restraint shall have a two to one safety factor.

c) The restraint shall be manufactured of ductile iron conforming to ASTM A536.

d) The restraint devices shall be coated with MEGA-BOND.

c. Split Restraint

1) Split Restraints shall be used for connecting to mechanical joints.

2) Series 19MJ00 for DR 18 CIOD 235 psi pipes as manufactured by EBBA Iron or approved equal.

F. Joints

1. Joints for PVC pipe and fittings shall be of the integral bell and spigot type with a confined elastomeric gasket having the capability of absorbing expansion and contraction without leakage, when tested in accordance with ASTM D 3212 for gravity pipes and ASTM D3139 for pressure pipes.

2. Gaskets shall meet the requirements of ASTM F477. The joint system shall be subject to the approval of the Construction Manager and shall be identical for pipe and fittings.

3. Gaskets shall be factory assembled and securely locked in place to prevent displacement during assembly.

4. Provisions must be made for expansion and contraction at each joint with an elastomeric gasket.

G. Joint Tightness

1. Two sections of pipe shall be assembled in accordance with the manufacturer’s recommendations.

H. Pipe Stiffness:

1. Minimum “pipe stiffness” at 5% deflection shall be 364 psi for SDR 18 and 129 psi for DR 25 pipes, when tested in accordance with ASTM D2412, “External Loading Properties of Plastic Pipe by Parallel-Plate Loading”.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install PVC pipes in accordance with the requirements of the following:

1. Section 33 30 00 – Sewer and Accessories, Part 3.
2. Manufacturer’s written recommendations.
3. Supplemental and applicable information from Uni-Bell PVC Pipe Association:
    a. Installation Guide for Gasketed-Joint PVC Pressure Pipe.

B. Bedding for PVC pipes shall be at a minimum Class “B” Bedding as specified in Section 31 23 00.

C. Tracer Wire – All PVC piping shall be installed with a continuous, insulated TW, THW, THWN, or HMWPE insulated copper, 10 gauge or thicker wire for pipeline location purposes by means of an electronic line tracer.

1. The wires shall be installed along the entire length of the pipe.
2. Sections of wire shall be spliced together using approved splice caps and waterproof seals. Twisting the wires together is not acceptable.

3.02 TRACER WIRE TESTING

A. Upon completion of installation by direct burial, sliplining, directional boring or pipe bursting, the Contractor shall demonstrate that the tracer wire is continuous and unbroken through the entire run of the pipe.

1. Demonstration shall include full signal conductivity (including splices) when energizing for the entire run in the presence of the Owner or Construction Manager.
2. If the wire is broken, the Contractor shall repair or replace it. Pipeline installation will not be accepted until the tracer wire passes a continuity test.

3.03 TESTING

A. Testing shall be in accordance with the requirements of the following:

1. Section 33 30 00 – Sewer and Accessories, Part 3.
2. Supplemental and applicable information from Uni-Bell PVC Pipe Association:
    a. Installation Guide for Gasketed-Joint PVC Pressure Pipe.

b. UNI-B 06 - "Recommended Low-Pressure Air Testing of Installed Sewer Pipe."

3. The Contractor shall conduct the tests in the presence of the Construction Manager.

4. **No leakage shall be allowed for sewer force mains**.

B. Circularity Tests

1. Where required by the Construction Manager, pipes may be tested at ground surface for circularity before installation and welding commences.

2. Circularity will be checked by pulling a closed cylindrical mandrel through the polyethylene pipe.

3. The mandrel's outside dimension shall be sized to permit no more than 5.0 percent deflection.

4. The percent deflection shall be established from the base inside diameter of the pipe.

5. The mandrel shall be approved by the Construction Manager prior to use.

6. The mandrel shall be at least three times the diameter of the pipe in length and not greater than inside diameter of pipe minus 2 millimeters.

7. Lines that permit safe entry may allow other deflection test options, such as direct measurements.

8. Pipes will be rejected which have greater than 5% deformation due to thermal softening.

3.04 GUARANTEE

A. Material Warranty:

1. A written guarantee of 10 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the pipe and fittings material.

2. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.

B. Workmanship Warranty

1. The Contractor shall guarantee the Work is free from defects in material and workmanship for a period of 3 years from the final acceptance.

2. The warranty shall cover the costs to repair or replace items including, but not be limited to, all gravity sewers, force mains, manholes, appurtenances, trenches, roadways, landscaping, other areas disturbed by the construction of the project and freight to project site, should these items have any defects in material or workmanship.

3. In addition to the standard pipe warranty, where applicable, the fusing contractor shall provide in writing a three-year warranty from the date of installation acceptance covering defects in fusion joining workmanship that requires remaking defective butt fusion, saddle fusion or electrofusion joints. The warranty shall also include freight to project site, formation, installation and pressure testing.

4. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the installer of warranty responsibility for the full warranty term.

C. Deficiencies related to material and workmanship shall be repairedby Contractor to the satisfaction of the Construction Manager.

D. No bell clamps or wrap around corsets are allowed as a means of repair on new pipelines.

E. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

F. If required, Contractor and pipe manufacturer representatives may participate in inspections to determine such deficiencies.

G. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract.

H. The Contractor shall be responsible for repairs to any trench settlements caused by leaking pipe, fittings, etc. He shall promptly furnish and place fill to original grade.

I. Should any leaks or trench settlement occur under the new pavement, the Contractor will be held responsible for the cost of all repairs, including pavement replacement.

J. Within the guarantee period, where no loss of customer service or property damage is involved, the Contractor shall begin work on requested repairs or corrective measures with 24 hours following notification by Owner.

K. If property damage or loss of customer service is involved, the Contractor shall begin work with four (4) hours of notification by Owner.

L. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

3.05 INSPECTION

A. Furnish to Owner copies of the Manufacturer's Sworn Certificate of Inspection and Testing of all PVC pipe and PVC fittings provided on the Work.

B. All PVC pipe and fittings will be subject to inspection and approval by Construction Manager after delivery of material to the site. Do not use broken, cracked, misshaped, imperfectly coated, unsatisfactory, or otherwise damaged pipe or fittings.

C. Such inspection by Construction Manager does not relieve the Contractor of full responsibility for the material installed.

END OF SECTION

SECTION 33 33 00

DUCTILE IRON PIPE AND FITTINGS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. This section specifies ductile iron pipe, ductile fittings and gaskets.
2. Refer to Section 33 30 00 for additional requirements.

B. Definition:

1. Where cast iron pipe is specified, the term and symbol shall mean ductile iron pipe.

1.02 REFERENCES

A. This section contains references to the following documents.

1. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly.
2. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
3. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids).
4. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
5. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI B1.1	Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms)
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250, and 800
ANSI B16.5	Pipe Flanges and Flanged Fittings
ASTM A 193	High Tensile Alloy and Stainless Steel Bolts
ASTM A 194	Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
ASTM A242	Standard Specification for High-Strength Low-Alloy Structural Steel
ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A563	Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric)
ASTM A716	Ductile-Iron Culvert Pipe
ASTM A746	Standard Specification for Ductile Iron Gravity Sewer Pipe
ASTM B633	Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C150	Portland Cement
AWWA C104 (ANSI A21.4)	Cement-Mortar Lining for Ductile- Iron and Gray-Iron Pipe and Fittings for Water
AWWA C105 (ANSI A21.5)	American National Standard for Polyethylene Encasement For Ductile-Iron Pipe Systems
AWWA C110 (ANSI A21.10)	Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In., for Water and Other Liquids
AWWA C111 (ANSI A21.11)	Rubber-Gasket Joints for Ductile- Iron and Gray-Iron Pressure Pipe and Fittings
AWWA C115 (ANSI A21.15)	Flanged Ductile-Iron and Gray-Iron Pipe With Threaded Flanges
AWWA C116 (ANSI A21.16-09)	Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
AWWA C150 (ANSI A21.50)	Thickness Design of Ductile-Iron Pipe
AWWA C151 (ANSI A21.51)	Ductile-Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
AWWA C153 (ANSI A21.53)	Ductile-Iron Compact Fittings, 3 In. Through 12 In. for Water and Other Liquids
AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C606	Grooved and Shouldered Type Joints

1.03 SUBMITTALS

A. The following information shall be provided in accordance with Section 01 33 23:

1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.

   a. Check marks shall denote full compliance with a paragraph as a whole.

   b. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation.

   c. The Construction Manage shall be the final authority for determining acceptability of requested deviations.

   d. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications.

2. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

B. The following information shall be submitted by pipe and fitting suppliers

1. Name of the pipe manufacturer and a list of the piping and quantities to be provided by manufacturer.

2. Name(s) of fitting manufacturer(s) and lists of fittings and quantities to be provided by manufacturer.

3. Pipe and fitting product data indicating conformance with this Specification, applicable standards, and warranty provisions, including written documentation regarding any intended variance from this specification and applicable standards.

4. At the time of shipment, the supplier shall provide certified documentation of pipe and fitting conformance with this Specification and applicable pipe and fitting standards specified herein.

PART 2 – PRODUCTS

2.01 GENERAL

A. Pipe design, materials and manufacture shall comply with the following documents:

Item	Document
Thickness design	AWWA C150
Manufacturing requirements	
• Water or other liquid	AWWA C151
Gravity sewer pipe	ASTM A746
Joints	
• Rubber gasket	AWWA C111
• Threaded flange	AWWA C115
Fittings	
• Water or other liquid	AWWA C110/AWWA C153
Cement mortar lining	AWWA C104

B. All ductile iron pipe shall be marked in accordance with AWWA C151 and ductile iron fittings shall be marked in accordance with AWWA C110.

C. Acceptable Manufacturers

1. American Cast Iron Company
2. U.S. Pipe
3. Or approved equal

2.02 PIPE

A. All pipe shall be Class 50 (thickness class) for 16-inch and smaller, and Class 51 for 18-inch and larger, unless otherwise specified or shown on the Drawings.

B. Flanged pipe minimum wall thickness shall be equal to Special Class 53. Flanges shall be furnished by the pipe manufacturer.

C. All pipes shall have a minimum pressure rating as indicated in the following table and corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings:

Diameter	Minimum Pressure Class
4” through 20”	350
24” and greater	300

D. Unless otherwise specified, pipe shall have nominal laying lengths of 18 or 20 feet.

E. All pipe shall be manufactured in the United States of America.

F. Certificates of conformance with the foregoing Specifications shall be furnished with each lot of pipe supplied.

2.03 GASKETS

A. Unless otherwise specified, gasket stock shall be a synthetic rubber compound in which the elastomer is nitrile or neoprene.

1. The compound shall contain not less than 50 percent by volume nitrile or neoprene and shall be free from factice, reclaimed rubber and other deleterious substances.

B. Gaskets for flanges shall be the full face type.

1. Thickness shall be 1/16 inch for pipe 10 inches and less in diameter and 1/8 inch for pipe 12 inches and larger in diameter.

C. Gaskets shall, in addition, comply with AWWA C111 for push-on and mechanical joints and with AWWA C606 for grooved end joints.

D. Sufficient lubricant shall be furnished with each order of pipe to provide a thin coating on both the gasket and the spigot-end of the pipe.

1. Lubricant shall be NSF 61 approved and shall have no deleterious effect on the rubber gasket.

2. Lubricant shall be of such consistency that it can be easily applied to the pipe in either hot or cold weather, and shall satisfactorily adhere to either wet or dry pipe.

3. ONLY LUBRICANT FURNISHED WITH THE PIPE BY THE PIPE MANUFACTURER SHALL BE USED.

2.04 FITTINGS

A. Unless otherwise specified, fittings shall conform to AWWA C110 with a minimum rated working pressure of 250 psi.

B. Ends shall be flanged, restrained mechanical joint, restrained push-on, or grooved to suit the conditions specified.

C. The AWWA C153 compact ductile iron fittings in sizes 3 through 12 inches are an acceptable substitute for standard fittings unless otherwise specified.

D. In general, use flanged fittings with long radius elbows except where space limitations prohibit use of same.

E. Design of special flanged fittings, including wall castings, shall conform to dimensions and details as directed, indicated, or noted on the approved drawings.

F. Fittings shall be cement lined in accordance with AWWA C104 and shall be furnished with a bituminous outside coating.

G. In lieu of cement lining and bituminous coating, fittings may be provided with a fusion bonded coating and lining meeting the requirements of AWWA C116.

H. Galvanized pipe fittings and PVC pipe fittings shall not be used as any part of the Fulton County Sewer System, nor shall it be used to join any appurtenances to the System.

2.05 JOINTS

A. Unrestrained Joints:

1. Push-On Joints:

a. Unrestrained joints, where specified, shall be the rubber ring compression, push-on type joint suitable for buried services.

b. Acceptable unrestrained joints shall be:

1) Fastite Joint as manufactured by American Cast Iron Pipe Company

2) Tyton Joint as manufactured by U.S. Pipe

3) Or approved equal.

c. This joint is not permitted on fittings or specials, unless otherwise specified.

d. Unless otherwise specified, joints shall have a maximum allowable deflection up to 5 degrees at specified pressures.

e. Gaskets shall comply with Paragraph 2.03.

f. Joint assembly and field cut joints shall be made in strict conformance with AWWA C600 and manufacturer's recommendations.

2. Mechanical Joints:

a. Where specified, mechanical joints for above or below ground services shall meet the requirements of ANSI/AWWA A21.10/C110 and ANSI/AWWA A21.11/C111.

b. Mechanical joint glands shall be ductile iron.

c. Gaskets and bolts and nuts shall comply with paragraphs 2.03 and 2.05D, respectively.

B. Restrained Joints:

1. General:

a. Unless otherwise specified, restrained joints shall be flanged or grooved end for exposed service and restrained push-on for buried services.

b. Restrained joint pipe (RJP) on supports shall have bolted joints and shall be specifically designed for clear spans of at least 36 feet.

2. Push-On Joints:

a. Restrained push-on joints shall be as specified in paragraph 2.05A, modified for restraint.

b. Acceptable restrained push on Joints

1) Flex-Ring or Lok-Ring Joint as manufactured by American Cast Iron Pipe Company,

2) TR Flex or HP Lok Joint as manufactured by US Pipe

3) Clow “SUPER-LOCK”

4) Griffin “SNAP-LOK”

5) Or approved equal.

c. Restraining gasket joints shall be assembled with American Fast-Grip gaskets or US Pipe FIELD LOK gaskets and may be used for pipe 12-Inches in diameter or less.

d. Restrained joints shall be capable of being deflected after full assembly.

e. Joint assembly shall be in strict conformance with AWWA C600 and manufacturer's recommendations.

f. No field welding for manufactured restrained joint pipe assembly will be permitted.

g. No field cuts of restrained pipe are permitted without prior approval of the Construction Manager.

h. Where field cutting of restrained joint pipe is required, the joint shall be assembled with American Field Flex-Rings or US Pipe TR FLEX GRIPPER Rings.

3. Flange Joints:

a. Unless otherwise specified, flanges shall be ductile iron and shall be threaded-on flanges conforming to ANSI/AWWA A21.15/C115 or cast-on flanges conforming to ANSI/AWWA A21.10/C110.

b. Flanges shall be adequate for 250 psi working pressure.

c. Bolt circle and bolt holes shall match those of ANSI B16.1, Class 125 flanges and ANSI B16.5, Class 150 flanges.

d. Gaskets shall be as specified in Paragraph 2.03.

4. Thrust collars shall be welded-on ductile iron body type or split retainer gland type, as shown on the Drawings or directed by the Construction

Manager, designed to withstand thrust due to 300 psi internal pressure on a dead end.

5. Anchorage:

   a. All valves, caps, tees, bends deflecting 11 ¼ degrees or more and other fittings shall have two forms of restraint as one of the following:

      1) Manufactured restrained joint plus concrete blocking (3,000 psi concrete thrust block sized to withstand line pressures of 300 psi and soil bearing pressures of 2,000 psf)

      2) Manufactured restrained joint plus rodding to concrete thrust collar (3,000 psi concrete collar and tie rods sized to withstand line pressures of 300 psi and soil bearing pressures of 2,000 psf)

6. Mechanical Joints:

   a. Where specified, restrained mechanical joints shall be the positive restraint type.

   b. Retainer glands on a mechanical joint may be used as a restrained joint only where retainer glands are specifically shown on the drawings, where specifically specified or where specifically identified and allowed by the Construction Manager.

      1) Retainer glands shall be Megalug Series 1100, as manufactured by EBAA Iron, or Uni-Flange Series 1400, as manufactured by Ford Meter Box Company.

   c. Locked mechanical hydrant tees, bends and adapters are an acceptable substitute for anchoring fire hydrants and valves to the pipe main.

C. Ball and Socket Flexible Joint Pipe:

1. Ball and socket flexible joint pipe shall be the boltless type and shall allow a maximum joint deflection of 15 degrees.

2. Each joint shall be provided with a retainer lock to prevent rotation after assembly.

3. Joints shall be the Flex-Lok Joint as manufactured by American Cast Iron Pipe Company, USIflex as manufactured by U.S. Pipe, or equal.

D. Bolts and Nuts:

1. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit. All bolts and nuts shall be made in the U.S.A.

2. Bolts and nuts for mechanical joints shall be Tee Head Bolts and nuts of high strength low-alloy steel in accordance with ASTM A 242 to the dimensions shown in AWWA C111/ANSI A21.11.

3. Flanged joints shall be bolted with through stud or tap bolts of required size as directed. Bolt length and diameter shall conform to ANSI/AWWA C115 for Class 125 flanges shown in ANSI/ASME B16.1.

4. Bolts for exposed service shall be zinc plated, cold pressed, steel machine bolts conforming to ASTM A 307, Grade B. Nuts for exposed service shall be zinc plated, heavy hex conforming to ASTM A 563. Zinc plating shall conform to ASTM B 633, Type II.

5. Bolts for submerged service shall be stainless steel machine bolts conforming to ASTM A 193, Grade B8M. Nuts shall be heavy hex, stainless steel conforming to ASTM A 194, Grade 8M.

6. Corrosion-resistant bolts and nuts for use with ductile iron joints shall be Type 316 stainless steel

E. Tapping Saddles: Tapping saddles are not allowed.

F. Pipe outlets shall be welded-on ductile iron pipe and shall be provided in lieu of tees or saddles on pipes with a diameter greater than or equal to 24-inches.

1. Outlets shall be plain end, push-on, mechanical or flanged joint, and shall meet the joint requirements stated in this Specification.

2. All welding, fabrication and outlet hole drilling shall be performed by the manufacturer of the parent pipe.

3. Outlets shall be free of burrs. Sizes shall be as indicated on the Drawings.

4. The outlets and parent pipe shall be minimum Class 53 ductile iron pipe for parent pipe 54-inches and smaller.

5. For pipe larger than 54-inches, parent pipe shall be Pressure Class 350.

6. Each welded outlet shall be rated for 250 psi working pressure and hydrostatically tested at 500 psi.

7. The maximum outlet diameters shall not exceed those listed in the table below:

Parent Pipe Diameter, Inches	Maximum Outlet Diameter, Inches
24	16
30	20
36	24
42	30
Parent Pipe Diameter, Inches	Maximum Outlet Diameter, Inches
48	30

54	30
60	30
64	30

2.06 PIPE COATING

A. The exterior of ductile iron pipe and fittings shall be coated with a layer of arc-sprayed zinc per ISO 8179.

1. The mass of the zinc applied shall be 200 g/m^2 of pipe surface area.
2. A finishing layer of bituminous topcoat as specified in AWWA C151 shall be applied to pipe and fitting over the zinc.
3. The coating system shall conform in every respect to ISO 8179-1 “Ductile iron pipes – External zinc-based coating - Part 1: Metallic zinc with finishing layer. Second edition 2004- 06-01.”

B. Where corrosive soils or soils with electrical currents are encountered that may, or in the judgment of the Owner, cause a deleterious effect on the piping system, the piping system shall be wrapped with polyethylene in accordance with the manufacturers recommendations to a minimum distance of 20 lineal feet beyond such conditions.

1. All elements of the piping system shall be wrapped entirely in polyethylene tubbing and secured with polyethylene tape to completely prevent the entrance of foreign matter.
2. Such encasement shall be carried out in accordance with AWWA/ANSI C105/A21.5.

2.07 PIPE LINING

A. Cement Mortar Lining:

1. Pipe:
   a. Cement mortar lining shall be to Standard thickness in accordance with ANSI/AWWA C104/A21.4.
2. Fittings:
   a. Cement mortar lining shall be to Double thickness in accordance with ANSI/AWWA C104/A21.4.
3. Pipe and fittings shall be lined with 40 mil dry film thickness of Protecto 401 Ceramic Epoxy by Induron or equivalent. A seal coat over the ceramic lining is not required.

2.08 PRODUCT DATA

A. The following information shall be provided in accordance with Section 01 33 23:

1. Shop drawings.
2. Alignment drawings.
3. Certifications specified in the following documents:
   a. ANSI A21.14, paragraph 14-4.2
   b. ANSI A21.52, paragraph 52-4.2
   c. ASTM A716, paragraph 4.2
   d. AWWA C110, paragraph 10-5.3
   e. AWWA C111, paragraph 11-7.1
   f. AWWA C115, paragraph 15-4.2
   g. AWWA C151, paragraph 51-5.2
   h. AWWA C153, paragraph 53-6.3
   i. AWWA C606, paragraph 4.1.1.1

PART 3 – EXECUTION

3.01 INSTALLATION

A. General:

1. Piping runs specified on the Drawings shall be followed as closely as possible. Proposed deviations shall be submitted in accordance with Section 01 33 00.
2. Pipe shall be installed in accordance with AWWA C600.
3. Coatings and linings shall be inspected for damage during installation, and damage shall be repaired according to the coating manufacturer's recommendations.

B. Insulating Sections

1. Where a metallic nonferrous pipe or appurtenance is connected to ferrous pipe or appurtenance, an insulating section shall be provided.

C. Anchorage:

1. Anchorage shall be provided as specified. Calculations and drawings for proposed alternative anchorage shall be submitted in accordance with Section 01 33 00.

3.02 ACCEPTANCE TESTING

A. Gravity Sewer:

1. Infiltration and exfiltration tests as specified in Section 33 30 00.

B. Force Main

1. Hydrostatic pressure and leakage in accordance with Section 4 of AWWA C600 except that test pressures shall be as listed in Section 33 30 00 and no leakage will be allowed.

C. The Contractor shall conduct the tests in the presence of the Construction Manager.

3.03 GUARANTEE

A. Material Warranty:

1. A written guarantee of 20 years submitted to the County for the specific project shall be provided by the Manufacturer against any defects of the pipe and fittings material.
2. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.

B. Workmanship Warranty

1. The Contractor shall guarantee the Work is free from defects in material and workmanship for a period of 10 years from the final acceptance.
2. The warranty shall cover the costs to repair or replace items including, but not be limited to, all gravity sewers, force mains, manholes, appurtenances, trenches, roadways, landscaping, other areas disturbed by the construction of the project and freight to project site, should these items have any defects in material or workmanship.
3. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the installer of warranty responsibility for the full warranty term.

C. Deficiencies related to material and workmanship shall be repairedby Contractor to the satisfaction of the Construction Manager.

D. No bell clamps or wrap around corsets are allowed as a means of repair on new pipelines.

E. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

F. If required, Contractor and pipe manufacturer representatives may participate in inspections to determine such deficiencies.

G. If repairs are made, the Contractor/Manufacturer shall warrant the repaired work for the periods as specified above for material and workmanship in addition to the original warranty period required by the Contract.

H. The Contractor shall be responsible for repairs to any trench settlements caused by leaking pipe, fittings, etc. He shall promptly furnish and place fill to original grade.

I. Should any leaks or trench settlement occur under the new pavement, the Contractor will be held responsible for the cost of all repairs, including pavement replacement.

J. Within the guarantee period, where no loss of customer service or property damage is involved, the Contractor shall begin work on requested repairs or corrective measures with 24 hours following notification by Owner.

K. If property damage or loss of customer service is involved, the Contractor shall begin work with four (4) hours of notification by Owner.

L. Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.

3.04 INSPECTION

A. Furnish to Owner copies of the Manufacturer's Sworn Certificate of Inspection and Testing of all ductile iron pipe and ductile iron fittings provided on the Work.

B. All ductile iron pipe and fittings will be subject to inspection and approval by Construction Manager after delivery of material to the site. Do not use broken, cracked, misshaped, imperfectly coated, unsatisfactory or otherwise damaged pipe or fittings.

C. Such inspection by Construction Manager does not relieve the Contractor of full responsibility for the material installed.

END OF SECTION

GUIDELINES

FOR

SANITARY SEWER PUMP STATION AND

FORCE MAIN DESIGN

WASTEWATER COLLECTIONS AND RECLAMATION

DIVISION OF

FULTON COUNTY DEPARTMENT OF PUBLIC WORKS

Adopted January 21, 2026

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PURPOSE AND INTENT

PART 1 PURPOSE AND INTENT

1.1 Adoption of Standards

1.1.1 These Standards and Specifications are adopted by the **Fulton County Public Works (FCPW)** under the authority of the Code of Ordinance of Fulton County and the Constitution of the State of Georgia.

1.1.2 This document will be evaluated from time to time and may be modified with approval by the **Director of the Department of Public Works** or Designee, based on future developments of the following:

1.1.2.1 Technological advances

1.1.2.2 Regulatory requirements

1.1.2.3 Advances in Best Practices

1.1.2.4 Department of Public Works' goals

1.1.3. The pump station shall be reviewed and approved by the Deputy Directors of Water Distribution, Wastewater, and Technical Services within the Department of Public Works. The Director of Public Works or Designee shall issue the final approval.

1.2 Guidance

1.2.1 These regulations shall be known as "**Fulton County Guidelines For Sanitary Sewer Pump Station And Force Main Design**" and may be referred to generally as "**Pump Station and Force Main Guidelines**".

1.2.2 This document provides general guidelines for the design, material and construction requirements for sanitary sewer pump stations and force mains to be connected to the Fulton County, Georgia, sanitary sewer collection system where connection to the gravity system is not available.

1.2.3 This document is intended to represent minimum requirements and "best practices" for the following:

1.2.3.1 Sanitary sewer pump stations and force mains connected to the Fulton County sanitary sewer collection system.

1.2.3.2 Pump stations which are, or are intended to be, for the operation and maintenance to be taken over by FCPW.

1.2.4 It is intended that this document and others referenced herein:

1.2.4.1 Will apply to designs for upgrades and expansions of existing Fulton County wastewater pump stations.

1.2.4.2 Will provide guidance to the Department, Design Engineers and Developer in the development and construction of new pump stations and force mains.

1.2.4.3 If there are any discrepancies or ambiguities, FCPW shall be consulted for clarifications and directions.

1.2.5 These Sanitary Sewer Pump Station and Force Main Guidelines are to be used for pump stations with pumps that are less than 50 HP. Pump stations and force mains beyond these criteria do not fall within the guidelines of these documents.

PART 2 GENERAL REQUIREMENTS

2.1 Developer shall furnish, install, and dedicate to FCPW the entire pump station and force main system.

2.2 It must include an access road with stations that are deeded to FCPW. The design must be reviewed and approved by FCPW.

2.3 Developer's Design Engineer (P.E. registered in the State of Georgia) shall design the system.

2.4 Capacity for Pump Stations:

2.4.1 Pump stations which are constructed by FCPW shall be determined by FCPW.

2.4.2 Pump stations for which the operation and maintenance to be taken over by FCPW shall be as approved by FCPW. Private pump stations shall also be reviewed and approved by FCPW.

2.4.3 Developer's Design Engineer shall consult with FCPW during the design of the system.

2.4.3.1 The system shall be designed with all components sized to meet the development's flow adjusted for peaks.

2.4.3.2 Developer shall size the system to meet future phases of the project.

A. Developer shall size the system to meet future phases of the project or may upgrade the system at a later date to serve additional phases. This shall include upstream offsite properties that will drain to the pump station and

potential future pump stations that might pump flow into the station.

2.4.3.3 FCPW may also decide on the installation of larger capacity pumps, wet wells, force mains, generators, etc. to account for future upstream flows that would eventually drain into the pump station.

2.4.3.4 Any such extra capacity beyond that reserved for the original Developer shall become available for FCPW to utilize at its discretion.

2.4.4 Developer's Design Engineer shall locate the pump station to drain the entire watershed sub-basin. FCPW shall have final approval of the location of the pump station.

2.4.4.1 FCPW will investigate the service impact associated with future Fulton County needs within the sub-basin and the potential installation of additional or larger force mains required to serve the sub-basin that will drain to the pump station.

2.4.4.2 If FCPW decides an additional or larger force main is to be installed concurrently with Developer's project, Developer shall design the additional or larger mains and FCPW must approve the design of said additional or larger mains.

2.4.5 If successful operation of a new pump station is dependent on existing pump station(s):

2.4.5.1 Developer is required to evaluate the existing conditions and design system upgrades to maintain adequate capacities of the existing pump station(s).

2.4.5.2 The design shall be submitted to FCPW for review and approval.

2.4.5.3 During the start-up phase, the Developer must demonstrate successful start-up of the upgrades to the existing pump station(s) prior to start-up of the new pump station.

2.4.5.4 If the Developer has multiple pump stations in series, the start-up sequence shall begin at the point of connection to the existing Fulton County system and proceed upstream to the other pump station(s).

2.4.6. A recent Phase I Environmental Site Assessment of the pump station site shall be provided by the Developer prior to acceptance of the property. The property shall be deeded to Fulton County and accepted by the Board of Commissioners in accordance with the latest Fulton County Department of

Real Estate and Asset Management rules and regulations. A legal description of the property and any access easement to the property along with plats shall be provided for dedication. The property shall be dedicated to Fulton County at no cost to the County. The dedication shall occur at the end of the two (2) year maintenance period but the documents shall be reviewed and approved prior to the start-up of the facility.

2.5 Betterment

2.5.1 **The extra cost associated with increasing the size of the pump station or force main may be paid by the County under a "County Participation Agreement". *The conditions relating to the method of payment will be negotiated by Fulton County on a case-by-case basis during the development review process as allowed per 82-188 of the Fulton County Code of Ordinances.***

PART 3 DESIGN CONSIDERATIONS

3.1 Pump Station Types

3.1.1 Site requirements, hydraulics, excavation depths, structure size, operation and maintenance requirements and costs, and aesthetics shall be evaluated when a pump station type is selected.

3.1.2 Submersible Pump Stations

3.1.2.1 The primary type of pump station that is considered in this document is the submersible type, but many of the requirements will apply to dry-pit type pumping stations.

3.1.2.2 ***Submersible pump stations are preferred due to their lower overall maintenance requirements and are typically more compact in size.***

3.1.3 Dry-Pit Pump Stations

3.1.3.1 Dry-Pit Pump Stations are appropriate when the pump size or weight is large enough to make it difficult to move or transport a single pump and motor as determined by Fulton County WWR and Operations.

3.1.3.2 However, should site conditions allow it, a well-tailored submersible station could be used for large submersible pumps.

3.2 Regardless of type or size of pump station, the following items are required elements of all stations:

3.2.1 Wet well, valve and meter vault and other necessary structures.

3.2.2 Pumps, piping, valves, electrical, instrumentation and all associated equipment necessary for reliable operation.

3.2.3 Backup power generator.

3.2.4 Flow metering.

3.2.5 Full station by-pass connection.

3.2.6 Control system with instrumentation and SCADA.

3.2.7 VFDs or soft-starts (both with by-pass starters).

3.2.8 Odor control.

3.2.9 Lighting and utility (water, natural gas, electric, communication, etc).

3.2.10 Protective Coatings.

3.2.11 Addressing site requirements which include aesthetics, access and security including surveillance cameras.

3.3 Where FCPW will be providing O&M services at startup, or at a later date, FCPW shall have final determination as to the type of station constructed including necessary features.

3.4 Unless unavoidable constraints necessitate it, a pump station shall not be installed such that it pumps directly to another pump station.

3.5 Elimination of an Existing Pump Station

3.5.1 Where possible, a gravity line is to be installed to carry flow from an existing pump station to the proposed pump station location for the purpose eliminating the existing pump station.

PART 4 ACCEPTANCE AND WARRANTY

4.1 Developer shall furnish, install, dedicate and provide a two (2) year full warranty from the date of acceptance for operation and maintenance by FCPW, for the entire pump station and force main system to FCPW.

4.2 The land will be dedicated to the County and accepted by the BOC, by deed and Board action, at the end of the two (2) year developer maintenance period.

4.3 Two (2) years from the date of transfer of ownership to FCPW, a full preventative maintenance inspection shall be performed by an authorized pump service representative.

4.4 Developer is responsible for the cost of this inspection and any repairs not covered under the warranty.

4.5 All other equipment supplied shall have manufacturer's standard warranties. Warranties shall provide minimum two (2) years of coverage.

4.6 Developer shall be responsible for cost of repairs to any pumps, pipes, valves, meters, fittings and other items.

PART 5 REVIEW AND APPROVAL PROCESS

5.1 General

5.1.1 Fulton County Public Works (FCPW) is responsible for reviewing and approving proposed sanitary sewer pumping station projects in Fulton County.

5.1.2 The review by FCPW is for general conformance to these Guidelines only.

5.1.3 Developer shall have an experienced Professional Engineer registered in the State of Georgia design the pump station facility and associated force main.

5.1.4 Developer and its Design Engineer shall be fully responsible for the planning, design, construction, initial startup and operation of the pump station facility, associated force main and appurtenances.

5.1.5 Developer shall notify FCPW in writing if any variation from these Guidelines is required for their project.

5.1.6 Partial approval and acceptance of the pump station will not be entertained under any circumstance.

5.2 Allowable Use of Pump Station Facilities

5.2.1 Pump stations shall only be approved in Fulton County where the installation of a gravity sanitary sewer system is not practical or feasible.

5.2.2 Practical or feasible shall generally be interpreted to mean that wastewater can be conveyed by gravity flow to an existing sewer.

5.2.3 Generally, the Developer of a residential, commercial, industrial or mixed-use development requiring sanitary collection shall have the responsibility to plan, design, permit and construct the pump station (subject to FCPW approval) and guarantee it for two (2) years after transfer of ownership to DPW.

5.3 Pump Station Conceptual Review and Approval Process

5.3.1 Developer shall submit to FCPW a Conceptual Report.

5.3.2 Before designing a pump station facility, a Capacity Letter must be obtained from FCPW Technical Services.

5.3.3 The main purpose of the Capacity Letter is the following:

5.3.3.1 To make FCPW Wastewater Collection and Reclamation aware of the proposed project.

5.3.3.2 To verify that a pump station is necessary or required.

5.3.3.3 To determine if allowance(s) for additional flow to the pump station from off-site source(s) are necessary.

5.3.3.4 To determine level of review necessary to demonstrate available capacity in receiving sanitary sewer.

5.3.3.5 To open the line of communication between Developer and FCPW. Active communication shall be maintained throughout the planning, design, permitting, and construction of the proposed project.

5.3.4 Allow at least thirty days, from the time of submittal, for FCPW to generate the Capacity Letter.

5.3.5 All information to be submitted in the conceptual report shall meet the requirements of these Guidelines.

5.3.6 If FCPW concurs that a wastewater pump station is necessary to serve the proposed development and the conceptual report is approved, the applicant will be authorized to prepare a pump station design for further review. Upon final review and approval, two sets of the submittal will be marked “APPROVED” and returned to Developer.

5.4 Pump Station Design Review and Approval Process

5.4.1 After reviewing these Guidelines, Developer shall prepare a design submittal for FCPW to review the detailed design elements of the proposed pump station.

5.4.2 The submittal must include plans and calculations for the pump station and force main, electrical controls, programmable logic controller (PLC), generators, etc., including the standard details and specifications for the pumps selected.

5.4.3 All information in the design submittal shall meet the requirements of Section 1, Part 6 and the design criteria set forth in Section 3, Part 2 of these Guidelines.

5.4.4 Allow at least thirty days, from the time of submittal, for FCPW to review the design report.

5.4.5 FCPW will return the submittal to the applicant with comments to be addressed.

5.4.6 After all comments have been addressed and approval has been given, two sets of the submittal will be stamped “APPROVED” and returned to Developer.

5.4.7 If FCPW approves the wastewater pump station design, Developer will be authorized to obtain all applicable permits, including a construction permit and electrical permit and may begin construction of the facility.

5.4.8 Once a construction permit is obtained, a preconstruction conference must be held with FCPW and Developer before any work may begin.

5.5 Pump Station Acceptance by FCPW Process

5.5.1 After Developer has completed the pump station construction, they shall contact FCPW in regard to scheduling a start-up inspection.

5.5.2 Developer shall work together with the FCPW representative(s) to successfully complete the inspection and start-up.

5.5.3 In order for FCPW to accept the pump station, Developer must submit the information discussed in Section 1, Paragraph 6.3 and 6.4 of these Guidelines.

5.5.4 Acceptance will be scheduled within five (5) business days.

5.5.5 The following requirements shall be completed:

5.5.5.1 Developer shall establish a street address for the pump station. All pump stations must have an address assigned to it prior to acceptance from FCPW.

5.5.5.2 Developer shall acquire all permit approvals from authorities having jurisdiction.

5.5.5.3 Developer shall provide the services of a FCPW approved third-party inspector.

5.5.5.4 A visit to the pump station site will be scheduled with the Developer's third-party inspector and the FCPW representative(s).

5.5.5.5 A facility inspection will be performed. Any work not meeting FCPW approval at this inspection will be noted and referenced in writing as a punch list.

5.5.5.6 Punch list items from FCPW representative shall be added to the final punch list maintained by the assigned FCPW representative.

5.5.5.7 A work completion date will also be stated on this punch list.

5.5.5.8 Both parties will sign the punch list indicating agreement.

5.5.5.9 Developer, during the facility inspection, shall demonstrate the following as a minimum:

A. All equipment units have been installed according to industry standards and manufacturer's instructions.

B. That the units operate without overheating or overloading any parts and without objectionable vibration outside of manufacturer's standards and tolerances.

C. That there are no mechanical defects in any of the parts.

D. That the pumps can deliver the specified pressure and flow.

E. That the pumps are capable of pumping raw sewage.

F. That the pump controls operate the station in all required scenarios.

G. That the generator is sufficient to operate the pump station in an event of a power outage and functions according to manufacturer's specifications.

H. That all the instrumentation and controls are installed and functioning properly according to the specifications.

I. That the communication between the instrumentation and controls and the central SCADA system is established and functioning properly according to the specifications.

J. That all cables, conduits and wiring raceways meet the specifications.

K. That all the necessary documentation for the instrumentation and controls including but not limited to wiring and cable labels, and controller IO labels are provided and are according to the specifications.

L. All alarms (high level, power outage) are operable and working.

5.5.5.10 Developer shall deed title to land on which the pump station and all appurtenances (including the access road) are installed to FCPW.

5.5.5.11 Developer shall also deed ownership of the pump station facility and all appurtenances to FCPW.

5.5.5.12 Proof of transfer of title shall be required before start-up of the pump station will be initiated. This transfer will occur at the end of the two (2) year maintenance period.

5.5.5.13 When all points of the punch list have been completed by Developer to the satisfaction of the FCPW representative, FCPW will make formal acceptance of the pump station.

5.5.5.14 After utilities have been connected, the start-up of the pump station shall be conducted by Developer and a representative of the pump manufacturer and shall be witnessed by the FCPW representative.

5.5.5.15 If the proposed pump station facility is NOT accepted by FCPW Developer will not be able to obtain a Certificate of Occupancy for the proposed development.

5.5.5.16 Developer shall guarantee the entire pump station facility for a period of **two (2) years** from the date of acceptance (as established by FCPW) and shall promptly remedy, repair or

correct any defect or omission in the work during this **two-year** period.

A. Developer shall provide FCPW with a maintenance bond or line of credit valued at 10% of construction cost.

5.5.5.17 Developer shall have utilities (water, electricity, telephone and gas, if applicable) installed in its name and shall pay these utility bills for the period of ownership prior to acceptance by FCPW.

5.5.5.18 After the **two-year warranty** and maintenance period, inspection of the facility will be conducted by Developer and the FCPW Representative. The maintenance bond/line-of-credit will be released only upon successful inspection. This inspection may require the complete start-up process.

5.5.5.19 If there are no outstanding problems, such as leaks, malfunctioning equipment, or deferred maintenance, the utility billing will be transferred to FCPW. Developer will supply FCPW with the account numbers for each utility.

5.5.5.20 The transfer of the land and easements will occur at the end of the two-year warranty and maintenance period.

5.6 Recommendations for Ordering Equipment and Utility Sources

5.6.1 Since manufactures' delivery times for pump stations, control panels, telemetry and peripheral accessories may vary widely, it is recommended that orders for this equipment be placed when pump station design approvals are received from FCPW.

5.6.2 This will help to avoid delays at the time of final plat submittal for the proposed development.

5.6.3 It is also recommended that application for utility (water, electricity, telephone and gas, if applicable) service to the pump station be made as early as possible.

5.6.4 Experience has shown that connection of utility service is often a major reason for delays in pump station completion.

5.7 The Developer shall be aware that the installation of a pump station shall be the final option after all other means to provide wastewater service to the property have been exhausted. This may include providing the County with copies of the easement offers to downstream property owners including the amount of the offer for the easement and the written denial from the property owners.

PART 6 SUBMITTAL REQUIREMENTS

6.1 General

6.1.1 All submittals shall be made to:

Fulton County Public Works Technical Services

141 Pryor St SW

Suite 6001

Atlanta, GA 30303

6.1.2 A “Sanitary Sewer Pumping Station and Force Main Checklist” is provided in Appendix A. This checklist is used by FCPW during design review/approval and is provided for information only.

6.2 Pump Station Conceptual Review and Approval Submittal

6.2.1 The conceptual review and approval submittal shall be presented in report format with maps and development plans to an appropriate scale.

6.2.2 The following items shall be included in the report:

6.2.2.1 Completed Conceptual Review and Approval Form (see Appendix A).

6.2.2.2 Proposed site located on a USGS Quadrangle map, with the proposed pump station location shown.

6.2.2.3 The map shall show the limits of the proposed development and of the sub-basin that drains to the pump station.

6.2.2.4 Location of proposed connection to receiving sanitary sewer.

6.2.2.5 Calculations for wastewater flows generated by the proposed development.

6.2.2.6 Calculations for wastewater flows generated in the remainder of the sub-basin.

6.3 Pumping Station Design Review and Approval Submittal

6.3.1 The design review and approval submittal shall be presented in plan format with maps and development plans to an appropriate scale.

6.3.1.1 Four (4) sets of 11”x17” design plans and one (1) electronic copy (in AutoCAD and PDF formats) of design plans shall be submitted.

6.3.1.2 The AutoCAD files shall follow the format and requirements presented in Appendix A – Fulton County As-Built CAD Standards of Section 01 78 38 – Record Documents of the

"Fulton County Wastewater System Standard Specifications." Please refer to the separate document for the requirements.

6.3.2 The plan set shall include:

6.3.2.1 A legend depicting the following:

A. Symbols used in the drawings.

B. General notes pertinent to FCPW requirements.

C. FCPW standard details used within the plan set.

6.3.2.2 A text box that denotes the following:

A. The flow rate from the selected pump in gpm.

B. The size and cross-sectional area of the discharge piping in the wet well in inches.

C. The resulting velocity within the discharge piping in fps shall be included on the pump station detail sheet.

6.3.2.3 A fitting schedule that contains the following:

A. Pipe size and material.

B. Fitting sizes.

C. Valve sizes and type.

D. Other appurtenances (e.g. Flow meter, pressure gauge, etc.)

E. Shall be listed on the pumping station detail sheet.

F. Pump station standard details are provided in Appendix B.

6.3.2.4 The following items shall be included in the design submittal and shall be stamped by a Professional Engineer registered in the State of Georgia:

A. Completed Design Review and Approval Form (see Appendix A).

B. Location map depicting property and land lot lines, buildings and roads.

C. Pump curve and system head curve (showing both new force main and maximum system head at worst pipe conditions.)

D. Pump details, specifications and shop drawings including wet well elevations.

E. Valve details, specifications and shop drawings.

F. Flow meter details, specifications and shop drawings.

G. Generator details, specifications and shop drawings, along with automatic transfer switch specifications and shop drawings.

H. Telemetry equipment details, specifications and shop drawings.

I. Single line electrical drawing showing power distribution for the proposed pump station.

J. Force main design showing size, material, plans, profiles and valve locations.

K. Depiction of receiving gravity sanitary sewer system and connection to proposed pump station force main.

L. Completed Pump Station Design Calculations Form (see Appendix A)**.**

M. Conduit and raceway specifications. See Electrical Conduit Specifications in Appendix A for additional requirements. All electrical components and conduits shall be in accordance with the latest edition of NFPA 70 National Electric Code (NEC).

6.4 Pump Station Acceptance by FCPW Submittal

6.4.1 The pump station start-up check list is provided in Appendix A.

6.4.2 At the start-up inspection, Developer shall provide the following materials to FCPW:

6.4.2.1 As-built drawings and all previously submitted information of the pump station facility.

6.4.2.2 Manufacturer’s warranties.

6.4.2.3 A certified pump test curve from the manufacturer must be provided on all pumps prior to acceptance.

6.4.2.4 Copies of the title of the deed and the proposed transfer of ownership to land on which the pump station and all appurtenances are installed, including the access road, and which are dedicated to FCPW.

6.4.2.5 Developer shall also deed ownership of the pump station facility itself and all appurtenances to FCPW at the end of the two-year maintenance period.

6.4.3 An example Pump Station Design Review and Approval Form is provided in Appendix A.

6.4.3.1 Items 6.4.2.1 and 6.4.2.2 must be provided in paper copy and electronic format.

6.4.3.2 All electronic files shall be in Adobe® (*.pdf) and AutoCad format. The electronic data shall be presented in the following file structure:

PUMP STATION SUBMITTAL FILE STRUCTURE

Folder	Information
Data Sheet	Completed Project Data Forms
Engineering Design	Engineering Design Reports
As-built Drawings	As-built drawings of pump station, .pdf format
As-built Drawings	As-built drawings of pump station, .dwg format
Pump Submittal	All manufacturer's submittals, reports, and tests of pumps
Shop Drawings	All other equipment shop drawings
O&M Manuals	Operation and Maintenance manuals for all equipment
Warranty Forms	Copies of all warranties
Deeds and Easements	Copies of all deeds and easements

6.5 Force Main Information to be shown:

6.5.1 Information within this section shall be provided for force main designs or pumping station projects that include a force main design component that extends beyond the pump station pad.

6.5.2 A title block presented on each sheet shall include the following:

6.5.2.1 The name of the development

6.5.2.2 Phase or unit of development (if applicable)

6.5.2.3 Land lot and district

6.5.2.4 Name, address and phone number of Developer and Developer's Design Engineer

6.5.2.5 Professional seal of Developer's Design Engineer with signature.

6.5.3 A cover sheet shall be included with a drawing index.

6.5.3.1 The cover sheet shall include an approval block for FCPW signature.

6.5.3.2 Cover sheet shall include a location map with north arrow.

6.5.4 Plan View

6.5.4.1 Plan view shall have a scale of not more than fifty (50) feet to the inch [1” = 50’].

6.5.4.2 Show all location, size and material of construction for all proposed pipelines within the project area.

6.5.4.3 The proposed force mains shall be shown on the plans as solid lines with size, material, use and pipe class called out.

A. For example: “8-inch DIP (FM)-Epoxy Lined, Class 350”.

6.5.4.4 Plans shall show the location of all force mains and gravity sanitary sewers.

6.5.4.5 Plans shall also show any pump stations adjoining the force main system.

6.5.4.6 All proposed and existing easements shall be shown.

6.5.4.7 Plans shall show all other buried existing or proposed utilities, including storm and gravity sanitary sewers, drywells, potable water mains, buried telephone, natural gas, power and cable TV lines, within the project area that are concurrent with proposed force main construction.

6.5.4.8 Existing utilities should be shown to the extent known, given records available to Developer’s Design Engineer.

6.5.4.9 Existing utilities shall be shown as dashed lines.

6.5.4.10 Construction details should note that all buried utilities are to be field located prior to construction.

6.5.4.11 Plans shall show the tie-in point(s) of the proposed force main system to the FCPW existing system.

6.5.4.12 Plans shall include typical construction details of the following:

A. All tie-ins to existing pipelines and structures.

B. Typical trench cross-sections including bedding, backfill, and compaction requirements.

C. Manholes.

D. Service connection details.

6.5.4.13 The project benchmarks shall also be shown and referenced to state plane coordinates.

6.5.5 Profile View

6.5.5.1 Profiles shall show each force main, manhole, sanitary sewer line, pump station, utility crossings etc. as referenced on the plan view.

6.5.5.2 Profiles shall list pipe utility use and material, size of pipe and bedding materials.

6.5.5.3 Profiles shall have a vertical scale of not more than ten (10) feet to the inch.

PART 7 CHANGE OR VARIANCE PROCEDURES

7.1 General

7.1.1 Approved plans shall not be modified, nor deviated from, unless approved in writing by FCPW.

7.1.2 Any changes to the design documents after approval has been granted by FCPW shall require the resubmittal of the design documents incorporating and highlighting the requested changes for review and approval.

7.1.3 Any deviations from the approved plans during construction must have approval from FCPW prior to the deviation being made.

7.1.3.1 A “Request For Exception/Change To Pump Station Construction” form provided in Appendix A of these Guidelines must be completed and submitted to FCPW for approval. The FCPW Inspector will make sure that all appropriate approvals are received.

7.2 Justification for Changes or Variances

7.2.1 Variances

7.2.1.1 Requests for variances to these Guidelines shall be brought to the attention of FCPW during the initial meeting with the same. If FCPW indicates Fulton County will consider the variance, Developer shall provide the necessary justification for the variance to be considered.

7.2.1.2 The justification shall include:

A. Identification of the proposed variance.

B. Identification of the requirements of those Guidelines for which a variance is being requested. Identification shall include the section and paragraph number of the Guidelines being referenced.

C. Reason(s) for the proposed variance request.

D. Description of the benefits or impacts to Fulton County's wastewater infrastructure if the variance is allowed.

E. Impact on the overall pump station and force main system.

7.2.2 Changes

7.2.2.1 Developer shall provide a detailed description of the reason(s) for the changes to the approved plans. If FCPW indicates Fulton County will consider the change, Developer shall provide the necessary justification for the change to be considered. The description shall include the following:

A. Identification of the proposed change.

B. Reason(s) for the proposed change.

C. Impact on the overall pump station and force main system.

7.3 Submittal Requirements

7.3.1 Variances

7.3.1.1 In order for FCPW to make a determination on whether a variance should be allowed, the following information shall be submitted to FCPW for review:

A. Justification information identified above.

B. Equipment or material data sheets for the proposed variance item, if applicable.

C. Design calculation and preliminary drawings for the proposed variance item, if applicable.

D. References to industry standards supporting the proposed variance, if applicable.

E. Variances for the sole purpose of economic benefit for Developer **WILL NOT** be considered.

7.3.2 Changes

7.3.2.1 In order for FCPW to decide if a change to the approved plans will be allowed, the following information shall be submitted to FCPW for review.

A. Revised plans showing the proposed change(s) highlighted for ease of comparison with the original approved plans.

B. Revised design calculations for the pumping system and force main in compliance with the original submittal requirements, if applicable.

C. Shop drawings and submittal data for the proposed change(s) as defined under the original submittal requirements, if applicable.

D. Any other information which will show the proposed change provides a system at least equal to, if not better than, the original approved plans.

7.4 Review and Approval Process

7.4.1 The review and approval processes for the variance or change requests will follow the same procedures as the initial approval processes described herein above. If the proposed change(s) does not impact issued permits, the submittals and reviews through FCPW are not required. It is Developer's responsibility to determine if revisions to permits will be required.

7.4.2 If the proposed changes require revisions to approved permits, it is Developer's responsibility to make the necessary submittals for revising the permits and obtain the required permits for construction.

7.4.3 If the proposed variance is approved, FCPW will issue a letter indicating the approval of the variance, to Developer.

7.4.4 If a proposed change is approved, FCPW will request the required number of plans be provided and will stamp the revised plans approved and distribute copies as described herein above. These plans shall be used for construction with a copy on site at all times.

7.4.5 If the variance or change is not approved, Developer shall follow the requirements of these Guidelines and/or the previously approved plans.

SECTION 2
DEFINITIONS & REFERENCES

PART 1 DEFINITIONS

Definitions and terms and requirements listed here shall apply throughout this document whether referenced elsewhere or not.

Acceptance

The time after which the pump station and force main have been tested and approved by FCDWP to operate and discharge to the Fulton County Sanitary Sewer System.

CERCLA

Comprehensive Environmental Response, Compensation, and Liability Act

Chapter 82, Utilities

Part of the Code of Ordinances of Fulton County which define Sewers and Sewage Disposal and Sewer Use and Pretreatment in Fulton County.

Commercial Wastewater

Typically, this includes wastewater discharges from treatment systems such as grease traps for restaurants, schools, churches, hotels, etc., and oil separators for car maintenance and car/truck washes. Refer to the Fulton County Sewer Use Ordinance.

Contractor or Constructor

Any individual, firm, or corporation with whom a contract is made by the developer or the FCDWP for the purpose of constructing the sanitary sewerage systems described herein.

Developer

Any individual, firm, or corporation who contracts with a contractor to construct a sanitary sewerage system which serves a specific privately developed area such as a residential subdivision or commercial area.

Developer Engineer

The experienced engineer who is hired by the Developer and is in responsible charge of the design of the developer-installed sanitary sewerage system and pump station. The engineer's experience here shall mean having successfully designed municipal wastewater pump stations and force mains, and those designs shall have been constructed and successfully commissioned. Developer's

Engineer shall be a Professional Engineer appropriately licensed by the Georgia State Board of Registration for Professional Engineers and Land Surveyors.

DIP

Ductile Iron Pipe

Discharge Manhole

A manhole on a sanitary sewer gravity pipeline where force main discharges pumped flow from a wastewater pump station.

Domestic Wastewater

Wastewater from sanitary fixtures such as toilets, and residential appliances.

Industrial Wastewater

Wastewater discharges from facilities such that the pollutants or volume of discharge require periodic monitoring. Refer to the Fulton County Sewer Use Ordinance.

Engineer

An Engineer or Firm who is hired by the FCDWP and is responsible for the sanitary sewerage system design; may also be referred to as consulting Engineer or consultant.

FCPW

Fulton County Public Works may be used interchangeably herein with FCDWR.

FCDWR

Fulton County Department of Water Resources may be used interchangeably herein with FCPW.

Firm Pumping Capacity

Capacity of the pumping station with one pump of each size out of service or on standby.

Force Main

A pipeline carrying pressurized wastewater flow pumped from a wastewater pump station.

FPS

Feet per second

GIS

Geographic Information System

GPD

Gallons per day

GPM

Gallons per minute

HDPE

High Density Polyethylene

HMI

Human Machine Interface

HP

Horsepower

Industry Standards

Unless this or other design documents include more stringent requirements, applicable design or construction industry standards shall assume to have the same applicability as if directly referenced here.

MCC

Motor Control Center

MGD

Million gallons per day

NFPA 70

National Electric Code

NFPA 70E

Standard for Electrical Safety in the Workplace

NFPA 820

Standard for Fire Protection in Wastewater Treatment and Collection Facilities

PCF

Pounds per cubic foot

PLC

Programmable Logic Controller

PSI

Pounds per square inch

Pump Station

A structure, either above and/or below ground, which houses pumps, piping, valves, electrical, controls, and auxiliary equipment. The primary purpose of a pumping station is to increase the energy of the wastewater using either kinetic or displacement pumping equipment to raise the fluid pressure, elevation, and/or quickly move the fluid over long distances. A pump station may also be referred to as a lift station. For the purposes of FCDWP and this document, pump stations are further sub-divided as follows:

Submersible Pump Station

One in which the wastewater pumps are submerged in the wastewater, with controls, power, and other elements located at or above ground level.

Dry Pit Pump Station

One in which the wastewater pumps are housed in a dedicated pump room but separated from the wastewater, with controls, power, and other elements installed within the same structure and protected from the weather and wastewater. This allows access the installed pumps for maintenance or other reasons.

PVC

Polyvinyl chloride

Reserved Capacity

To be determined during the review of the station by Fulton County Technical Services.

Sanitary Sewerage System

As defined in Article III, chapter 82 of the Code of Ordinances of Fulton County. Means a combination of methods for collecting and transporting untreated wastewater, from its source of generation to a sewage treatment plant. This includes street sewers (which collect sewage from building sewers or sewer service laterals), outfalls which collect sewage from the street sewers and interceptors or main collector sewers which collect sewage from outfalls and lead directly to the treatment plant.

SARA

Superfund Amendments and Reauthorization Act

SCADA

Supervisory Control and Data Acquisition System

Sewer Use Ordinance

Article IV, chapter 82 of the Code of Ordinances of Fulton County. To prevent the introduction of pollutants into the publicly owned treatment works that will interfere with its operation; to prevent the introduction of pollutants into the publicly owned treatment works that will pass through the publicly owned treatment works, inadequately treated, into receiving waters, or otherwise be incompatible with the publicly owned treatment works.

Solids-Bearing Liquids

Shall mean liquids to be pumped containing, or are assumed or likely to contain, solids that require appropriate pump design considerations and/or materials of construction. Solids-bearing liquids could contain rags, stringy materials, trash, non-deformable solids, grease, or grit. Solids-bearing liquids may also be liquids with settleable solids exceeding 50 milligrams per liter (mg/L) and include wastewater, stormwater, primary effluent, return sludge, return activated sludge (RAS), trickling filter circulation, and similar services or may be a combination of the preceding.

Standard Details and Specifications

Refers to the standard sanitary sewer details and specifications used by the FCDWP showing and describing materials, products, and installation requirements for piping and appurtenances used in FCDWP's sanitary sewer system. The most current version of these documents is incorporated into this document by reference. May also be referred to as "Standards", "Standard Details" or "Standard Plans".

Wastewater

Water-born wastes including those from households, businesses, and industry. The Fulton County Sewer collection system is a separate sanitary system designed to prevent stormwater from entering the sanitary sewerage system. Refer to the Fulton County Sewer Use Ordinance. As applicable to pumping stations and equipment, wastewater shall be considered to be Solids-Bearing Liquids.

PART 2 ABBREVIATIONS, ACRONYMS, AND REFERENCES

Where abbreviations and acronyms are used in specifications or other documents, they shall mean the recognized name of the entities in the following list, unless specifically described otherwise.

AA Aluminum Association, Inc. (The)
www.aluminum.org

American Association of State Highway and Transportation Officials

AASHTO	www.transportation .org
ACI	ACI International (American Concrete Institute) www.aci-int.org
ACOE	Army Corps of Engineers www.usace.army.mil
ADAAG	Americans with Disabilities Act (ADA), Architectural Barriers Act (ABA), Accessibility Guidelines for Buildings and Facilities www.access-board.gov
AGA	American Gas Association www.aga.org
AI	Asphalt Institute www.asphaltinstitute.org
AISC	American Institute of Steel Construction www.aisc.org
AISI	American Iron and Steel Institute www.steel.org
ANSI	American National Standards Institute www.ansi.org
AOSA	Association of Official Seed Analysts www.aosaseed.com
APA	Architectural Precast Association www.archprecast.org
ASCE	American Society of Civil Engineers www.asce.org
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org

ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org
AWS	American Welding Society www.aws.org
AWWA	American Water Works Association www.awwa.org
CDA	Copper Development Association Inc. www.copper.org
CGA	Compressed Gas Association www.cganet.com
CFR	Code of Federal Regulations www.gpoaccess.gov/cfr/index.html
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org
CRSI	Concrete Reinforcing Steel Institute www.crsi.org
CSI	Construction Specifications Institute (The) www.csinet.org
DIPRA	Ductile Iron Pipe Research Association
EPA	Environmental Protection Agency www.epa.gov
EJCDC	Engineers Joint Contract Documents Committee www.asce.org
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org
FAA	Federal Aviation Administration www.faa.gov

FCI	Fluid Controls Institute www.fluidcontrolsinstitute.org
FMG	FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com
FSA	Fluid Sealing Association www.fluidsealing.com
Georgia DNR	Georgia Department of Natural Resources www.gadnr.org
GSI	Geosynthetic Institute (Geosynthetic Research Institute, GRI) www.geosynthetic-institute.org
HI	***Hydraulic Institute*** ***www.pumps.org***
HI	Hydronics Institute www.gamanet.org
HUD	Department of Housing and Urban Development www.hud.gov
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org
ICBO	International Conference of Building Officials (See ICC)
ICBO ES	ICBO Evaluation Service, Inc. (See ICC-ES)
ICC	International Code Council (Formerly: CABO - Council of American Building Officials) www.iccsafe.org
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org
ISO	International Organization for Standardization www.iso.ch
LPI	Lightning Protection Institute www.lightning.org

MBMA Metal Building Manufacturers Association
www.mbma.com

MSS Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
www.mss-hq.com

NACE NACE International (National Association of Corrosion Engineers International)
www.nace.org

NCMA National Concrete Masonry Association
www.ncma.org

NCPI National Clay Pipe Institute
www.ncpi.org

NEMA National Electrical Manufacturers Association
www.nema.org

NFPA NFPA
www.nfpa.org

NOAA National Oceanic and Atmospheric Administration
www.noaa.gov

NRMCA National Ready Mixed Concrete Association
www.nrmca.org

NSF NSF International (National Sanitation Foundation International)
www.nsf.org

NSSGA National Stone, Sand & Gravel Association
www.nssga.org

OSHA Occupational Safety & Health Administration
www.osha.gov

PCI Precast/Prestressed Concrete Institute
www.pci.org

RUS Rural Utilities Service (See USDA)

SAE	17SAE International www.sae.org
SBCCI	Southern Building Code Congress International, Inc. (See ICC)
SPI/SPFD	Society of the Plastics Industry, Inc. (The) Spray Polyurethane Foam Division (See SPFA)
SSPC	SSPC: The Society for Protective Coatings www.sspc.org
STI	Steel Tank Institute www.steeltank.com
SWRI	Sealant, Waterproofing, & Restoration Institute www.swrionline.org
TMS	The Masonry Society www.masonrysociety.org
UL	Underwriters Laboratories Inc. www.ul.com
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org
USDA	United States Department of Agriculture www.usda.gov
USPS	United States Postal Service www.usps.com

SECTION 3

GENERAL TECHNICAL REQUIREMENTS

PART 1 GENERAL

1.1 The pump station shall be designed and constructed in accordance with the requirements and Standard Details referenced and provided herein.

1.2 Several drawings are included with this document which provide examples of expected configurations and features of the pump stations. See Appendix B.

1.3 Flood Protection

1.3.1 The pump station tops of structures shall be designed to be protected from the **100-year flood.**

1.3.2 **All electrical and control components including generator shall be installed a minimum of one-foot above the 500-year flood level.**

PART 2 DESIGN CRITERIA

2.1 Pump Station Service Area Map

2.1.1 The potential service area of the pump station shall be clearly delineated on an area map.

2.1.2 The service area shall include the area that can reasonably flow by gravity to the pump station site based upon topography.

2.1.3 The service area map must also identify any areas being served by existing sewer facilities.

2.1.4 If the sanitary sewer drainage basin is larger than the proposed pump station service area, FCPW reserves the right to require larger pumps, wet well, storage facilities and force main.

2.1.4.1 These will be considered on a case-by-case basis.

2.2 Design within GDOT ROW

2.2.1 If any portion of a proposed project enters a State of Georgia controlled right-of-way, then a GDOT permit application is required.

2.2.2 Developer shall submit to FCPW the required materials in hard copy and in electronic form, on a flash drive.

2.2.3 Hard copy forms, permits and drawings, etc. shall be on 8 ½" X 11" papers. Drawings may be on 11" X 17" papers and need not be to scale.

2.2.3.1 All measurements necessary for the permit application must be submitted in English.

2.2.3.2 Generally, portions of the project design can be reduced in size and match lined, if necessary, as long as the text remains legible.

2.2.3.3 Compaction notes indicating compaction requirements must be included on every construction drawing required for the application (see Section 10, Paragraph 1.11.1 for backfill requirements).

2.2.3.4 Submittal shall include four (4) each of the following:

A. Plan

B. Profile

C. Traffic control plan

D. Section from GDOT county map.

E. The GDOT Permitting Checklist is provided in Appendix A.

2.2.4 GDOT requires the GDOT permit application to be submitted through the Georgia Utilities Permitting System (GUPS).

2.2.4.1 Developer will not be able to submit the GDOT permit directly through the GUPS.

2.2.4.2 Developer shall provide all necessary information, as stated in the previous paragraphs. FCPW will review the information and provide comments (if necessary).

2.2.4.3 Once the necessary information has been approved, FCPW will submit the GDOT permit application through the GUPS.

2.2.5 Developer shall refer to the GDOT Utility Accommodation Policy and Standards Manual, most current edition, for policies regarding construction of utilities within the public highway right-of-way.

2.2.6 Traffic control shall be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), latest edition.

2.2.7 Trench restoration within GDOT right-of-way shall be in accordance with GDOT Standard Detail 1401 Pavement Patching Details.

2.2.8 All bore and jack pits must be a minimum of ten (10) feet from outside edge of pavement.

2.2.8.1 Plans shall show casing size and carrier pipe size within the approach slab for bridge crossings.

2.2.9 All documents necessary for said application must be provided by Developer's Engineer.

2.3 Calculation of Sanitary Flows

2.3.1 All flow calculations shall be presented in the Pump Station Design Calculations Form, Appendix A.

2.3.2 Follow the submittal process described in Section 1, Part 6 of these Guidelines.

2.3.3 Determination of design sanitary flows shall be based on wastewater flows expected to become tributary to the pump station for the entire development at build-out.

2.3.3.1 The sanitary flows will be identified as on-site sanitary flows and off-site sanitary flows.

A. On-site sanitary flows are those flows that will be generated directly from the project site.

B. All other flows shall be identified as off-site sanitary flows and shall be based on wastewater flows expected to become tributary from the entire drainage basin over the life of the pump station.

2.3.3.2 In addition, sanitary flows that will be realized immediately shall be identified as “initial flows” and the remaining flows shall be identified as “future flows.”

2.3.3.3 Delineation of Drainage Basin

A. The drainage basin surrounding the proposed site shall be delineated with the location of the pump station as the most downstream point.

B. If the entire drainage basin is within the proposed site, the Average Daily Flow (ADF) is calculated by applying the flow generation factors from the table below.

C. If there are additional offsite areas within the drainage basin that are upstream of the proposed development, those areas need to be accounted for when calculating the ADF.

D. FCPW will determine during the conceptual review and approval process whether a proposed pump station will need to service off-site flows.

2.3.4 Average Daily Flow

2.3.4.1 The Average Daily Flow (ADF) that a site will generate is calculated based on the use of the site.

2.3.4.2 The table below shows sanitary flow generation factors, in gallons per day (gpd), which can be used to estimate sanitary flows from proposed and existing developments.

SANITARY FLOW CONTRIBUTIONS FROM SITE SPECIFIC SOURCES

Contributor	Sanitary Flow (gpd)
Airports, Railroads, Bus Terminals	5/Passenger + 10/Employee
Stadiums, Racetracks, Assembly Halls	5/Seat
Bar/Lounge	30/Seat
Barber Shop/Beauty Salon	125/Chair + 20/Employee
Bath House for Swimming Pool	10/Swimmer
Boarding Houses	75/Resident
Bowling Alley	75/Lane + 20/Employee
Car Wash (non-recycling)	75/Car
Church	5/Sanctuary Seat
Campgrounds without Sewer Connections	100/Space
Campgrounds with Sewer Connections	150/Space
Country Club	25/Member
Day Camp	20/Person
Day Care Center	15/Person
Dental Office	20/Employee + 100/Chair
Fitness Center/Spa	50/Person
†Food Service **	†Food Service **
Food Service – Restaurants Open 24 Hours/day	75/Seat + 20/Employee
Food Service – Restaurants Open Less than 24 hour/day	50/Seat + 20/Employee
Restaurants on Interstates	100/Seat+20/Employee
Drive-In Restaurant	50/Space+20/Employee
Food Service – Catering	50/100-ft^2 Floor Space

Contributor	Sanitary Flow (gpd)
Carryout Only, Food Stands	50/100-ft² floor space +20/Employee
Catering (single service only)	50/100-ft² floor space
Funeral Home	300/Embalming + 100/Employee
†Grocery Store	200/1000-ft2 Floor Space
Hospital	300/Bed + 100/Resident Staff
Hotel/Motel	100/Room
Motel with Kitchenette	150/Room
Laundry, Sel-service	500/Machine
Marina (pump out facilities)	30/Slip
†Meat Market	50/100-ft² Floor Space
Medical Offices	200/Exam Room
Nursing Home/ Nursing Home/Personal Care Home, etc.	150/Bed + 100/Resident Staff
Prison/Jail	125/Bed + 20/Employee
Resident Camps	60/Person
Homes (Residences)	150/Bedroom
Rest Area	Determined after consultation with GA DOT
Retail Stores Retail Stores, Convenience Stores (Freestanding)	Larger of 400/Restroom or 100/Fixture
Schools – Day, Toilets Only	12/Person
†Schools – Day, Toilets, Cafeteria	16/Person
†Schools – Day, Toilets, Cafeteria, Gym	20/Person
†Schools – Boarding	100/Person
Service Station	20/Person
Interstate Location	3000 Minimum
24 Hour Operation	325/fixture
<24 Hour Operation	250/fixture

Contributor	Sanitary Flow (gpd)
Shopping Center/Mall	100/1000-ft^2 Enclosure Space
Theaters (Indoor)	5/Seat
Theaters (Drive-in)	10/Space
Veterinary Office/Animal Hospital	100/Run + 10/Cage + 20/Employee
Workers Including Factory, Office, School, Commercial and Construction (Without Showers and Industrial Waste)	30/Person
† Operations with BOD_5 and TSS greater than 200 mg/L require pretreatment to reduce BOD_5 and TSS to 200 mg/L or below.	
** These flows are to be additive to other flows. For example, a bar or lounge serving food would have this flow added to the 30 gpd per seat flow.	

Note: Flow Estimating Factors based upon Georgia Environmental Protection Division Large Community Design Guidance, Appendix A (Latest Edition)

2.3.5 Offsite Areas

2.3.5.1 If it is determined by FCPW that offsite flows need to be accounted for in the design of the pump station, the following process shall be followed.

A. If the offsite area is already developed, an analysis of the existing sites using the flow contributions in the above table will result in additional ADF that must be accounted for.

B. If the offsite area is not developed, the future land use must be analyzed to determine the development potential of the area.

C. Developer shall work with FCPW Technical Services to determine land use and flow projections for average and peak daily flows.

D. If the sum of the ADF generated onsite and the offsite area's calculated flow results in pump selection outside the limits of these pump station and force main guidelines, coordinate design efforts with FCPW staff.

2.3.6 Peaking Factor

2.3.6.1 Once the total ADF has been determined, the flow must be multiplied by a Peaking Factor (PF) to determine the peak flow that will be realized in the pump station.

2.3.6.2 The peaking factor shall not be less than 2.5.

2.4 Determination of Receiving Sewer Capacity

2.4.1 Before a pump station can be considered, it must be determined that the receiving sanitary sewer is not already capacity limited. If the receiving sewer is already capacity limited, this can cause surcharging and create the potential for wastewater overflows.

2.4.2 During the pump station conceptual review and approval process, FCPW will determine the level of analysis that must be performed to determine if a proposed pump station will cause capacity problems.

2.5 Calculation of System Head Curve

2.5.1 The total dynamic head (TDH) is the head against which the pump must work.

2.5.2 The TDH is made up of static head and friction head loss.

2.5.3 The TDH is determined by summing the total static head, friction losses and velocity head losses.

2.5.3.1 Friction losses include those from pipe, fittings and valves.

2.5.4 When TDH is plotted against discharge, the resulting line is the System Head Curve

2.5.5 Static Head

2.5.5.1 The static head is the distance that the wastewater flows must be moved vertically, from the water surface elevation in the wet well to the highest elevation of the force main or receiving gravity sewer invert.

2.5.5.2 System head curves must be developed for the following static head conditions:

A. Pump-off elevation (greatest static head)

B. Lead pump-on elevation

C. High water elevation (all pumps running at full speed)

2.5.6 Friction Head Loss

2.5.6.1 The friction head loss is the head of water that must be supplied by the pump to overcome the frictional losses in the pipe.

2.5.6.2 It is a function of pipe length, diameter, flow rate and the friction coefficient (C factor).

2.5.6.3 The design shall use the Hazen-Williams formula to calculate the pipe Friction Head Loss (or the Darcy-Weisbach method, with justification of factors used):

$$h_f = L\left(\frac{10.44Q^{1.852}}{C^{1.852}D^{4.8655}}\right)$$

Where:

h_f is the friction head loss, in feet

L is the force main pipe length, in feet

Q is the flow rate, in gallons per minute

C is the friction coefficient, dimensionless

D is the force main pipe diameter, in inches

2.5.6.4 Because the friction coefficient of the force main will change over time, system head curves shall be generated and evaluated for present and future conditions.

2.5.6.5 The C factors indicated below shall be the only values allowed for these calculations.

2.5.6.6 Friction head loss must be analyzed for the following conditions:

A. The initial operating condition (C =130)

B. The system after it has aged (C =100)

C. C values for material such as HDPE and PVC may be used with FCPW approval.

D. This ensures that when selecting a pump, the operating range will be efficient throughout the lifetime of the pumping system.

2.5.6.7 Friction losses from fittings and valves are calculated using the following formula:

$$h_f = K\left(\frac{V^2}{2g}\right)$$

Where:

h_f is the friction head loss, in feet

V is the velocity in force main, in feet per second

g is the gravitational force (32.17 feet per second^2)

K is the resistance coefficient, dimensionless

2.5.6.8 Refer to Crane, HI, manufacturer's data or Cameron Hydraulic Handbook for published Resistance Coefficients K values.

2.5.7 System Head Curve

2.5.7.1 The System Head Curve represents the conditions under which the pump must operate at various inflows and TDH combinations for a specific set of pipe size, pipe material and pipe length combinations.

2.5.7.2 The System Head Curves can be plotted using the force main discharge (Q) on the x-axis and the corresponding TDH values for each static head and friction head loss condition on the y-axis.

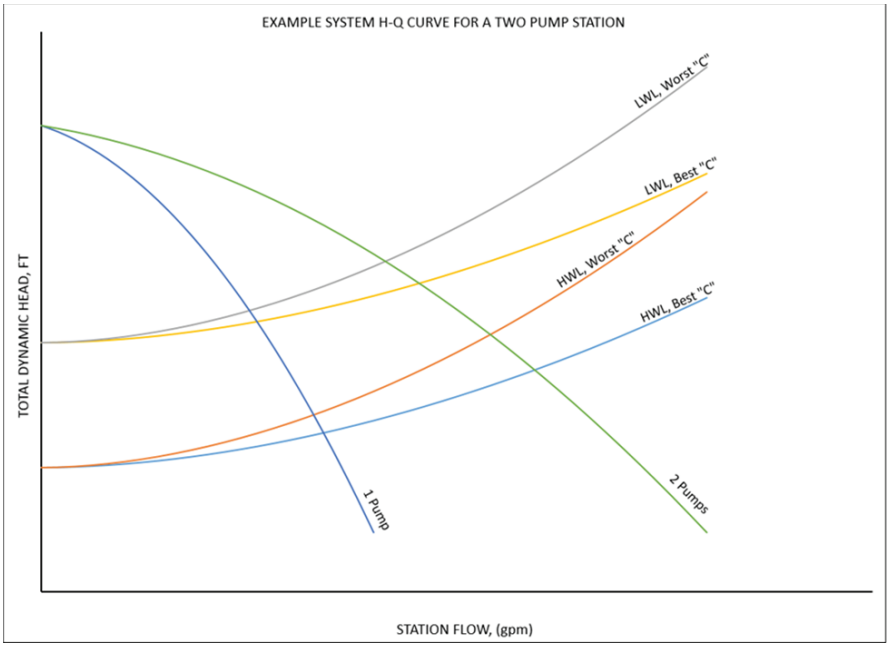
2.5.7.3 These curves define the energy required to pump sanitary flows through the discharge system.

2.5.7.4 When overlaid with pump performance curves provided by the manufacturer, it will yield the pump operating ranges.

2.5.7.5 The pump selected shall be able to operate well under all four pressure conditions.

2.5.7.6 The below figure illustrates example system and pump curves:

Example System and Pump Curves



2.6 Pump Selection Process

2.6.1 Pump selection shall be based on a hydraulic analysis of the system through which the wastewater is to be conveyed.

2.6.2 The design operating range is defined as the intersection of the pump curve and the calculated system curves for the various conditions.

2.6.3 The design operating range of the pumps shall be within ten percent (10%) (on a flow basis) of the Best Operating Point (BOP) of the pump as determined by the manufacturer and identified on the pump curve.

2.6.3.1 Pumps shall be selected such that the pumps are capable of pumping the required capacity for all total dynamic head requirements developed by the system for the lifetime of the pump station.

2.6.3.2 Pumps shall produce a velocity in the discharge piping between three (3) and six (6) feet per second.

2.6.3.3 The pump selected shall be capable of pumping the peak design flow with the largest pump out of service.

2.6.3.4 All pumps shall be non-clogging units (chopper or screw types are preferred) capable of pumping solids bearing liquids and passing six (6) inch spherical objects or provide alternative

technologies approved by Georgia Environmental Protection Division (EPD).

2.6.3.5 Pumps shall be selected such that all design operating points are on the pump curve as supplied by the pump manufacturer.

2.6.3.6 In addition, pumps shall be selected such that the net positive suction head available (NPSHA) shall be 130% or greater than the net positive suction head required for the pump (NPSHR) at each of the design operating points.

2.6.3.7 To the greatest extent possible, pumps shall operate at or near their highest efficiency point throughout their anticipated service life, taking into account increases in head requirements (due to increased friction losses) over time.

2.6.3.8 Pumps shall be selected such that the pumps do not cavitate at any point within the design operating range.

2.6.4 Pumps that operate within the unstable portion of the pump curve under any of the expected design conditions shall not be allowed.

2.6.5 Freewheeling (i.e., operating at pump run-out) or deadheading (i.e., operating at pump shut-off) of pumps shall not be allowed.

2.6.6 The impeller chosen shall be the smallest available so that there is flexibility for future increased pumping needs.

2.6.7 The motor horsepower chosen shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

2.6.8 Material certification specifying the hardness of wearable parts shall be provided by the pump manufacturer.

2.6.9 Pumps shall be constructed in an ISO 9001 approved facility.

PART 3 WET WELLS AND VALVE VAULTS

3.1 General

3.1.1 Circular wet wells shall have a minimum inside diameter of 8 feet.

3.1.2 Rectangular wet wells shall have a minimum interior dimensions of 8 feet x 8 feet square.

3.1.3 Wet well floors, walls, ceilings and piping and exposed metals, which are not inherently corrosion resistant, shall have a corrosion resistant coating or lining system.

3.1.4 No manhole steps or ladders shall be installed in the wet well.

3.1.5 All openings into the wet well shall be covered and sealed airtight to prevent the release of odorous air into the atmosphere.

3.1.6 If the wet well is less than thirty (30) feet deep, the pump station may be a precast polymer concrete wet well with self-cleaning bottom.

3.1.7 If the wet well is greater than thirty (30) feet deep, the pump station may be cast in place designed by a licensed Professional Engineer in the State of Georgia.

3.1.8 Prefabricated structures of fiberglass or other type of materials may be considered on a case-by-case basis.

3.1.9 Wet well shall be of a self-cleaning design.

3.1.10 The wet well shall be provided with a depth as required to maintain the active storage volume, the emergency storage volume and to allow for proper operation of the duplex pumps.

3.1.11 Wet well and pump intake design shall be designed for solids bearing liquids per ANSI/HI 9.6 and 9.8

3.1.12 Wet well sizing shall be designed in accordance with the requirements of the Section 5 Minimum Hydraulic Requirements.

3.1.13 Wet Well Geometry

3.1.13.1 The following equation shall be used to determine the active storage volume in the wet well (the volume between the pump-on and pump-off elevations) required to generate the required pump cycle time:

$$V = T\left(\frac{Q_{PUMP}}{4}\right)$$

Where

V is the active volume within the wet well, in gallons

T is the allowable pump cycle time between starts, in minutes

Q_{PUMP} is the pumping rate of a single pump, in gpm

3.1.13.2 The geometry of the wet well shall be shaped such that the only flat surfaces occur directly under the pump inlets.

3.1.13.3 The wet well floor shall have a minimum slope of 60 degrees to the hopper bottom.

3.1.13.4 The horizontal area of the hopper bottom shall be no greater than necessary for proper installation and function of the pump inlet.

3.1.13.5 The walls shall be cylindrical, with an eight (8) foot minimum diameter.

3.1.13.6 The entry hatch shall be large enough to remove the pumps for servicing.

3.1.13.7 The wet well shall have a minimum depth of eight (8) feet.

3.1.14 Clearances

3.1.14.1 Pump-to-pump and pump-to-sidewall clearances shall be the minimum possible to minimize the potential for sedimentation problems while also being within the manufacturer's recommendation.

3.1.14.2 Unless specifically prevented by site conditions, the top of the wet well shall be at least two feet below the lowest building floor elevation receiving sewer service.

3.1.15 Influent Sewer Lines

3.1.15.1 Velocity in the influent sewer shall be minimum scouring velocity.

3.1.15.2 The required sanitary storage volume must be provided entirely within the wet well.

3.1.15.3 Only one inlet connection shall be permitted to a wet well.

3.1.15.4 Any additional influent lines shall be combined into a manhole upstream of the wet well.

3.1.16 Sump Design

3.1.16.1 The sump design shall be an integral part of the pump station.

3.1.16.2 Proper pump performance depends on correct sump design, which will also reduce cost of operation and maintenance.

3.1.16.3 Ideally, the flow of water into any pump shall be uniform, steady, without swirl and without entrained air.

3.1.16.4 Unsteady flow will lead to mechanical problems in the pump and air entrainment will lead to cavitation in the pump.

3.1.16.5 All sumps shall be designed in accordance with the manufacturer's recommendations.

3.1.17 Buoyancy Protection

3.1.17.1 Structures shall be designed to counteract buoyant forces.

3.1.17.2 Below-ground pump station structures shall be protected from the buoyant forces of groundwater.

3.1.17.3 Buoyancy protection for wet wells shall be demonstrated through the use of flotation calculations.

A. Developer's Engineer, a Professional Engineer registered in the State of Georgia, shall be responsible to verify that the structure is protected from floatation.

B. A geotechnical analysis shall be performed to gather groundwater and soil data.

C. Flotation calculations shall be performed on below-ground pump station structures using groundwater table elevation determined from the geotechnical analysis.

D. Flooding conditions shall also be designed for.

E. Buoyancy forces shall be computed by multiplying the volume displaced by the wet well by the associated weight in water.

F. Counteracting force shall be computed by adding the weights of the entire structure including that of the wet well barrel, bottom slab, top slab, superstructure if any, the net weight of the saturated soil over the bottom slab and any additional restrains

G. Flotation calculations shall not add the weight of the pumps, internal piping and appurtenances, or wastewater present in the pump station, including the wastewater below the all pumps-off activation level, into the downward forces used to counteract buoyancy.

H. The use of the saturated weight of any soil above the extended footing of the pump station structure to the groundwater table elevation will be allowed in the flotation calculations.

3.1.17.4 Flotation calculations shall show that the design of the below-ground pump station structures will be protected from buoyancy with a factor of safety that is equal to or greater than one.

A. The factor of safety should be 1.5 or greater which shall be obtained by dividing the counteracting force by the buoyant force.

3.1.17.5 An anti-flotation collar at the base of the pump station may be used to offset the buoyancy force.

3.1.17.6 Pressure relief valves shall not be used.

3.1.18 Pump Cycle Time

3.1.18.1 Pumps shall be cycled such that the numbers of starts are minimized, and resting times are maximized to avoid overheating and overstressing of the pump motor.

A. The minimum time between pump starts shall be ten (10) minutes.

B. The minimum cycle time occurs in a two (2) pump system when the inflow is at half the peak flow.

C. Automatic pump alternation of the starting order of the pumps after shutoff is required and will provide longer cycle times and rest times.

3.1.19 Pump Control Elevations

3.1.19.1 Within the wet well, there shall be set elevations for the following conditions:

A. High Level Alarm

B. Lag Pump On

C. Lead Pump On

D. All Pumps Off

E. Low Level Alarm

3.1.19.2 Pumping Sequence

A. The lead pump is energized when the wastewater level reaches the **lead pump-on** elevation.

B. The lead pump shall operate continuously until the water level is lowered to the **all pumps off** elevation.

C. The lag pump shall be energized if the lead pump is incapable of handling the flow of wastewater, allowing the water level to reach the **lag pump-on** elevation.

D. The lag pump shall then operate in unison with the lead pump until the water level is lowered to the **all pumps-off** elevation when both pumps are de-energized.

E. An automatic circuit shall be provided to alternate the lead pump and lag pump sequence on every pump down cycle.

F. A time delay relay shall be provided to prevent both lead and lag pumps from starting at the same time.

3.1.19.3 Storage in the wet well shall be provided above the high-level alarm equal to three (3) hours at design flow.

A. Storage volume is calculated to be that volume between the **high-level alarm** and the lowest point of overflow and includes volume in the wet well and gravity sewer.

B. The location of the lowest point of overflow shall be noted in the Design Review and Approval Submittal.

3.1.19.4 The **high-water alarm** elevation shall be set to provide one foot of freeboard below the influent sewer pipe.

3.1.19.5 The **lag pump-on** elevation shall be set at a minimum of six (6) inches below the **high-water alarm** elevation.

3.1.19.6 The **lead pump-on** elevation shall be set at the elevations that satisfy the individual pump cycling volumes.

3.1.19.7 The wet well active volume is obtained using the equation provided in Section 3, Paragraph 3.1.13.1.

3.1.19.8 The **all pumps-off** elevation shall be no lower than the lower of either the pump discharge flange elevation or manufacturer's minimum recommended level.

3.1.19.9 The **low-level alarm** elevation shall be set six (6) inches below the all pumps off elevation.

3.1.20 Water-Level Sensors

3.1.20.1 Floats and probes shall be installed at the closest accessible location.

3.1.20.2 The water-level sensors activate the pumps and, therefore, are a vital component of the control system.

A. FCPW will allow only electronic sensors.

B. Sensors shall be continuous water level measuring devices and shall be hydrostatic transducer as primary and ultrasonic transducer as a backup.

C. Float switches shall not be used for pump control.

3.1.20.3 The signals from these sensors are inputted to a PLC which will control the starting and stopping of the pump motors.

3.2 Materials of Construction

3.2.1 Acceptable materials of construction include:

3.2.1.1 Precast concrete

3.2.1.2 Cast-in-place concrete

3.2.1.3 Fiber reinforced polyester (FRP)

3.2.1.4 High density polyethylene (HDPE)

3.2.2 Precast Concrete

3.2.2.1 Precast concrete section shall meet the requirements of the following applicable standards:

A. ASTM C478 “Standard Specification for Precast Reinforced Concrete Manhole Sections”

B. ASTM C913 “Standard Specification for Precast Concrete Water and Wastewater Structures”

C. ASTM C858 “Standard Specification for Underground Precast Concrete Utility Structures”

D. ASTM C923 “Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals”

E. ASTM C990 “Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants”

3.2.2.2 Precast concrete wet wells shall consist of pre-cast reinforced polymer concrete sections and a flat slab top section with access hatches, as required.

A. The minimum compressive strength of the concrete for all sections shall be 4,000 psi.

B. Concrete for wet wells shall be Type II, four thousand (4,000) psi at twenty-eight (28) days.

C. The maximum allowable absorption of the concrete shall not exceed 8 percent of the dry weight.

D. The circumferential reinforcement in the riser sections and base wall sections shall consist of one line of steel and shall be not less than 0.20 square inches per linear foot.

E. The ends of each reinforced concrete riser section and the bottom end of the top section shall be so formed that when the risers and the top are assembled, they will make a continuous and uniform wet well.

3.2.2.3 Pre-cast wet wells shall be constructed with a monolithic base structure as shown in Standard Detail P-014, Appendix B.

3.2.2.4 Wet well sections

A. The minimum wet well diameter shall be eight (8) feet.

B. The minimum wall thickness shall be eight (8) inches for all wet wells.

C. The minimum pre-cast base section thickness shall be twelve (12) inches

D. The pre-cast top slab shall have minimum thickness of ten (10) inches.

E. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on each pre-cast section.

F. Pre-cast wet well section shall be handled by lift rings or non-penetrating lift holes

G. Each section of the precast wet well shall have not more than two holes for the purpose of lifting, handling and installing.

1) These holes shall be tapered and shall be plugged with mortar after installation.

H. The first pre-cast sections shall be placed and carefully adjusted to true grade and alignment.

I. The sections shall be uniformly supported by the base structure and shall not bear directly on any of the pipes.

J. The completed wet well shall be rigid, true to dimensions and watertight.

K. Pre-cast sections shall be placed and aligned to provide vertical alignment with a one-quarter (1/4) inch maximum tolerance per five (5) feet of depth.

3.2.2.5 Base sections shall be placed on bedding rock.

A. The bedding rock shall be firmly tamped and made smooth and level to assure uniform contact and support of the pre-cast structure.

B. The pre-cast base section shall be carefully placed on the prepared bedding so as to be fully and uniformly supported in true alignment and making sure that all entering pipes can be inserted on proper grade.

3.2.2.6 Section Joints

A. Barrel, top and base sections shall have tongue and groove joints.

B. Section shall be joined using an approved preformed plastic gasket meeting the requirements of Federal

Specifications SS-S-00210, "Sealing Compound, Preformed Plastic for Pipe Joints", Type 1, Rope Form

C. Joints shall be sealed with epoxy grout on both the internal and external walls for a smooth continuous wall

3.2.2.7 If wet well base or cone are to be cast in place, Number 5 (#5) rebar at twelve (12) inch off-center will be anchored as dowel bars to ensure monolithic construction.

A. Wet well top slab shall extend minimum three (3) inches above the pump station pad.

3.2.2.8 If ground water is encountered during construction of the wet well, a six (6) inch perforated drainpipe surrounded by Number 57 (No. 57) Stone and wrapped with filter fabric shall be installed.

A. The perforated drainpipe is to begin at the wet well base, slope downward and discharging to daylight as low as possible per geotechnical.

3.2.3 Cast-in-place concrete

3.2.3.1 Concrete mix design shall be in accordance with ACI 318 and ACI 350.

A. 28-Day Strength: 4,000 PSI.

B. Cement Content: Minimum 560 pounds per cubic yard.

C. Air Content: 5% to 7% in accordance with ASTM C231.

D. Water to Cement Ratio: Maximum 0.44.

E. Slump Range: 3 to 5 inches in accordance with ASTM C143.

F. Use of fly ash shall be approved by FCDPW Construction Project Manager.

G. Use of admixtures shall be approved by FCPW Construction Project Manager.

3.2.3.2 Materials

A. Cement: Domestic Portland cement in accordance with ASTM C150, Type II.

B. Fine Aggregate: Washed, inert, natural sand in accordance with ASTM C33.

C. Coarse Aggregate: Number 57 (No. 57) stone in accordance with ASTM C33.

D. Water: Clean, potable water free from injurious amounts of oils, acids, alkalis, salts, organic matter, or other deleterious substances.

3.2.3.3 Reinforcement

A. Steel reinforcing bars shall be in accordance with ASTM A615, Grade 60.

B. Welded wire reinforcement shall be in accordance with ASTM A185.

3.2.4 Fiber reinforced polyester (FRP)

3.2.4.1 General

A. Fiberglass reinforced polyester wet wells shall be manufactured from commercial grade polyester resin or vinyl ester resin, with fiberglass reinforcements.

B. The resin system shall be suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection systems.

C. The wet well shall be of one-piece unit construction.

3.2.4.2 Materials

A. Resin: The resins used shall be a commercial grade unsaturated polyester resin.

B. Reinforcing Materials:

1) The reinforcing materials shall be commercial Grade "E" type glass in the form of mat, continuous roving, chopped roving, roving fabric or a combination of the above, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin.

C. Surfacing Material:

1) If reinforcing materials are used on the surface exposed to the wastewater, it shall be a commercial grade chemical-resistant glass that will provide a suitable bond with the resin and leave a resin rich surface.

D. Fillers and Additives:

1) Fillers, when used, shall be inert to the environment and wet well construction.

2) Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used. The resulting reinforced plastic material must meet the requirement of this specification.

3.2.4.3 Fabrication

A. Exterior Surface:

1) The exterior surface shall be relatively smooth with no sharp projections. Handwork finish is acceptable if enough resin is present to eliminate fiber show.

2) The exterior surface shall be free of blisters larger than 1/2 inch in diameter, delamination and fiber show.

3) For a UV inhibitor the resin on the exterior surface of the wet well shall have gray pigment added for a minimum thickness of 0.125 inches.

B. Interior Surface:

1) The interior surface shall be resin rich with no exposed fibers.

2) The surface shall be free of grazing, delamination, blisters larger than 1/2 inch in diameter and wrinkles of 1/8 inch or greater in depth.

3) Surface pits will be permitted up to 6 square feet if they are less than 3/4 inch in diameter and less than 1/16 inch deep.

C. Fiberglass Reinforced Bottom:

1) The bottom shall be fabricated using fiberglass material as identified above.

2) Bottom to be attached to wet well walls with fiberglass layup to comply with ASTM-D3299 specifications.

3) When reinforcement is necessary for strength, the reinforcement shall be fiberglass channel laminated to wet well bottom per ASTM-D3299.

D. Integral Internal Fiberglass Fillet:

1) Fiberglass wet wells may have an internal sloped fillet bottom.

2) The fillet shall be constructed of the same fiberglass material as the wet well and shall be integral to the wet well.

3) The fiberglass fillet shall have a 1:1 slope and shall not interfere with pump mounting in the wet well.

E. Fiberglass Reinforced Top:

1) The fiberglass wet well top shall be fabricated using fiberglass material as identified above.

2) Top to be attached to wet well pipe with fiberglass layup to comply with ASTM-D3299 specifications.

3) When reinforcement is necessary for strength, the reinforcement shall be fiberglass channel laminated to wet well top per ASTM-D3299.

F. Installation of Stubouts:

1) Influent or discharge lines may be factory installed.

2) Approved methods are PVC sewer pipe, Inserta-Tee fittings or Kor-N-Seal boots.

3) Installation of stubouts to be fiberglass layup to comply with ASTM-D3299 specifications.

G. Defects Not Permitted:

1) Exposed fibers: glass fibers not wet out with resin.

2) Resin runs: runs of resin and sand on the surface.

3) Dry areas: areas with glass not wet out with resin.

4) Delamination: separation in the laminate.

5) Blisters: light colored areas larger than 1/2 inch in diameter.

6) Crazing: cracks caused by sharp objects.

7) Pits or Voids: air pockets.

8) Wrinkles: smooth irregularities in the surface.

9) Sharp projection: fiber or resin projections necessitating gloves for handling.

3.2.4.4 Physical Requirements

A. Load Rating:

1) The complete wet well shall have a minimum dynamic-load rating of 16,000 ft-lbs. when tested in accordance with ASTM-D3753.

2) To establish this rating, the complete wet well shall not leak, crack or suffer other damage when load tested to 40,000 ft-lbs. and shall not deflect vertically downward more than 1/4 inch at the point of load application when loaded to 24,000 lbs.

B. Stiffness:

1) The wet well cylinder shall have a minimum pipe-stiffness value shown in the table below when tested in accordance with ASTM-D3753

LENGTH - FT.	F/AY - PSI
10 to 20	2.01
21 to 30	3.02
31 to 40	5.24

C. Physical Properties

	Hoop Direction	Axial Direction
Tensile Strength (psi)	18,000	5,000
Tensile Modules (psi)	0.8×10^6	0.7×10^6
Flexural Strength (psi)	26,000	4,500
Flexural Modules (psi)		
(no ribs - 48", 60", 72") (psi)	1.4×10^6	0.7×10^6
(with ribs - 96", 144") (psi)	0.7×10^6	0.7×10^6

3.2.5 HDPE

3.2.5.1 The following table lists standards associated with this section:

RESIN STANDARDS	ASTM D3350	"Standard Specification for Polyethylene Plastics Pipe and Fitting Materials".
	ASTM F412	"Standard Terminology Relating to Plastic Piping Systems".
	ISO 4427-1	"Plastics piping systems – Polyethylene (PE) pipes and fittings for water supply – Part 1: General".

DIMENSIONS AND MANUFACTURING	ASTM F714	"Standard Specification for Polyethylene (PE) Pipe (SDR-PR) Based on Outside Diameter".
	ASTM D2513	"Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing and Fittings".
	ASTM D3035	"Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter".
	ASTM F2619	"Standard Specification for High Density Polyethylene (PE) Line Pipe".
	ISO 4427-1	"Plastic piping systems – Polyethylene (PE) pipes and fittings for water supply – Part 2: Pipes".

3.2.5.2 The products used in the fabrication of the wet well structures shall conform to the following requirements:

A. HDPE extruded solid wall pipe requirements:

1) Solid wall pipe shall be used for wet wells up to 96 inches in diameter and shall be a minimum grade of PE 4710 with a minimum cell classification value of 445474C per ASTM D3350.

2) Pipe shall be manufactured in conformance with the standard of ASTM F714.

3) Dimension Ratio (DR) and Outside Diameter (IPS/DIPS) shall be as specified on plans.

B. HDPE profile wall pipe requirements:

1) Profile wall pipe shall be used for wet wells up to 120 inches and shall be manufactured to the dimensions and material requirements of ASTM F894 with a minimum cell classification value of 334433C per ASTM D3350.

C. HDPE sheet material Requirements:

1) HDPE sheet or plate shall be of pipe grade material with a minimum equivalent designation of PE 3608 or a minimum cell classification value of 345464C per ASTM D3350.

D. HDPE fitting requirements:

1) HDPE fittings shall be of a minimum grade of PE 4710 with a minimum cell classification value of 445474C per ASTM D3350

2) HDPE fittings shall conform to either ASTM D3261 for molded or machined fittings and ASTM F2206 for fabricated fittings.

3.2.5.3 HDPE Fabrication Requirements

A. The fabricator shall construct the HDPE wet well structures based on FCPW approved drawings.

B. The inlets and outlets shall be extrusion welded on the inside and outside of the structure, where access is available.

1) Two gussets shall be provided for 2”-8” extrusion welded inlets and outlets.

2) Four gussets shall be provided for 10” and larger extrusion welded inlets and outlets unless impractical.

C. Wet well connections larger than 4” nominal OD pipe shall be joined by the following methods:

1) Butt fusion

2) Electrofusion

3) Flanged connections using an HDPE flange adapter and metallic backup ring having a bolt pattern per ASME B16.5 or B16.47 Series A.

D. For 4” OD pipe and smaller, threaded transition fittings may be used in addition to those connections specified for 4” and larger.

E. Employing mechanical couplings or similar connections requires approval by the FCPW.

F. Make all butt fusion welds in accordance with ASTM F2620.

1) All butt fusion welds performed with hydraulically operated butt fusion equipment shall be recorded using a data acquisition device.

2) The fabricator shall maintain records of the temperature, pressure and graph of the fusion cycle for a minimum of 3 years.

G. Lifting eyes provided shall be integral to the wet well structure body and the locations of which shall be accurately indicated on shop drawings.

H. Wet well structure and outlets shall not be used as anchor points against excessive axial loads or movement.

1) When expecting large changes in temperature, design restraints to isolate the structure and prevent strain at the inlets or outlets.

2) Cast restraints into a concrete block or collar around the pipe.

I. As an integral part of the wet well structure, anti-flotation and/or anti-settling measures such as anchor lugs, rings, or collars shall be provided.

J. Reinforced concrete pads at surface level spanning the HDPE wet well structure footprint shall be provided when used in traffic areas.

1) The pad shall transfer live loads to the surrounding fill and remove direct loading to the wet well structure riser or manway.

2) A Professional Engineer registered in the State of Georgia shall design the concrete pad.

3) Integration of the pad with the wet well structure shall be coordinated with the manufacturer.

K. Equipment Mounting

1) Special provisions shall be provided when mounting pumps in an HDPE wet well structure.

2) Bolting directly to the wall of the HDPE structure is not permitted.

L. The wet well structures shall be factory tested in accordance with ASTM F2164. FCPW may request to observe the test.

1) Pressure rated vessels may be tested with a hydrostatic pressure test. Minimum test duration will be one hour. Maximum test duration will be three hours.

2) When approved, conduct a water fill test by filling the structure and checking for leaks.

3) Approval drawings and testing documents will specify the level of water and test duration.

4) Minimum test duration will be one hour.

5) A low-pressure air test may be used instead of testing with water using a minimum of 1 psi test pressure for 15 minutes.

3.2.5.4 Direct Burial Installation

A. Trench Construction: Construct the trench and trench bottom in accordance with ASTM D2321.

B. Install the HDPE wet well structure on a concrete pad or a stable base consisting of 12” of Class I materials compacted to 95% proctor density per ASTM F1759.

C. Embedment materials:

1) Embedment materials shall be Class I or Class II materials as defined by ASTM D2321.

2) Class I or flowable fill (controlled low strength material /CLSM) materials are preferred.

3) Backfill and bedding materials shall be free of debris.

D. Bed and compact beneath the manhole or structure in accordance with ASTM D2321.

E. Backfilling shall be done to conform to the ASTM F1759.

1) Backfill should extend at least 3.5 feet beyond the edge of the wet well structure for the full height of the structure and extend laterally to undisturbed soils.

2) Compaction shall be minimum 90% proctor density with a minimum fill modulus of 1000 psi.

3.3 Piping Penetrations

3.3.1 For precast concrete wet wells, pipe penetrations shall be sealed with the following methods using resilient connectors:

3.3.1.1 A-Lok Products, Inc.

3.3.1.2 Trelleborg Pipe Seals

3.3.1.3 Link-Seal by GPT Industries

3.3.1.4 FCPW approved equal.

3.3.2 For cast-in-place concrete wet wells, pipe penetrations shall be sealed with the following methods.

3.3.2.1 Cast-in-place wall pipe with water collar.

3.3.2.2 Cast-in-place in wall sleeve water collar, with Link-Seal by GPT Industries and non-shrink grout on inside face.

3.3.3 For HDPE or FRP wet wells, pipe penetrations shall be made in accordance with the above or the manufacturer’s recommended procedures.

3.4 Mixers

3.4.1 Mixers will be required to be installed in the wet well if in the opinion of Fulton County the design of the wet well does not prevent solids from settling, reduce odor, and stop grease from building up. The mixer design and type will be addressed on a case by case basis upon discussions with Fulton County Public Works staff.

PART 4 VALVE AND METER VAULT DESIGN

4.1 General

4.1.1 All wastewater pump stations shall have a combined below grade valve and meter vault, separate from, but immediately adjacent to the wet well.

4.1.2 Guidelines for proper design of the valve and meter vault include the following:

4.1.2.1 Valve and meter vault, pumping station, and other main structures shall be located minimum five (5) feet apart.

4.1.2.2 Valve and meter vaults are to be constructed of precast or cast-in-place concrete.

4.1.2.3 Valve and meter vaults shall generally be no less in width as the wet well.

4.1.2.4 There shall be a minimum of 2 feet of clearance around flanges for pipe 8 inches and smaller and a minimum of 3 feet for pipe larger than 8 inches.

4.1.2.5 Valve and meter vaults shall be provided with double leaf aluminum access hatches meeting the requirements described in Paragraph 5.1.

A. Valves and flow meters shall be located directly under hatch openings.

B. Valves shall be operational from the ground surface without the need of entering the vault.

C. Flow meters and pressure gauges shall be readable from the ground surface without the need of entry.

D. Piping and appurtenances within the valve and meter vault shall be set three (3) feet above floor elevation and shall be provided with stainless steel pipe supports.

E. Piping within the valve vault shall be minimum three (3) feet below the ground surface.

4.1.2.6 Pipe penetrations shall be per Paragraph 3.3.

4.1.2.7 No manhole steps shall be installed in valve and meter vaults

4.1.2.8 The discharge piping from each pump shall be routed through the valve and meter vault with check valves and shutoff valves on horizontal stretches of pipe, to prevent solids from settling back on the check valve.

4.1.2.9 Check valves shall be placed upstream of shutoff valves.

4.1.2.10 A flow meter shall be installed downstream of the valves in the valve and meter vault.

A. The length of force main between the meter and the valves shall be straight, in accordance with the manufacturer's recommendations, with no bends or fittings in the line, to reduce turbulence of the wastewater entering the flow meter.

4.1.2.11 Pressure gauges shall be installed within the valve and meter vault.

A. The pressure gauge tap with diaphragm mounted seals shall be located on the side of each pipe in the valve and meter vault, see Standard Detail P-014 in Appendix B for placement.

B. Gauge gradation shall not be more than one hundred and twenty percent (120%) of the maximum pressure anticipated at the pump station.

C. Pressure gauge face shall be four (4) inches minimum and installed facing up toward to the access hatch. The pressure gauge shall be easily read by looking down into the valve and meter vault.

4.1.2.12 The valve and meter vault shall have a concrete floor with concrete sides and two aluminum hatches. The floor shall be sloped at two percent (2%) to a sump to collect rainwater.

4.1.2.13 All pipes, valves, meters and fittings within the vault shall receive, after installation, one (1) three (3) mil coat of suitable primer and one (1) three (3) mil coat of suitable **gray** paint.

4.1.2.14 The exterior of the vault shall receive two (2) coats of three (3) mils epoxy.

4.1.2.15 Vault top slab shall extend minimum three inches above the pump station pad.

4.1.2.16 A sump shall be provided in the valve and meter vault to collect rain and wash-down water.

4.1.2.17 Valve and meter vaults shall be considered confined spaces.

A. Adequate means for ingress and egress, including OSHA approved ladders or steps and access hatches of sufficient size, shall be required.

B. There shall be at least twelve (12) inches between the edge of the vault ladder and the pipe wall to provide ease of access.

C. The OSHA approved aluminum access ladder shall be installed from the access hatch to one (1) foot above the floor inside the vault and extend no less than two (2) feet above the hatch when fully extended.

D. Vaults shall be sized to accommodate this requirement.

E. Where access ladder is not provided, adequate room shall be allowed to place safely a temporary ladder and a 2-foot minimum clearance.

4.1.2.18 Size shall allow for personnel to enter and work.

A. Vault shall provide additional openings to allow for forced air ventilation.

B. Clearance shall be provided between flanges and vault floor and walls to allow for use of tools and wrenches sized for the flange bolts.

4.1.2.19 Piping and valves may be allowed to be installed above ground (not inside a vault) if suitable freeze protection and protection against vandalism is provided.

A. In such case, valves shall be installed over a containment pad.

PART 5 PUMP STATION EQUIPMENT AND MATERIALS

5.1 Access Hatches

5.1.1 Access hatches shall be of double leaf aluminum construction and sized appropriately per the equipment manufacturers recommendation to allow adequate clearance for easy removal of the pumps and other equipment.

5.1.2 Exterior access hatches shall be watertight aluminum hatches.

5.1.3 Access hatch shall be provided with the following:

5.1.3.1 Hinges with tamper proof bolts.

5.1.3.2 Automatic hold open arm and a flush aluminum drop handle.

5.1.3.3 All hardware shall be Type 316 stainless steel.

5.1.3.4 Hatches shall be rated for a live load of 300 psf except as specified below.

5.1.3.5 Hatches located within an area accessible by vehicle shall be rated for H20 loads.

5.1.3.6 All hatches shall have a recessed pad lock box to allow for secure locking of the hatch without presenting a potential trip hazard.

5.1.4 Provide two (2) hatch keys for hatch locking devices

5.2 Safety Grates

5.2.1 All access hatches shall be equipped with metal safety grates with safety latches.

5.2.2 Each safety grate shall be designed to combine covering of the opening, fall through protection per OSHA Standard 1910.23 and controlled confine space entry per OSHA Standard 1910.146.

5.2.2.1 Welding shall be in accordance with ANSI/AWS D1.2-90 Structural Welding Code for Aluminum.

5.2.3 The safety grate shall be made of 6061-T6 aluminum with a minimum ultimate strength of 38,000 psi and a minimum yield strength of thirty-five thousand (35,000) psi, as per A.S.T.M. B221.

5.2.4 Grate design shall use safety factors as defined in the “Specifications for Aluminum Structures, 5th addition, by the Aluminum Association, Inc. for “Bridge Type Structures”.

5.2.5 Grating shall be designed to withstand a minimum live load of three hundred (300) pounds per square foot. Deflection shall not exceed 1/150th of the span.

5.2.6 Grate opening shall be five (5) inch by five (5) inch, with banding, which will allow for visual inspection, limited maintenance and float adjustments while the safety grate fall through protection is left in place.

5.2.7 Design must assure that the fall through protection is in place before the doors can be closed, thereby protecting the next operator.

5.2.8 Each grate shall be provided with a permanent hinging system, which will lock the grate in the ninety (90) degree position once opened.

5.2.8.1 Grates in the open position create a physical barrier around the opening, protecting passing pedestrians.

5.2.9 Each grate shall have an opening arm, which will allow opening of the grate, while providing the grate as a barrier between the operator and the pit.

5.2.9.1 The opening arm shall also be equipped with a controlled confined space entry lock.

A. This locking device will prevent unauthorized entry to the confined space.

5.2.9.2 The grating system will allow anyone to make visual inspection and float adjustments without entering the confined space.

5.2.10 Grate shall be coated with an OSHA typed safety orange color, promoting visual awareness of the hazard.

5.2.10.1 The aluminum safety grates shall receive a two-coat powder coat system, applied by the electrostatic spray process.

5.2.10.2 The base coat is a thermosetting epoxy powder coat finishes with a minimum thickness of two (2) to four (4) mils.

5.2.10.3 The topcoat is a mar-resistant, TGIC polyester powder coating with a minimum thickness of two (2) to four (4) mils.

5.2.10.4 Each coat shall be baked at 350-375 degrees F until cured.

5.2.11 Safety grates shall have a rated capacity to support expected loadings and shall be designed not to interfere with the removal of the pumps or other equipment.

5.2.12 Acceptable hatch manufacturers include:

5.2.12.1 Halliday Products

5.2.12.2 Bilco

5.2.12.3 FCPW approved equal

5.3 Piping

5.3.1 Pipe diameter shall be larger than the diameter of the maximum solid size that is passed by the pumps present in the pump station.

5.3.1.1 The minimum allowable force main size is six (6) inches and the minimum allowable solid size that the pumps shall be able to pass is six (6) inches.

5.3.1.2 Size the pipe to achieve a flow velocity between three (3.0) and six (6.0) feet per second.

5.3.2 Wet Well Discharge Piping

5.3.2.1 Each pump shall have a separate discharge line from the base elbow in the wet well and through the valve and meter vault to a point minimum three (3) feet past the exterior of discharge side of the vault.

5.3.2.2 Discharge piping shall be DIPS DR 11 HDPE. Ductile iron pipe may be used only with FCPW's specific approval. These discharge lines shall be of a minimum six (6) inches in size.

5.3.2.3 All inlet pipes shall be properly installed so as to form an integral watertight unit.

5.3.2.4 All pipes, valves and fittings, unless otherwise stated, shall have flanged ends.

5.3.2.5 All bolts, nuts and washers used to connect these flange ends shall be of type 316 stainless steel.

5.3.2.6 All pipe valves and fittings shall be installed as indicated in Standard Detail P-014, Appendix B.

5.3.2.7 For pump stations less than eighteen (18) feet deep, each vertical discharge pipe in the wet well shall be of one (1) piece, continuous length.

A. If the depth of the wet well exceeds eighteen (18) feet, flange pipe connections shall be used to connect the riser pipes.

1) 314 SST pipe supports restraining the pipe to the wall of the wet well shall be used every five (5) feet.

B. Under no condition shall adapter flanges be permitted in the wet well.

5.3.2.8 Where DIP has been approved for use by FCPW:

A. All pipes, valves and fittings shall be epoxy lined.

B. All pump discharge pipes and fittings within the wet well shall receive, after installation, two (2) coats of epoxy paint. Each coat shall be eight (8) mil dry thick.

5.3.3 Yard Piping

5.3.3.1 A bypass connection shall be installed on the force main in the valve and meter vault so emergency bypass pumping may be performed.

5.3.3.2 The bypass line shall have quick disconnect equal to the size of the force main and have a plug valve and a check valve.

5.3.4 All piping from the pump suction to connection to the force main shall be ductile iron pipe (DIP).

5.3.4.1 Pipe thickness, coatings and linings shall be determined based on conditions of service.

5.3.4.2 No Uni-flange or Mega-flange types will be allowed.

5.3.5 A restrained solid sleeve flex joint shall be used between the wet well and valve and meter vault per Detail P- 014.

5.3.6 The following table lists standards associated with this section

Reference	Title
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250, and 800
ANSI B16.5	Pipe Flanges and Flanged Fittings
AWWA C110 (ANSI A21.10)	Ductile-Iron and Gray-Iron Fittings, 4 In. Through 48 In., for Water and Other Liquids
AWWA C153 (ANSI A21.53)	Ductile-Iron Compact Fittings, 4 In. Through 64 In
AWWA C111 (ANSI A21.11)	Rubber-Gasket Joints for Ductile- Iron and Gray-Iron Pressure Pipe and Fittings
AWWA C115 (ANSI A21.15)	Flanged Ductile-Iron Pipe With Threaded Flanges
AWWA C150 (ANSI A21.50)	Thickness Design of Ductile-Iron Pipe
AWWA C151 (ANSI A21.51)	Ductile-Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds, for Water or Other Liquids

5.3.7 Ductile Iron Pipe shall meet the requirements of ANSI/AWWA C150/C151 and ANSI/AWWA C115 for flanged pipe.

5.3.7.1 The required pipe class shall be such that the “manufacturer’s allowable working pressure” meets the greater of the following two conditions:

A. A minimum of twice the design working pressure

B. One- and one-half times the design surge pressure, whichever is greater.

5.3.7.2 Flanged DIP shall be a minimum Thickness Class 53.

5.3.8 Ductile iron fittings shall meet the requirements of ANSI/AWWA C110.

5.3.8.1 All exposed, including all unburied and submerged joints, pipe fittings shall be flanged.

5.3.8.2 Flanged fittings shall be flat faced.

5.3.8.3 Gasket material shall be a synthetic rubber compound in which the elastomer is nitrile or neoprene.

A. Gaskets for plain faced flanges shall be the full-face type.

B. Thickness shall be 1/8 inches.

5.3.8.4 Flange assembly bolts shall be as recommended per the joint specification.

A. Bolts for submerged service shall be made of Type 316 stainless steel in conformance with ASTM F593.

B. Where washers are required, they shall be of the same material as the associated bolts.

5.3.9 Linings

5.3.9.1 DIP and fittings shall have a corrosion resistant internal lining. Linings shall be double thickness PROTECTO 401 Ceramic Epoxy or approved equal.

5.3.9.2 Conditions of service may necessitate other specialized coatings or linings.

5.3.10 Coating

5.3.10.1 The exterior of ductile iron pipe shall be coated with a layer of arc-sprayed zinc per ISO 8179.

5.3.10.2 The mass of the zinc applied shall be 200 g/m^2 of pipe surface area.

5.3.10.3 A finishing layer of bituminous topcoat shall be applied to the zinc.

5.3.10.4 The coating system shall conform in every respect to ISO 8179-1 “Ductile iron pipes – External zinc-based coating - Part 1: Metallic zinc with finishing layer. Second edition 2004-06-01.”

5.3.10.5 An additional spray on epoxy coating shall be applied to all pipe and fittings inside the wet well.

5.4 Equipment Connection Fittings

5.4.1 Shall be required:

5.4.1.1 To permit easy disassembly and reassembly

5.4.1.2 To provide misalignment adjustment between equipment connection flanges and the connection to field piping.

5.4.1.3 To provide full pressure thrust restraint between the field piping connection and equipment connection flanges.

5.4.1.4 To impede the transmission of damaging forces.

5.4.1.5 To connect the magnetic flowmeter.

5.4.2 Equipment connection fittings shall be Romac ECF400 Series or equal.

5.4.2.1 Equipment connection fittings shall each conform to the requirements of the specified piping system of sufficient length to span the gap between the connection at the equipment and the connection at the field piping with gasketed flange adapters at each end.

5.4.2.2 Pressure rating of flange adapters shall equal or exceed the pressure rating of mating flanges.

5.4.2.3 All metal portions of equipment connection fittings, except for 316 stainless steel components, shall be coated and lined with fusion bonded epoxy conforming to AWWA.

5.5 Valves

5.5.1 Valves are specifically prohibited from being installed in the wet well.

5.5.2 Check Valves

5.5.2.1 Furnish and install check valves for each pump discharge.

5.5.2.2 When a pumping station is constructed, a check valve shall be installed on each pump discharge pipe, five (5) feet upstream of the joining wye or tee.

5.5.2.3 This shall allow for the isolation of each individual pump of the station.

5.5.2.4 Check valve shall be installed inside the valve and meter vault.

5.5.2.5 Pump discharge check valves shall be spring loaded or weight-and-lever type swing check valves.

5.5.2.6 Swing check valves shall be selected to best suite their installation type.

5.5.2.7 The valves shall be designed, manufactured and tested in accordance with the following Standards:

A. American Water Works Association Standard ANSI/AWWA C508.

B. Manufacturers Standardization Society Standard Practice MSS SP-136.

5.5.2.8 Swing check valves shall be of the full waterway body type with drain ports and domed access covers and vent port.

5.5.2.9 A side oil dampener shall be provided on valves sizes 8-inch and larger.

5.5.2.10 Swing check valves shall be Val-Matic series 7900, APCO series 6000/6000A, or approved equal.

5.5.3 Isolation Valves

5.5.3.1 Acceptable isolation valve shall be plug valves.

5.5.3.2 All pump stations shall have plug valves installed at the following locations:

A. On the discharge pipe of each pump.

B. On the by-pass piping connection.

C. Between the flowmeter and fence (at the point of connection between the pump station piping and force main.)

D. Additional locations as shown on the Drawings.

5.5.3.3 On force mains exceeding five thousand (5,000) feet, isolation valves shall be required for each two thousand and five hundred (2,500) feet to facilitate future repairs and shall be coordinated with ARV locations.

5.5.3.4 All buried isolation valves shall be located inside a standard valve box with a valve marker.

5.5.3.5 The valve marker shall clearly denote “Sanitary Sewer Force Main”.

5.5.3.6 An 18” square concrete pad shall be provided around each valve cover for buried valves.

5.5.3.7 Plug valves shall meet the following requirements:

A. General

1) Plug valves shall be non-lubricated, resilient-seated, eccentric valves.

2) Pressure ratings shall be 175 psi on valve sizes through 12-inch and 150 psi for 14-inch and larger.

3) Valve pressure ratings, body flanges and wall thicknesses shall be in full conformance with ANSI B16.1, latest revision.

4) Valves shall seal leak-tight against full rated pressure in both directions.

5) Valve seats shall be tested to provide leak tight shut-off to one hundred and seventy-five (175) psi for valves through twelve (12) inches with pressure in either direction.

6) In addition, every valve shall be given a certified hydrostatic shell test and seat test, with the plug open to a pressure twice that of rating specified above to demonstrate overall pressure integrity of the valve body. Test reports shall be available upon request by the FCPW.

7) Plug valves shall conform to the latest revision of ANSI/AWWA C517-05.

8) All materials shall be new.

9) Valves and operators shall have seals on all shafts and gaskets on valve actuator covers to prevent the entry of water. Actuator mounting brackets shall be totally enclosed and shall have gasket seals.

10) All buried valves shall have mechanical joint ends conforming to ANSI/AWWA C111/A21.11.

11) All exposed valves measuring 4 inches in diameter and larger shall have Class 125 flat face flanged ends, at a minimum, conforming to ANSI B16.1 or ANSI/AWWA C110/A21.10.

12) Plug valve and connecting pipe shall have the capability to be pigged without the use of special equipment.

13) A valve key for plug valves shall be provided to FCPW for each pump station.

B. Plugs

1) Shall be solid one-piece, Cast-Iron ASTM A126 Class B or Ductile Iron ASTM A536 Grade 65-45-12.

a) Two-piece plugs or plugs with internal cavities shall NOT be acceptable.

2) The plug shall have a cylindrical seating surface eccentrically offset from the center of the shaft.

3) Valves shall be furnished with resilient elastomer faced plugs, suitable for use with wastewater.

a) Plug facing shall be composed of either EPDM or Neoprene.

b) Pug facings composed of natural rubber, Viton, or Nitrile shall NOT be acceptable.

4) Plug shall not contact the seat until at least 90% closed.

5) Spherical shaped plugs are not acceptable.

C. Bodies and covers shall be Cast Iron ASTM A126 Class B or Ductile Iron ASTM A536 Grade 65-45-12.

1) At a minimum, valves measuring 4 inches to 12 inches in diameter shall have 175 psig bodies, and valves measuring 14 inches and greater in diameter shall have 150 psig bodies.

2) Ports shall be rectangular and 100% port.

3) The valve port area shall meet or exceed standard pipe area per ASME/ANSI B36.10M. Round ports are not acceptable.

4) For specific installation locations where the Total Dynamic Head (TDH) plus the surge pressure exceeds the minimum pressure ratings above, Class 250 flat face flanged ends and a 400 psi (for 3-inch to 12-inch valves) or 300 psi (for 14-inch and greater valves) valve body shall be provided.

D. Seats

1) Valve seats shall be in accordance with AWWA C517, latest revisions.

2) Seats on the body shall be 1/8” thick welded overlay of not less than 95% pure nickel.

a) Seat shall be at least 1/2” wide, 1/8” thick through entire width and raised.

b) The raised surface shall be completely covered with nickel to ensure that the resilient plug face contacts only the nickel seat.

3) Alternatively, valve seats shall be replaceable 316 stainless steel seats.

4) Seats composed of thermosetting epoxy or fusion bonded nylon shall NOT be acceptable.

5) Screwed-in seats shall NOT be acceptable.

E. Bearings

1) Radial shaft bearings shall be permanently lubricated, sleeve-type, sintered, oil-impregnated bearings:

a) Type 316 stainless steel for sizes 4-inch to 18-inch.

b) ASTM A743 Grade CF8M for sizes 20-inch to 36-inch.

c) Bronze in accordance with ASTM B-127.

d) Non-metallic radial shaft bearings shall NOT be acceptable.

2) Thrust bearings/washers shall be composed of Type 316 stainless steel, Teflon, Nylon 11, or Nylatron.

F. Shaft seal

1) Adjustable packing shall be Acrylonitrile-Butadiene (NBR) multiple V-ring type, with a packing gland follower.

2) Packing gland shall permit inspection, adjustment or complete replacement of packing without disturbing any part of the valve or actuator assembly, except the gland follower.

3) Shaft seals shall be self-adjusting.

4) Non-adjustable packing or packing requiring actuator removal to replace the packing shall not be acceptable.

5) All shaft seal hardware shall be 316 stainless steel.

G. End connections shall meet or exceed the latest revisions of AWWA C517 and other applicable standards. End Connections shall be flanged drilled per ASME B16.1 for above grade valves and Mechanical Joint for buried valves per AWWA C111.

H. Interior Valve Lining

1) All interior ferrous surfaces of the plug valve that will have contact with wastewater, except the valve seating surfaces, shall be coated with a factory applied, fusion bonded or thermosetting epoxy

coating in accordance with AWWA C550, latest revision.

2) Coating shall be holiday-free with a minimum thickness of twelve (12) mils DFT.

3) Surfaces shall be clean, dry and free from rust, oil and grease before coating.

I. All valves larger than 6-inch shall be installed with worm gear actuators. The actuator shaft and gear quadrant shall be supported on permanently lubricated bronze bearings.

1) Valves shall be equipped with traveling nut, self-locking type operators designed, manufactured and tested in accordance with AWWA C517.

2) All gearing shall be enclosed in a cast iron housing with outboard seals to protect the bearings and other internal components.

3) The actuator shaft and gear quadrant shall be supported on permanently lubricated bronze bearings.

J. Plug valves installed in valve vaults, except where indicated otherwise, shall have mechanical gear actuators with handwheel operators designed for submerged service.

1) Actuator shall clearly indicate valve position for above-ground and valve vault installations.

2) Actuator mounting brackets for submerged service shall be totally enclosed and shall have gasket seals.

3) All exposed valve nuts, bolts, springs, washers and the like shall be Type 316 stainless steel.

K. All buried valves shall be provided with totally enclosed worm gear actuators, 2-inch square AWWA operating nuts, extension stems and valve boxes.

1) Buried actuators shall be 90% grease filled.

2) Input shaft and fasteners shall be stainless steel.

3) Actuator mounting brackets shall be totally enclosed.

4) Buried valve operators shall be extended to within 6 inches of grade.

L. Gear actuators shall be designed to produce the required operating torque with a maximum rim pull of 80 pounds on a hand wheel and with a maximum input of 150 foot-pounds on 2-inch operating nuts.

M. Actuator shall be capable of withstanding an over-torque without damage up to three hundred (300) foot-pounds for handwheel operators, or up to four hundred and fifty (450) foot-pounds for two (2) inch nut operators.

N. Plug valves and operators shall be installed according to the manufacturer's recommendations for conveying fluids with high solid concentrations.

1) For valves installed in a horizontal pipeline, install the valve so the plug rotates up when opened. Where drain-back does not exist, install the valve with the higher pressure, when closed, against the end opposite the seat.

2) For valves installed in a vertical pipeline, or where the possibility of overhead drain-back exists, the plug valve shall be installed so that the plug face is pointing to the side when the valve is open, and the plug face is pointing upwards when the valve is closed to prevent drain-back solids from settling into the valve body.

O. Below grade plug valves shall be installed horizontally with right angle operators pointing up to allow operation from grade.

P. Above-ground valves 6 inches in diameter and smaller shall have manual lever operators, unless otherwise specified or noted on the Drawings.

Q. Above-ground valves 8 inches in diameter and larger shall be manually hand wheel operated through totally enclosed worm gear actuators, unless otherwise specified or shown on the Drawings.

R. Manual operators for plug valves mounted above 6 feet from the operating floor shall be equipped with worm gear chain wheel actuators.

S. All valves shall be provided with mechanical travel stops for the open and close positions and shall rotate 90 degrees from fully open to fully close.

T. Valves shall be either directly cast with, or provided with an attached corrosion-resistant, nameplate stating, at a minimum, the following:

1) Valve serial number

2) Manufacturer

3) Size

4) Maximum shutoff pressure

5) Design pressure rating.

U. The seat end shall be clearly indicated on the valve exterior relative to half of the body containing the plug/seat interface.

5.5.3.8 Valves shall be Dezurik, Val-Matic or approved equal.

5.5.4 Air/Vacuum Valves

5.5.4.1 Air release/vacuum valves (combination valves) are to exhaust pockets of air in the force main accumulated during operation of the pump station and to exhaust or admit air during the filling or draining of the force main.

5.5.4.2 Consideration shall be given to providing automatic air release/vacuum valves with flood protection in areas within the one hundred (100) year floodplain or any areas where flooding is anticipated to occur.

5.5.4.3 Automatic air release/vacuum valves shall be provided at all high points to prevent air locking of the force main and at locations along the force main where sub-atmospheric pressures or column separation may occur.

5.5.4.4 The route of the force main shall be such that the number of air release/vacuum valves will be minimized to the greatest extent possible.

5.5.4.5 Locations

A. At the discharge of the pump if necessitated by the piping arrangement.

B. Force mains shall have a combination air release/vacuum valve at each high point and as may be prescribed by any hydraulic transient analysis.

C. Location and sizing of combination air release/vacuum valves shall be determined by hydraulic modeling of the force main and verified by the valve manufacturer.

D. The sizing shall also take into consideration rapid draining of the force main due to a line break.

E. Force mains shall be designed to minimize the number of air release/vacuum valves required.

1) The force main bury depth may be varied up to a maximum of 10 feet where deemed necessary to eliminate air release valves.

5.5.4.6 One spare air release/vacuum valve shall be provided for every five (5) air release/vacuum valves installed.

A. If applicable, a minimum of one (1) spare valve shall be provided per force main.

5.5.4.7 All air release/vacuum valves shall be located inside a concrete manhole.

A. The manhole shall be appropriately sized for the installation and maintenance of the air release/vacuum valve.

1) Minimum manhole diameter shall be 96 inches.

B. Air release/vacuum valve manholes shall be installed such that the air valve can be worked on and removed without the need to pull the top of the manhole off.

C. Approved air release/vacuum valve installation is provided in Standard Detail P-018, Appendix B.

D. The manhole shall be provided with a FCPW approved odor control device.

5.5.4.8 Types

A. Air/vacuum valves shall be Vent-Tech by International valve or Vent-O-Mat series RGX and shall be installed per Standard Detail and manufacturer's recommendation.

5.6 Pressure Gauge

5.6.1 Pressure gauge sizing shall take into consideration the current discharge pressure, flow ranges and future capacity of the pump station.

5.6.2 Gauge gradation shall not be more than one hundred and twenty percent (120%) of the maximum pressure anticipated at the pump station.

5.6.3 The pressure gauge tap shall have diaphragm mounted seals.

5.6.4 Pressure gauge face shall be four (4) inches minimum.

5.6.5 Pressure gauges shall be installed within the valve vault.

5.6.6 Wafer style isolation ring of the same diameter as the force main piping shall be installed to facilitate the installation of a pressure gauge.

5.6.7 The pressure gauge tap with diaphragm mounted seals shall be located on the top or side of each pipe in the valve vault, see Standard Detail P-014 in Appendix B for placement. The determine if placement on the top or side will be determined by Fulton County Technical Services.

5.6.8 Pressure gauge face shall be installed facing up toward to the access hatch such that the pressure gauge shall be easily read by looking down into the valve vault.

5.6.9 The pressure gauge shall be connected to the telemetry system via the control PLC for off-site monitoring.

5.6.10 Acceptable manufacturers:

5.6.10.1 Pressure gauge manufacturer is Endress & Hauser.

5.6.10.2 Isolation ring manufacturer is Onyx.

5.7 Diaphragm Seals

5.7.1 Diaphragm seals shall be Type 316 stainless steel seals with flushing connections.

5.7.2 Acceptable Manufacturers:

5.7.2.1 Ametek

5.7.2.2 Ashcroft

5.7.2.3 Trerice

5.7.2.4 FCPW Approved Equal

PART 6 HOIST

6.1 Materials and Installation

6.1.1 Stationary electric hoists, “jib crane,” are the only acceptable type for pump station applications.

6.1.2 All hoists shall be of stationary type mounted on a concrete pad of sufficient size and strength suitable for the hoist and anticipated load size and weight.

6.1.2.1 An example jib crane base is provided as Standard Detail P-005.

6.1.2.2 As shown in Standard Detail P-005, number five (#5) rebar with two (2) ninety (90) degree bends shall anchor the jib crane to the concrete pad.

6.1.2.3 Dimensions shown in Standard Detail P-005 are minimum values. The pad may need to be larger and/or deeper depending on the pump weight and jib crane installed.

6.1.3 Electric hoist shall be weather proofed with a weatherproof cover.

6.1.4 Electric hoists to include ratchet type manual crank.

6.1.5 Hoists shall be epoxy coated in a three (3) step process using Ameron Amercoat 68HS epoxy primer, Amercoat 385 epoxy, and a finish coat of Amercoat 450HS polyurethane paint.

6.1.6 Portable hoists shall not be allowed.

6.1.7 The hoist system shall be designed so that the pumps can be lifted from the wet well and placed on a platform or maintenance vehicle easily.

6.1.8 The hoist and accessories shall be rated for not less than one and one-half (1.5) times the heaviest anticipated load.

6.1.9 Acceptable hoist manufacturers

6.1.9.1 Thern.

6.1.9.2 FCPW approved equal.

6.1.10 The hoist system shall be mounted next to the pumping station. Special care shall be taken to assure that the proper length and strength of hoist cable is provided.

6.1.11 Hoist shall be installed with stainless steel anchor bolts.

6.1.12 Power for the hoist shall be supplied via the pump station control panel with a dedicated circuit breaker located on the inner panel door.

6.1.13 For example, hoist placement reference Standard Detail P-014 in Appendix B.

PART 7 ODOR CONTROL AND WET WELL VENTILATION

7.1 Pumping stations wet wells are hazardous areas and stringently classified under the National Fire Protection Association (NFPA), the Occupational Safety and Health Administration (OSHA) and the National Electric Code (NEC).

7.2 In general, Developer's Engineer shall eliminate any need to enter the wet well on a routine basis.

7.3 Guidelines related to wet well ventilation and the related subject of odor control include the following:

7.3.1 To reduce odor problems caused by gas release, the fall of wastewater from the inlet sewer to the wet well water level shall be minimized to the extent practicable.

7.3.2 Because of poor ventilation and the presence of dangerous gases, wet wells are generally classified as Class I, Group D, Division 1 areas under the NEC.

7.3.2.1 Explosion proof submersible pumps and measuring devices shall be the only equipment inside the wet well.

7.3.2.2 Electrical connections in the wet well shall also be explosion proof.

7.4 Wet wells are generally rated as Class A confined spaces according to OSHA regulations. This classification requires special safety procedures for entry.

7.5 Wet wells shall be ventilated with odor control, as listed herein.

7.5.1 All air contacting wastewater within the wet well shall be treated to remove odors prior to discharging to the atmosphere.

7.5.2 The odor control system shall include neutralizing or preventing production of odorous compounds, treatment of odorous compounds, containing and treating foul air and enhancing dispersion of foul air.

7.5.3 Odor complaints from pump stations are generally caused by the release of hydrogen sulfide (H_2S) gas. Therefore, the air treatment systems are primarily designed to control H_2S.

7.6 The odor control system manufacturer shall be responsible for a complete system including carbon vessel, ductwork, dampers, mist/grease eliminator, piping, concrete pad, controls, and conduit and wiring required for the odor reduction system.

7.6.1 The odor control system shall include neutralizing or preventing production of odorous compounds. The Developer/Contractor shall provide for treatment of odorous compounds, containing and treating foul air, and enhancing dispersion of treated air.

7.6.2 The odor control system is to be an activated carbon type.

7.6.3 Media System

7.6.3.1 Recommended Activated Carbon Odor Control System Manufacturers:

A. ECS

B. Daniel

C. Purafil

D. Purair

E. FCPW approved equal

7.6.4 Substrate characteristics:

7.6.4.1 Virgin, granular gas-phase type suitable for control of sewage treatment odors, designed for high loadings of organic compounds.

7.6.4.2 Carbon substrate characteristics:

A. Mesh size distribution: 4 x 8 min.

B. Mean particle diameter: minimum 3.7 mm, ASTM D2862.

C. Uniformity coefficient: maximum 1.9 per foot at bed depth, AWWA B604.

D. Iodine number: 1000 or 1050.

E. Maximum head loss at 50 fpm velocity densely packed bed: 1.9 in wc/ft bed depth.

7.6.5 Contractor/Developer shall furnish service for two (2) years from start-up of the system and the media shall be refilled at time of acceptance at Contractor/Developer cost.

7.6.5.1 Carbon Usage Rate Test:

A. Developer shall supply FCPW a quarterly analysis of the activated carbon to be reported as "H_2S Capacity."

B. Developer shall furnish this service for two (2) years from start-up of the systems at no additional cost to FCPW.

C. The testing shall establish the carbon usage rate and the optimum replacement or regeneration procedure to be used. This information shall be presented to FCPW at the time of ownership transfer.

7.6.6 Ventilation Equipment

7.6.6.1 Pump stations shall be adequately vented in complete compliance with all applicable local and state building codes as well as OSHA and NFPA Standards.

7.6.6.2 Forced air odor control systems shall be designed for a minimum of 12 air changes per hour.

7.6.6.3 If needed, pump station wet wells shall be provided with a gooseneck-type inlet vent and damper. Active ventilation units may also be acceptable.

7.6.6.4 Vents shall be constructed of stainless steel or Schedule 80 PVC with an UV inhibitor and shall be adequately supported to

withstand damage during normal and emergency operation and maintenance.

7.6.6.5 Vent elevations shall be a minimum of two feet above the one hundred- (100-) year flood elevation as identified on the most recent Federal Emergency Management Agency (FEMA) map when available or as established through appropriate modeling techniques. The vent shall be a minimum of one foot above the five hundred- (500-) year flood elevation whichever is higher.

7.6.6.6 Wet well suction ductwork shall be above the high-water level.

7.6.6.7 Vents shall be provided with an air vent filter and insect/bird screen of fiber glass, stainless steel, or aluminum. Under no circumstances shall steel or galvanized steel be used.

7.6.7 Units requiring a constant supply of water or biological treatment units shall not be acceptable.

7.7 Odor control systems shall be designed for the following capacities when wet wells are within (or are anticipated to be within) 200 feet of residential or commercial area.

7.7.1 99.5% removal of the following contaminants:

7.7.1.1 H_2S at concentrations up to 10 ppm.

7.7.1.2 Sulfur dioxide

7.7.1.3 Ammonia

7.7.1.4 Mercaptans

7.7.1.5 Aldehydes

7.7.1.6 Organic compound

7.7.2 Odor shall not be detectable beyond fence lines.

7.8 Industrial Wastewater Sampling

7.8.1 Prior to the acceptance of any industrial wastewater discharge into the FCPW collection system, a water quality report shall be submitted to FCPW.

7.8.2 A sampling point shall be provided upstream of the industrial wastewater discharge into the pumping station. It is recommended that sampling be performed at a manhole upstream of the discharge manhole.

7.8.3 Odor control requirement shall be based on longest detention time.

7.9 Pump stations shall be adequately vented in complete compliance with all applicable local and state building codes as well as OSHA and NFPA Standards.

7.9.1 At a minimum, pump station wet wells shall be provided with 12 air changes per hour for standard domestic wastewater.

7.9.2 For air inlet ventilation, a vent shall extend through the concrete slab at the top of the wet well and shall connect to the odor control unit, as shown in Standards Detail P-014, Appendix B.

7.9.3 Vents shall be constructed of stainless steel or FRP and shall be adequately supported to withstand damage during normal and emergency operation and maintenance.

7.9.4 Vent elevations shall be a minimum of two feet above the 100-year flood elevation as identified on the most recent FEMA map when available or as established through appropriate modeling techniques.

7.9.5 Vents shall be provided with an insect/bird screen of stainless steel or aluminum. Under no circumstances shall steel or galvanized steel be used.

PART 8 PROTECTIVE COATINGS

8.1 Coating Systems

8.1.1 The exterior of concrete wet wells shall be coated with epoxy.

8.1.1.1 Coating shall be continuous, free of pin holes and or voids and shall be applied in accordance with manufacturer’s instructions.

8.1.1.2 After wet well top slab, base and all sections have been permanently set into place, seal outside with a chemically compatible non-shrink grout prior to exterior application of protective coating.

8.1.1.3 Non-penetrating lift holes shall be filled with non-shrink grout after installation of the sections.

8.1.1.4 Concrete surfaces shall be free from oil, curing compounds, dust, dirt, and other interfering materials removed by sandblasting and shall be fully cured prior to the application of any coatings.

8.1.2 Interior surfaces of concrete wet wells shall be coated with a corrosion resistant epoxy coating before the station is accepted by the FCPW.

8.1.2.1 Prior to applying the spray liner, eight (8) inch joint wrap shall be applied to the precast section joint seams.

8.1.2.2 Surface preparation, thickness, mixing and application shall be in accordance with the manufacturer's instructions.

8.1.2.3 The coating shall be 100% solids high build epoxy coating formulated for application within a sanitary sewer environment.

8.1.2.4 The coating thickness shall be 125 to 250 mils in one or two multi-pass coats.

8.1.2.5 The coating color shall be white or off-white.

8.1.2.6 The cured epoxy resin system shall conform to the following minimum structural standards:

	Strength (psi)
Compressive Strength (ASTM D695)	12,000
Flexural Strength (ASTM D790)	11,000
Tensile Strength (ASTM D-638)	7,000
Flexural Modulus (ASTM-790)	500,000

8.1.3 Any manhole that is downstream from the force main discharge shall be protected from corrosion.

8.1.4 Acceptable epoxy coating systems:

8.1.4.1 Perteu Coat M PLS 614

8.1.4.2 Epoxy 301-14 by Warren Environmental

8.1.4.3 CPP by Epoxytec

8.1.4.4 Approved equal.

8.1.5 Cast-in-place or pre-cast concrete may use admixtures such as Xypex Bio-San C-500 instead of an exterior coating.

PART 9 BUILDINGS

9.1 Applicability

9.1.1 Certain pump station designs may require additional structures or a wet well-dry pit design. Parts 10 through 14 and onward through the end of this Section identify the major requirements for these configurations.

9.2 General

9.2.1 The items listed here are intended as a general guide only and may not cover all requirements. It is the responsibility of the Developer's Design Engineer to apply the most stringent requirements.

PART 10 GENERAL BUILDING REQUIREMENTS

10.1 Governing Codes and Standards:

10.1.1 International Building Code with Georgia Amendments, latest edition.

10.1.2 Applicable Local Issuing Authority requirements.

PART 11 SHELTERS

11.1 Shelter shall be sized to accommodate pump station's electrical and controls equipment and to provide secure protection from the weather, vandalism, and unauthorized access.

11.2 Structures shall be designed for wind and seismic requirements as determined by governing codes and standards noted in Paragraph 10.1 above.

11.3 Shelter shall be installed on a cast-in-place slab with curb.

11.4 Internal mounting flange shall be provided for anchoring the shelter to curb.

11.5 The following components and features shall be provided in addition to the standard features:

11.5.1 LED Interior and exterior entry lighting.

11.5.2 Personnel door with interior panic hardware and lock.

11.5.3 Convenience receptacles.

11.5.4 Custom color selection.

11.5.5 Built-in equipment mounting struts.

11.5.6 Thermostat controlled HVAC.

11.5.7 Double or rollup door sized to accommodate removal of installed panels.

11.6 Shelters shall be by Tracom, Inc., Warminster Fiberglass or an approved equal.

PART 12 ARCHITECTURAL DESIGN CRITERIA

12.1 Architectural Requirements for dry-pit Pump Station Building

12.1.1 Separate electrical and pump rooms are required.

12.1.2 The pump room will also include a bridge crane capable of hoisting the pumps and motors selected for the design.

12.1.2.1 Developer's Design Engineer shall be responsible for sizing crane to match final equipment selections.

12.1.3 All interior and exterior luminaires shall be LED.

12.1.4 A roll up door shall be provided for equipment removal. Personnel door(s) shall be provided for daily access. Doors shall be lockable.

12.1.5 Building security shall be provided. Intruder alarms shall be tied into SCADA.

12.1.6 The exterior will be designed to match the prevailing local architecture.

12.1.7 The roof shall be hip, sloped standing metal seamed roofing.

12.1.8 Prefinished metal gutters and downspouts are required.

12.1.9 The building will not have windows unless there are floors above ground level.

12.1.10 Interior materials shall be suitable for the intended environment.

12.2 Prefabricated Structures

12.2.1 May be allowed depending on prevailing structural and architectural requirements.

PART 13 STRUCTURAL DESIGN CRITERIA

13.1 Pump station structures shall be designed and built in complete compliance with all applicable state, local and federal codes as well as any applicable OSHA Standards.

13.2 Governing Codes and Standards:

13.2.1	ACI 301-10	Specifications for Structural Concrete
13.2.2	ACI 318-11	Building Code Requirements for Structural Concrete
13.2.3	ACI 350- 06	Code Requirements for Environmental Engineering Concrete
13.2.4	CRSI	Manual of Standard Practice

13.3 Material Standards

13.3.1 Concrete

13.3.1.1 ASTM C150 Type I/II.

13.3.1.2 4000 psi minimum strength unless design requires higher strength.

13.3.2 Reinforcing Bars

13.3.2.1 ASTM A615 Grade 60 deformed.

13.3.3 Waterstops

13.3.3.1 Flexible PVC CE CRD-C572.

13.4 Design Requirements

13.4.1 Construction of the pump station building shall accommodate weight of equipment to be installed, bridge crane and roof system as required for any equipment to be installed on the roof.

13.4.2 Design of concrete structures shall incorporate consideration of all external forces including but not limited to:

13.4.2.1 Dead loads.

13.4.2.2 Live loads.

13.4.2.3 Wind loads.

13.4.2.4 Seismic loads.

13.4.2.5 Lateral soil pressures.

13.4.2.6 Lateral hydrostatic pressures.

13.4.2.7 Uplift hydrostatic pressures.

13.4.2.8 Soil bearing loads.

13.4.2.9 Top slab loading.

13.4.2.10 Pipe support loading.

13.4.2.11 Equipment weights, performance loads and induced forces.

13.4.2.12 Internal piping forces such as water hammer.

13.4.2.13 Lifting of precast concrete members.

13.4.3 Dimensions of concrete structures shall be determined based on functionality and required access of housed equipment and systems.

13.4.4 Required Foundation Preparation, Allowable Soil Bearing and Lateral Soil Pressures shall be provided by a Registered Geotechnical Engineer.

13.5 Concrete

13.5.1 Concrete shall be structural concrete with a twenty-eight (28) day compressive strength of four thousand (4,000) psi.

13.5.2 Proportion concrete in accordance with the latest requirements of ACI 211.1.

13.5.3 The slump of all concrete will be maximum four (4) inches or less than 1 inch unless exceptions specifically authorized by FCPW.

13.5.4 The air content by volume of all concrete will be from three percent (3%) to six percent (6%).

13.5.5 Concrete will contain a water-reducing and retarding admixture, unless specifically exempted by FCPW.

13.5.6 Do not exceed the water-cement ratio of the design mix which includes all water added. Water-cement ratio of the design mix shall be per manufacturer's recommendation.

13.5.7 The water reducing and retarding admixture will be in accordance with the manufacturer's requirements.

13.6 Pump Station Pad

13.6.1 Size

13.6.1.1 A minimum six (6) inch thick, forty-five (45) feet by forty-five (45) feet concrete pad shall be installed. The concrete pad shall extend to a minimum of six- (6-) inches outside the fence line. Alternate paving materials may be approved by Fulton County Technical Services.

13.6.2 Material and Installation

13.6.2.1 The pavement design shall consider loading exerted by an eighty thousand (80,000) pound tanker truck.

13.6.2.2 Pump station pad shall be, at a minimum, reinforced with Number 5 (#5) rebar spaced twelve (12) inches on center on both the top and bottom faces and in each way as well, i.e., longitudinal and transverse. Expansion joints shall be installed as needed in the pump station pad.

13.6.3 A concrete curb shall be constructed underground around the pump station, as shown in Standard Detail P-008 in Appendix B.

13.6.4 Asphalt will not be acceptable for the pad.

13.6.5 The pump station pad shall be constructed on a six-inch layer of compacted aggregate base course stone over a prepared subgrade.

13.6.6 Pump station subgrade shall be constructed on earth fill of select material.

13.6.7 Select backfill material shall consist of finely divided earth, stone, dust, sand, crushed stone, or other approved material free from all wood, vegetable matter, debris and other objectionable material and having scattered clods, stone or broken concrete less than two (2) inches in maximum dimension.

13.6.8 The pump station concrete pad shall be installed with a 0.5% slope from the center of the pad to the edge of the pad.

13.6.9 The pump station concrete pad shall be concaved and sloped away from the station to divert the storm water away from the station and toward a storm drain.

13.6.10 Concrete must extend six (6) inches past the station fenced perimeter all the way around.

13.6.11 Additionally, the installation of a flume or stormwater piping (perforated pipe wrapped in filter fabric) to divert stormwater from the pad to a stormwater pond may be required by FCPW.

13.6.12 The fill shall be placed in layers of not more than six inches compacted thickness and compacted by the use of heavy rolling or power tamping equipment to secure at least ninety-five percent (95%) of the Standard Proctor Dry Density.

13.6.13 Backfills around structures shall be properly placed and compacted.

13.6.13.1 The fills shall be brought up in layers.

13.6.13.2 The layers shall be thoroughly compacted to at least ninety-five percent (95%) of the Standard Proctor Dry Density,

13.6.13.3 Each layer to be not deeper than six inches compacted thickness.

13.6.13.4 Compaction around structures shall be by use of heavy power tamping equipment.

PART 14 MECHANICAL DESIGN CRITERIA

14.1 Governing Codes and Standards:

14.1.1 Referenced codes and standards shall refer the latest approved edition.

14.1.2 International Mechanical Code with Georgia Amendments.

14.1.3 International Plumbing Code with Georgia Amendments.

14.1.4 National Fire Protection Association (NFPA) standards.

14.1.5 American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE) standards.

14.1.6 American Society for Testing and Materials (ASTM).

14.1.7 Underwriter Laboratories – UL Listing and Label

14.2 Mechanical Scope of Work:

14.2.1 Provide ventilation system for the Pump Room.

14.2.1.1 The ventilation system shall be sized to account for heat gain in the space including the heat generated from equipment running continuously at full load.

14.2.1.2 The ventilation system intake and exhaust shall be located such that the air will sweep thru the entire room and there will be no short-circuiting of airflow.

14.2.1.3 Intake and exhaust wall louvers shall be sound attenuating.

14.2.1.4 All ductwork and louvers shall be of aluminum construction.

14.2.2 Provide hose-down corrosion resistant type electric unit heater(s) rated for appropriate area classification.

14.2.2.1 Unit heaters shall be provided with integral thermostat to maintain the space above 50° F in the winter.

14.2.3 The Electrical Room shall be provided with air conditioning units to cool the space to within acceptable limits as determined by the installed gear.

14.2.3.1 The cooling system shall be N+1 with each unit sized for 100% of the total cooling load in the space including heat gain from VFDs and other electrical gear.

14.2.3.2 The cooling units serving the Electrical Room shall be provided with smoke detection and remote reporting of smoke alarm condition.

14.2.4 The Electrical Room shall be provided with a separate room temperature sensor, and a remote high temperature alarm shall be activated in the event of high space temperature (adjustable).

14.2.5 Provide the services of an independent testing and balancing company certified by National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC) to perform testing and balancing of HVAC systems.

14.2.6 The pump station shall be provided with reduced pressure zone type backflow preventer, floor drains, and indoor and outdoor non-freeze type hose bibbs for wash-down.

14.2.7 All above ground (interior) potable piping shall be ASTM B88, Type L hard drawn copper.

14.2.7.1 The pipe fittings shall be soldered copper or bronze, and the pipe joints shall be brazed.

14.2.8 The Pump Room shall be provided with sump pump(s) to which all water in the Pump Room will drain.

14.2.8.1 Power supply and control equipment for the sump pumps shall be installed in the Electrical Room.

PART 15 SURVEY STANDARD

15.1 As-builts for all water and wastewater projects shall include all new and existing infrastructures directly adjacent to the project area.

15.1.1 This includes, but not limited to, fire hydrants, water valves, water mains, water meters, tees, tap sleeves, bends, reducers, and plugs.

15.1.2 Sewer infrastructure shall include manholes, sewer mains, force mains, air valves, cleanouts and all features in and around sanitary sewer lift stations.

15.2 The primary survey strategy will implement a GPS methodology.

15.2.1 Developer's consultant shall use the Real Time Kinematic Method (RTK) or Rapid Static Method (RSM) and equipment adequate to produce horizontal, vertical, and elevation coordinates (x, y, and z) which shall be consistent with FCPW methods (centimeter survey grade accuracy).

15.2.2 If it's determined that a number of features cannot be located directly by GPS due to obstructions, a secondary survey shall be employed to capture obscured points.

15.2.2.1 The secondary strategy should consist of surveying using conventional methods. Establishing a transit and back sight using GPS, establishing a traverse loop, maintaining a minimum of 1:10,000 closure for the traverse, and side shots being collected by occupying the traverse points.

15.2.2.2 Side shots should be enough to adequately survey the required features and/or other relevant features.

15.2.3 After data collection is complete, standard survey procedure dictates that the files will be downloaded into a coordinate geometry (COGO) package for any translation or rotation that might be required.

15.2.4 The specifications for the datum and coordinate will be the Georgia West State Plane coordinate system.

15.2.4.1 The horizontal datum will be the North American Datum (NAD83).

15.2.4.2 The vertical datum will be the North American Vertical Datum (NAVD88).

PART 16 LIFTING EQUIPMENT

16.1 Each pump station of any configuration shall be supplied with lifting systems capable of moving each pump to and from the installed position to a service vehicle parked on the pump station property.

16.2 All hoists shall be motorized**.**

16.3 The hoist shall be rated for 150 percent of the heaviest load anticipated.

16.4 Cranes shall comply with the requirements of the following:

16.4.1 OSHA

16.4.2 The Crane Manufacturer's Association of America (CMAA) Standards

16.4.3 The Hoist Manufacturer's Institute (HMI) Standards

16.4.4 ANSI/ASME HST-4 Performance Standard for Electric Wire Rope Hoists

16.4.5 Other relevant standards applicable for the selected lifting mechanism.

PART 17 SPARE PARTS AND ACCESSORIES

17.1 All submersible wastewater pumping stations shall be furnished with the following spare parts and accessories:

17.1.1 Each – Factory operation and maintenance manuals

17.1.2 Each – Programming Key for Transfer Switch

17.1.3 Each – Pressure Transducer

17.1.4 Each – Sets of keys to the pump station and all lockable doors, cabinets or fixtures.

17.1.5 Each – Valve key to operate the valves

17.1.6 Each – Eight-foot fiberglass ladder**.**

17.1.7 Each – One complete pump.

SECTION 4

WASTEWATER PUMPS

PART 1 SUMMARY

1.1 This section specifies centrifugal submersible pumps suitable for pumping solids-bearing liquids (wastewater) at variable speed.

1.2 For proposed pumps that are not from a pre-approved manufacturer's standard offering, or that are custom-engineered pumps, additional design and Quality Assurance Requirements may be required.

1.3 Pumps will be installed in either a wet-pit or dry-pit configuration as specified.

1.3.1 Pumping units for wet-pit configurations shall be complete with motor, cables, protection devices, discharge fitting/elbow, guide bars and brackets, chain and cable hooks and other accessories as necessary.

1.3.2 Pumping units for dry-pit configurations shall be submersible type and complete with motor, cables, protection devices, inlet elbow, integral cooling system, supports/pedestal and mounting plates and other accessories as necessary.

1.4 Pump manufacturer shall provide the following documentation:

1.4.1 Design for the pump baseplate/frame and anchorage including anchor bolts.

1.4.2 Drawings showing the following:

1.4.2.1 Dimensions and size of pumps, motors, drives and specified appurtenances.

1.4.2.2 Piping connections.

1.4.2.3 Construction details of equipment (including bearings and bearing isolators).

1.4.2.4 Wiring diagrams.

1.4.2.5 Weights.

1.4.3 Manufacturer's data including materials of construction and equipment weight.

1.4.4 Proof of service of previously installed units of similar size, rating and configuration.

PART 2 REFERENCES

2.1 The following list of references are included as part of this document.

Reference	Title
ABMA 9	Load Ratings and Fatigue Life for Ball Bearings
ABMA 11	Load Ratings and Fatigue Life for Roller Bearings
AISC	American Institute of Steel Construction—Manual of Practice
ANSI/API 610	Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries (also referenced as ISO 13709-2009)
ANSI/ASME B46.1	Surface Texture, Surface Roughness, Waviness and Lay
ANSI/HI 1.1–1.6	Rotodynamic (Centrifugal) Pumps
ANSI/HI 2.1–2.4	Rotodynamic (Vertical) Pumps
ANSI/HI 9.1–9.5	Pumps – General Guidelines for Types, Applications, Definitions, Sound Measurements and Documentation
ANSI/HI 9.6.1	Rotodynamic Pumps—Guideline for NPSH Margin
ANSI/HI 9.6.2	Centrifugal and Vertical Pumps for Allowable Nozzle Loads
ANSI/HI 9.6.3	Rotodynamic Pumps (Centrifugal and Vertical) Guideline for Allowable Operating Region
ANSI/HI 9.6.4	Rotodynamic Pumps—Vibration Measurements and Allowable Values
ANSI/HI 9.6.6	Rotodynamic Pumps for Pump Piping
ANSI/HI 9.6.8	Rotodynamic Pumps—Guideline for Dynamics of Pumping Machinery
ANSI/HI 9.8	Pump Intake Design
ANSI/HI 11.6	Submersible Pump Tests
ANSI/HI 14.6	Rotodynamic Pumps for Hydraulic Performance Acceptance Tests
API 686/PIP REIE 686	Recommended Practices for Machinery Installation and Installation Design
ASME B18.8.2	Taper Pins, Dowel Pins, Straight Pins, Grooved Pins, and Spring Pins (Inch Series)
ASME Code	ASME Boiler and Pressure Vessel Code
ASTM A27	Steel Castings, Carbon, for General Application
ASTM A36	Carbon Structural Steel
ASTM A148	Steel Castings, High Strength, for Structural Purposes
ASTM A322	Steel Bars, Alloy, Standard Grades
ASTM A564	Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes

Reference	Title
ASTM A571	Austenitic Ductile Iron Castings for Pressure-Containing Parts Suitable for Low-Temperature Service
ASTM A995	Standard Specification for Castings, Austenitic-Ferritic (Duplex) Stainless Steel, for Pressure-Containing Parts, Grades 2A, 3A, or 6A
ASTM B148	Aluminum-Bronze Sand Castings
AWWA C213	Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
AWWA C550	Protective Epoxy Coatings for Valves and Hydrants
NSF/ANSI 61	Drinking Water System Components – Health Effects
IEC 61298-2	Process Measurement and Control Devices. General Methods and Procedures for Evaluating Performance Tests Under Reference Conditions
ISO 1940-1:2003	Mechanical Vibration—Balance quality requirements for rotors in a constant (rigid) state—Part 1: Specification and verification of balance tolerances
ISO 9001	Quality Management Systems—Requirements, 3rd Edition (2000)
ISO 10816-1	Mechanical Vibration—Evaluation of Machine Vibration by Measurement on Non-rotating Parts—Part 1: General Guidelines, Annex B, Table B.1. Class I, II or II, as applicable. For the purposes of this specification, Annex B of ISO 10816, Part 1 forms a part of this specification and ISO 10816, Part 1.
ISO 10816-3	Mechanical Vibration—Evaluation of Machine Vibration by Measurement on Non-rotating Parts—Part 3: Industrial machines with nominal power above 15 kW and nominal speeds between 120 r/min and 15000 r/min when measured in situ, Annex A, Table A.1 and A.2. For the purposes of this specification, Annex A of ISO 10816, Part 3 forms a part of this specification and ISO 10816, Part 3.
ISO 10816-6	Mechanical Vibration—Evaluation of Machine Vibration by Measurement on Non-rotating Parts—Part 6: Reciprocating machines with power ratings above 100 kW, Annex A, Table A.1, machine vibration classification number 3. For the purposes of this specification, Annex A of ISO 10816, Part 6 forms a part of this specification and ISO 10816, Part 6.

Reference	Title
ISO 10816-7	Mechanical Vibration—Evaluation of Machine Vibration by Measurement on Non-rotating Parts—Part 7: Rotordynamic Pumps for Industrial Applications, Including Measurements on Rotating Shafts, Annex A, Tables A-1, and A-2 Category II as applicable. For the purposes of this specification, Annex A of ISO 10816, Part 7 forms a part of this specification and ISO 10816, Part 7.
MIL STD 167-2	Mechanical Vibrations of Shipboard Equipment (Reciprocating Machinery and Propulsion System and Shafting)

PART 3 GENERAL

3.1 Pump stations conveying residential, commercial, institutional, or industrial wastewater shall be provided with pumps that are suitable for continuous duty in conveying raw, unscreened solids-bearing wastewater.

3.2 Furnish and install a minimum of two (2) heavy-duty submersible wastewater pumps as specified in Section 3, Paragraph 2.6.

3.3 All pumps shall be identical within each pump station facility.

3.4 A demonstration that the submersible pumps can be removed and installed in the wet well using a powered hoist and crane and without special equipment or manipulation shall be performed at startup.

3.5 Pump(s) shall be designed for easy removal and reinstallation without the need for the removal of bolts, nuts or other fasteners.

3.5.1 The pump(s) shall automatically and firmly connect to the discharge connection, guided by no less than two parallel, non-load bearing guide rails extending from the top of the pump station to the wet well mounted discharge connection.

3.6 Pump(s) shall be heavy-duty, electric submersible, non-clog units specifically designed for pumping solids-bearing liquids and shall be fully guaranteed for this use.

3.6.1 Chopper or screw type pumps shall be considered preferable and shall be the type used unless determined inadequate for the application.

3.6.2 In such case, FCPW shall be consulted for pump selection.

3.7 Pump(s) shall be designed for continuous or cyclic operation under submerged, partially submerged or totally dry condition without damage to the pump or motor.

3.8 Each pump shall be driven by a single variable speed drive or soft start. The pump vendor shall provide confirmation on the suitability for use of the proposed drive selection.

3.9 Maximum speed of 1,800 RPM unless approved otherwise.

3.10 The pump shall be capable to operate without any limitation between 70% and 115% of the Best Efficiency Point for capacity (B.E.C) of the performance curve.

PART 4 PERFORMANCE & DESIGN CRITERIA (Pump station designer shall modify this section)

4.1 Service Conditions

Equipment number	PUMP 1	PUMP 2	PUMP N	
Area exposure	Submerged	Submerged	Submerged	
Fluid type	Wastewater	Wastewater	Wastewater	
Area Classification	C1, D1 Group D	C1, D1 Group D	C1, D1 Group D	
Fluid temperature	40 °F to 80 °F	40 °F to 80 °F	40 °F to 80 °F	

4.2 Design Requirements

Design Requirements			
Equipment number	**Value**	**Units**	**Note**
SMALLEST SIZE rigid sphere diameter, capable of passing through the pump from inlet to discharge	6	Inches	
Minimum efficiency at best efficiency point (BEP) at maximum speed		%	1
Piping connection size, minimum			
Pump inlet	6	Inches	
Pump discharge	6	Inches	
Operating speed, maximum	1,800	rpm	
Operating speed, constant or variable	Variable		
Approximate pump suction centerline elevation, NAVD 88		feet	

Design Requirements			
Equipment number	**Value**	**Units**	**Note**
Maximum expected surge pressure		feet	
Motor			
Horsepower		HP	
Type	Submersible, explosion proof		
Inverter duty	Yes		
Space heater			
Over temperature protection	Yes		
Moisture sensors	Yes		
Operating speed, maximum	1,800	rpm	
Voltage/Phase	480 VAC/ 3 Phase		

Notes:

1. The minimum acceptable efficiency at best efficiency point (BEP) at the speed required to achieve the performance specified under Condition Points A and B. The minimum acceptable efficiency is not necessarily required to be associated with any operating condition specified in paragraph Operating Conditions

4.3 Operating Conditions.

4.3.1 The operating conditions in the table below are intended to describe the results of hydraulic conditions of the pump station. Developer's Design Engineer shall determine the values in the table for pump selection.

4.3.2 Equipment furnished under this section shall be fully suitable for continuous operation at any specified condition or any condition lying between the extremes of the operating conditions specified.

Pump Performance at Operating Conditions			
Operating Condition		**Value**	
A	Note 1, 5	Capacity	gpm
		Total System Head	feet
		NPSHA	feet
		Duty Point Location	

Pump Performance at Operating Conditions			
B	Note 2, 5	Capacity	gpm
		Total System Head	feet
		NPSHA	feet
		Duty Point Location	
C	Note 3, 5	Capacity	gpm
		Total System Head	feet
		NPSHA	feet
		Duty Point Location	
D	Note 4, 5	Capacity	gpm
		Total System Head	feet
		NPSHA	feet
		Duty Point Location	

Pump Performance at Operating Conditions Table Notes.

1. **Condition A** shall be taken as the rated operating condition. Performance at the rated condition shall be guaranteed. Condition A has been selected to obtain the rated pumping capacity for the installation. It is not intended that the pumps be selected for maximum efficiency at Condition A. Pumps furnished under this section shall be selected to achieve Condition A performance, and also shall operate continuously without objectionable vibration or cavitation at the head specified under Condition B. Condition A may be located in the Allowable Operating Region as established by the pump manufacturer in accordance with ANSI/HI 9.6.3 and published in the manufacturer's published application data for the specific model proposed for this application. For constant speed pumps, this condition shall be the pump's full speed operating duty point.
2. **Condition B** head indicates operating conditions when the pump is operating at maximum speed against minimum anticipated system head, assuming a hypothetical head-capacity curve. Condition B shall be used for pump selection. Condition B shall be located within the Preferred Operating Region as established by the pump manufacturer in accordance with ANSI/HI 9.6.3 and listed in the manufacturer's published application data for the specific model proposed for this application. Condition B shall be located to the right of BEPQ and shall be not less than (80) percent of BEPQ. Pumps with head-capacity curves steeper than that assumed will produce somewhat less flow at somewhat lower head. The reverse will occur with pumps having a shallower head-capacity curve. Proposed pump

selections meeting this discharge head requirement by operating the equipment at less than full speed will be rejected. NPSHA, as listed for Condition B is calculated on a pumped flow of [TBD] gpm.

3. **Condition C** is the anticipated continuous duty minimum speed condition. Pumps furnished under this specification shall be capable of sustained (24 hours per day) operation at this condition. Condition C shall be located within the Preferred Operating Region as established by the pump manufacturer in accordance with ANSI/HI 9.6.3 and listed in the manufacturer's published application data for the specific model proposed for this application.

4. **Condition D** represents the expected momentary (startup/shutdown) condition. The maximum anticipated number of service cycles is x per day.

5. Total head in the above tabulation is the algebraic difference between the discharge head and suction head as defined in ANSI/HI 1.1 – 1.6. Net positive suction head available (NPSHA) in the above tabulation is referred to the pump inlet piping at centerline elevation as shown and is calculated in accordance with ANSI/HI 1.3 for average barometric pressure and maximum temperature conditions. NPSHA at the pump impeller eye can be determined by adjusting the given value by proposed pump dimensions and the indicated requirements for pump installation details. An allowance of five feet has been included for the presence of volatile constituents in the pumped fluid.

6. Maximum expected surge pressure is to be as determined by the Design Engineer's analysis.

PART 5 SYSTEM OPERATION

5.1 The pumps shall be installed in wet or dry-pit configurations as shown on the Drawings with sufficient space for access to install and remove the equipment.

5.2 The pumps shall be operated at variable speed responding to a control system that will vary the speed and number of the pumps to maintain a level set point in the wet well.

5.2.1 Pumps shall cycle on and off at minimum operational speed during low flow periods.

5.2.2 Pumps shall alternate duty status.

5.2.3 Additional information in the control strategies is listed in the Instrumentation and Control Guidelines. Refer to Details P-024 and P-027.

5.3 The control systems shall incorporate minimum speed settings for the pumps to maintain normal pump operation within the respective pump's Preferred Operating Region (per ANSI/HI 9.6.3) to the maximum extent possible.

5.3.1 Developer shall coordinate the minimum speed settings with FCPW and pump manufacturer during the submittal review phase and finalize the same in the field during start-up.

5.3.2 Pump manufacturer shall coordinate pump and motor operational and starting characteristics with variable speed drive settings used for control of this equipment.

5.3.3 Include the following with the System Curve to be developed by Developer's Engineer:

5.3.3.1 Motor minimum operational speed

5.3.3.2 Motor maximum operational speed

5.3.3.3 Motor ramp-up and ramp-down speed, voltage, and hertz requirements

PART 6 CONSTRUCTION

6.1 Typical is listed here which may vary from manufacturer to manufacturer.

6.2 The features and materials specified herein are typically considered acceptable but may not preclude certain pumps from being considered.

6.3 General:

6.3.1 Pump suction and discharge openings shall be no less than six (6) inches.

6.3.2 Staying within the design parameters, the pump selection shall be the largest pump with minimum diameter impeller to allow for future growth.

6.3.2.1 Motor horsepower shall be non-overloading for a maximum diameter impeller.

6.3.3 Developer shall store, rotate and handle pumps according to manufacturer's recommendations.

6.3.4 Pumps shall be mounted in the wet well as shown in the Standard Detail P-014, Appendix B.

6.3.5 Pumps shall be readily removable and replaceable without dewatering the wet well or disconnecting any piping in the wet well. Each pump shall have a lifting chain.

6.3.6 Base elbow shall be anchored to the wet well floor with stainless steel "J" bolts set six (6) inches into concrete. "J" bolts shall be hooked under reinforcing steel.

6.3.7 Each submersible pump shall be supplied with one (1) lifting system. The system shall be appropriately sized for the weight of the pump to be lifted.

6.3.8 The pumps shall automatically connect to discharge elbows when lowered into place on a dual Type 316 stainless steel two (2) inch guide rail system requiring no bolts, nuts, or fasteners to affect proper sealing.

6.3.8.1 The guide bars shall not support any portion of the weight of the pumps.

6.3.9 Upper and intermediate guide rail supports shall be Type 316 stainless steel. The pump manufacturer shall submit the recommended locations of the guide rail supports to FCPW.

6.3.10 A minimum of one cable holder for each cable shall be provided. Cable holder shall be Type 316 stainless steel.

6.3.11 Mating of the pump discharge flange and base elbow face shall be accomplished by a simple linear downward motion and utilize smooth metal to metal surface contact.

6.3.12 No portion of the pump shall bear directly on the floor of the wet well and no rotary motion of the pump shall be required for sealing.

6.3.12.1 Minimum of six (6) inches concrete shall be poured in bottom of the wet well after centerline of access cover is determined.

6.3.12.2 Reinforcing steel shall be placed as required by Developer's Design Engineer and approved by FCPW.

6.3.12.3 Precast polymer concrete wet wells shall follow manufacturer's requirements.

6.3.12.4 Reinforcing steel to be placed as indicated in the Standard Detail P-014, Appendix B.

6.3.13 Sufficient submergence of the pump shall be provided to prevent the occurrence of vortexing within the wet well.

6.3.13.1 In no case shall the all pumps-off activation level be less than the minimum level required for successful pump operation as recommended by the pump manufacturer.

6.4 Pump Body and Accessories

6.4.1 Motor and rotating parts shall be removable from the motor end of the pump.

6.4.2 Pump/Motor mating surfaces, where watertight sealing is critical, shall be machined and fitted with Viton rubber O-rings.

6.4.2.1 Joint sealing shall be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

6.4.2.2 Rectangular cross-sectioned rubber, paper or synthetic gaskets that require specific torque limits to achieve compression shall not be considered equal.

6.4.2.3 No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

6.4.3 The pump shall be listed by Factory Mutual or Underwriters Laboratory as conforming in all respects to the requirements in UL 1207.

6.4.4 Any materials specified here are considered acceptable for the purposes of durability, strength and resistance to erosion and corrosion.

6.4.4.1 Alternative materials may be proposed for the purpose of providing greater strength or to meet required stress limitations. However, alternative materials must provide at least the same qualities as those specified for the purpose.

6.4.5 Major pump components (pump casing, impeller, intermediate housing, motor housing) shall be minimum ASTM A-48, Class 30 or 35, cast iron with smooth surfaces devoid of blow holes or other casting irregularities.

6.4.6 The lifting handle and all exposed nuts or bolts shall be Type 304 or 316 stainless steel.

6.4.7 All metal surfaces, other than stainless steel, coming into contact with the pumped media shall be protected by a factory applied epoxy coating guaranteed to protect the pump's materials from the pumped media.

6.4.7.1 The coating shall consist of two (2) coats, eight (8) to fifteen (15) mils thick, with total minimum DFT of 20 mils with a cured hardness of 90D in accordance with ASTM D2240.

6.4.7.2 The epoxy shall be one hundred (100) percent solids by volume.

6.5 Casing:

6.5.1 One-piece casting specifically designed to bear the loads associated with removal and placement of the pump when submerged or exposed and to withstand the pressures imposed by the pump operation.

6.5.2 For submersible pumps, the entire weight of the pump/motor unit shall be supported by the pump discharge elbow. No portion of the pump/motor unit shall bear on the sump floor directly or on a sump floor mounted stand.

6.5.3 Shall have clear passageways designed to pass minimum solids size for that size class of pump unless specified otherwise.

6.5.4 The cutwater shall be specifically designed for use in fluids with stringy solids and rags.

6.5.5 The discharge nozzle shall be not less than the diameter specified in this Section and shall be reinforced for the loads imposed by the specified conditions of service.

6.5.6 The nozzle flange face shall be designed to mate with the discharge fitting specified in this Section.

6.5.7 Sealing of the pumping unit to the discharge connection shall be accomplished by a machined watertight contact.

6.6 Shaft:

6.6.1 Pump and motor shaft shall be a solid, continuous shaft.

6.6.2 The pump shaft shall be an extension of the motor shaft. The impeller shall be mounted on the motor shaft. Couplings shall not be acceptable.

6.6.3 The pump shaft shall be made of Type 416 or Type 420 stainless steel or ASTM A576 Cr 1040 with Type 420 stainless steel.

6.6.4 The pump shaft shall be turned, ground, polished and of proportions suitable for use in the specified application and shall be completely isolated from the pumped liquid.

6.7 Bearings:

6.7.1 The pump shaft shall rotate on two (2) bearings.

6.7.1.1 Motor bearings shall be anti-friction, double-shielded and factory sealed and permanently grease lubricated with high temperature grease and be capable of being regreased.

6.7.1.2 The upper bearing shall be a single row roller bearing.

6.7.1.3 The lower bearing shall be a double-row angular contact bearing to compensate for axial thrust and radial forces.

A. Single row lower bearings are not acceptable.

6.7.2 The minimum B-10 bearing life shall be one hundred thousand (100,000) hours at any point along the usable portion of the pump curve at maximum product speed.

6.8 Impeller:

6.8.1 Impeller(s) shall be minimum ASTM A-48, Class 30 cast iron, dynamically balanced, multi-vane, semi-open, back-swept non-clog design having long through-lets without acute turns.

6.8.2 Impeller(s) shall be capable of handling solids, fibrous materials, heavy sludge and other matter found in wastewater.

6.8.3 Impeller(s) shall be keyed to the shaft, retained with an expansion ring

6.8.4 The impeller shall be capable of passing a minimum 6-inch diameter solid.

6.8.5 The impeller to volute clearance shall be readily adjustable.

6.8.6 The manufacturer shall guarantee clog-free operation.

6.9 Wear Rings/Suction Covers

6.9.1 Suction Covers

6.9.1.1 A replaceable cast iron suction cover shall be used to provide efficient sealing between the volute and suction inlet of the impeller.

6.9.1.2 The suction cover shall be designed such that it may be adjusted to maintain working clearances and hydraulic efficiencies.

6.9.2 Wear Rings

6.9.2.1 Wear rings in pumps shall be constructed of hardened Type 400 stainless steel with minimum Brinell Hardness Number (BHN) of three hundred (300).

6.9.2.2 The pump shall have a stainless steel impeller wear ring heat-shrink fitted onto the suction inlet of the impeller.

6.10 Mechanical Seals:

6.10.1 Each pump shall be provided with a tandem double mechanical shaft seal system consisting of two (2) totally independent lapped face seal assemblies.

6.10.2 Each seal shall consist of one stationary and one positively driven rotating corrosion resistant tungsten-carbide or silicon-carbide ring.

6.10.3 The lower, primary seal unit shall be located between the pump and the lubricant chamber.

6.10.4 The upper, secondary seal unit shall be located between the pump and the lubricant chamber and the motor.

6.10.5 Each seal interface shall be held in contact by its own spring system.

6.10.6 The seals shall operate in a lubricant reservoir that hydrodynamically lubricates the lapped seal faces at a constant rate.

6.10.7 The seals shall be easily replaceable.

6.10.8 The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counterclockwise direction of rotation without damage or loss of seal.

6.10.9 The following seal types shall not be considered acceptable nor equal to the dual independent seal specified:

6.10.9.1 Shaft seals without positively driven rotating members.

6.10.9.2 Conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces.

6.10.9.3 Ceramic seals.

6.10.9.4 Seals requiring regular maintenance or adjustment.

6.10.9.5 Seals requiring constant differential pressure to effect sealing.

6.10.9.6 Seals subject to opening and penetration by pumping forces.

6.10.10 Seal lubricant shall be FDA approved non-toxic.

6.10.11 The seal system shall not rely upon the pumped media for lubrication.

6.10.12 The motor shall be able to operate continuously while non-submerged without damage while pumping under load.

6.10.13 The pump shall be capable of continuous submergence without loss of watertight integrity to a depth of 65 feet.

6.10.14 The mechanical seal shall accommodate the manufacturer's shaft deflection at the seal face and shaft angularity with a safety factor of 3.

6.10.15 Seal lubricant chamber.

6.10.15.1 Each pump shall be provided with a lubricant chamber for the shaft sealing system.

6.10.15.2 Designed to prevent overfilling and to assure that an air pocket is provided in the seal lubricant chamber to absorb the expansion of the seal lubricant due to temperature variations.

6.10.15.3 The seal lubricant chamber shall have drain and inspection plug with positive anti-leak seal and shall be easily accessible from the outside.

6.10.16 Should both seals fail and allow fluid to enter the stator housing, a port shall be provided to direct that fluid immediately to the stator float switch to shut down the pump and activate an alarm. Any intrusion of fluid shall not come in contact with the lower bearings.

6.11 Motor

6.11.1 Variable Frequency Drives (VFD) shall be used for pumps twenty (20) horsepower and greater.

6.11.2 The motor and the pump shall be provided by the same manufacturer.

6.11.3 The pump motor shall be submitted for approval by FCPW.

6.11.3.1 A performance chart shall be provided showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no-load characteristics.

6.11.3.2 Pump motors shall be accompanied by a material certification specifying the hardness of wearable parts from the manufacturer.

6.11.3.3 Motor shall be installed with the pump casing at the pump manufacturing facility.

6.11.4 Pump motors shall be approved as explosion proof conforming to FM explosion proof Class 1, Division 1, Group D environments.

6.11.5 Pump motor shall be constructed in an ISO 9001 approved facility.

6.11.6 Motors shall be 60 Hertz, three phase.

6.11.6.1 Acceptable motor voltages are

A. 480V for any size motor.

B. 240V/208V for motors up to 25 HP only if 480V utility service is not available.

6.11.7 Motor shall be of squirrel-cage induction, shell type design, housed in an air-filled or oil-filled watertight chamber.

6.11.8 NEMA B type Inverter Duty (NEMA MG1 Part 31) with a service factor based upon nameplate rating as follows:

6.11.8.1 The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15.

6.11.8.2 The motor shall have a voltage tolerance of plus or minus ten percent (10%).

6.11.9 The motor shall be designed for operation up to 40°C (104°F) ambient and with a temperature rise not to exceed 80°C (176°F).

6.11.10 The stator winding and stator leads shall be insulated with moisture resistant Class H insulation and shall be rated at a temperature of 180°C.

6.11.10.1 The stator shall be insulated by the tickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least ninety-five percent (95%).

6.11.11 The stator shall be heat-shrink fitted into the cast iron stator housing.

6.11.11.1 The use of multiple step dip and bake-type stator insulation process is not acceptable.

6.11.11.2 The use of bolts, pins or other fastening devices requiring penetration of the stator housing is not acceptable.

6.11.12 Temperature rise not to exceed NEMA MG-1 requirements for Class B insulating materials when operating continuously under load.

6.11.13 Motors shall be Factory Mutual or UL listed in accordance with UL 674 and 1207 for the area classification indicated in Paragraph 6.11.4.

6.11.14 The motor shall be specifically designed for submersible pump usage and for continuous duty pumping media of up to one hundred four degrees (104°) Fahrenheit with an even one hundred seventy six (176°) degrees Fahrenheit temperature rise.

6.11.15 The rotor bars and short circuit rings shall be made of cast aluminum.

6.11.16 Wire nuts or crimping-type connectors shall not be used.

6.11.17 Capable of sustaining a minimum of 20 starts per hour when operated with variable frequency motor controllers.

6.11.18 The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet.

6.11.19 Submersible power cable shall be of adequate length to accommodate the pumping system installation as shown on the Drawings, sized according to NEC and ICEA standards, P-MSHA approved.

6.11.20 The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

6.11.21 Soft Starters are required for pumps less than twenty (20) horsepower.

6.11.22 Cooling System:

6.11.22.1 The motor shall be provided with an integral closed-loop motor cooling system using a food-grade oil, glycol or glycol and water mixture or equivalent fluid as the cooling liquid.

6.11.22.2 A stainless-steel cooling jacket shall encircle the stator housing, providing for dissipation of motor heat regardless of whether the motor unit is submerged in the pumped media or surrounded by air.

6.11.22.3 An impeller, integral to the cooling system and driven by the pump shaft, shall provide the necessary circulation of the cooling liquid through the jacket.

6.11.22.4 The cooling liquid shall pass about the stator housing in a closed loop system in turbulent flow providing for heat transfer.

6.11.22.5 The cooling system shall have one fill port and one drain port integral to the cooling jacket.

6.11.22.6 Fans, blowers or auxiliary cooling systems that are mounted external to the pump motor are not acceptable.

6.11.22.7 Pump motors which are cooled by circulating pumped sewage within the motor housing are not acceptable.

6.11.22.8 The cooling system shall provide for continuous pump operation in liquid or ambient temperatures up to one hundred four degrees (104°) Fahrenheit even when the motor is not submerged. Restrictions below this temperature are not acceptable.

6.11.22.9 Pumps for dry-pit service shall be provided with a motor cooling solution per this section ***without exception*.**

6.11.23 Temperature Sensors:

6.11.23.1 All stators shall incorporate thermal switches, embedded in the end coils of the stator winding, in series to monitor the temperature of each phase winding.

6.11.23.2 Should high temperature (260°F) occur, the thermal switches shall open, stop the motor and activate an alarm.

6.11.23.3 These thermal switches shall be used in conjunction with, and supplemental to, external motor overload protection and shall be connected to the control panel.

6.11.23.4 Sensors shall be wired to the specified motor protection relay for motor protection.

6.11.24 Moisture Detection:

6.11.24.1 Provide motors with a moisture detection system.

A. A float switch shall be installed in the seal leakage chamber. When the float switch is activated, the motor shall stop, and an alarm shall be activated.

B. A second moisture detector shall be located in the motor junction box or inspection chamber.

6.11.24.2 All moisture detectors shall be wired to the motor junction box for connection to the specified motor protection relay.

6.11.24.3 Moisture detectors shall be either mechanical float switch or capacitance probe type as recommended by the manufacturer.

6.11.25 Motor Protection Relay:

6.11.25.1 Provide motor protection relay to protect motor from high temperature and moisture.

A. During normal pump operation, the temperature switch shall be closed, and the leakage switch shall be normally open.

B. Sensor circuit shall operate on 12 or 24 VDC feed from the main relay body.

C. The relay shall be provided with LEDs to indicate status of leakage, temperature and supply voltage.

6.11.25.2 Power supply: 120 VAC.

6.11.25.3 Provide SPDT contacts for the following remote alarm functions:

A. Over-temperature.

B. Moisture detection.

6.11.25.4 UL or UR approved suited for panel installation.

6.11.25.5 Relay shall be mounted inside the associated pump's motor controller. Coordinate size, wiring and mounting of the relay into the motor controller.

6.11.25.6 Relay shall be provided by pump manufacturer.

6.11.26 The thermal switches and seal leakage float switches shall be monitored from the pump control panel.

6.11.27 The wires for the thermal switches and moisture sensor may be a part of a composite motor cable. If separate cables are provided, they shall be of adequate length to reach the control panel without splicing.

6.12 Junction Chamber

6.12.1 The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables.

6.12.2 Connection between the cable conductors and stator leads shall be made with threaded compression type binding posts permanently affixed to the terminal board.

6.12.3 The use of wire nuts or crimp-type connectors is not acceptable.

6.12.4 Junction chamber containing the terminal board, shall be hermetically sealed from the motor by an elastomer compression seal.

6.13 Cables:

6.13.1 The pump shall have two cables.

6.13.1.1 One cable shall be for power and one cable shall be for control (the motor thermal sensors and moisture detector).

6.13.1.2 For smaller units it will be acceptable to have shielded sensor wires within the body of the power cable, precluding the need for a second pilot cable.

6.13.2 The cable design shall be suitable for installation in a municipal wastewater pumping station.

6.13.3 The cable length shall not exceed the product manufacturer's recommended length.

6.13.4 Developer shall be responsible for determining the length of cable required to wire the motors and sensors from the wet well to the terminal boxes.

6.13.5 Developer shall provide additional cable length for slack to allow the pumps to be removed from the wet well without disconnecting the cable at either end.

6.13.6 The power cable shall be of sufficient length to reach from the pump to the control panel terminal block without splicing.

6.13.7 The cable shall have enough slack such that it can be routed and secured out of the way of any equipment in the wet well.

6.13.8 The additional cable length shall be coiled and secured within the wet well.

6.13.9 The length of cable for slack shall be based on the pump manufacturer's recommendation.

6.13.10 The power cable shall be suitable for the submersible pump applications and sized according to NEC and ICEA standards.

6.13.11 The outer jacket of the cable shall be oil resistant.

6.13.12 The pilot cable shall be designed specifically for use with submersible pumps and shall be type SUBCAB (Submersible Cable).

6.13.12.1 The cable shall be shielded, multi-conductor type and shall be approved by Factory Mutual (FM).

6.13.12.2 The cable length shall be adequate to reach the junction box without the need for splices.

6.13.13 Cable Entry

6.13.13.1 The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet.

6.13.13.2 The cable entry junction chamber and motor shall be sealed from each other, which shall isolate the stator housing from foreign material gaining access through the pump top.

6.13.13.3 The cable entry assembly shall meet European Standards, unless otherwise permitted by FCPW.

6.13.13.4 The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal.

6.13.13.5 The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable conductor insulation and compressed by the entry body containing a strain relief function, separate from the function of sealing the cable.

6.13.13.6 The assembly shall provide ease of changing the cable, when necessary, using the same entry seal.

6.13.13.7 The cable entry junction chamber and motor shall be separated by a terminal board, which shall isolate the interior from foreign material gaining access through the pump top.

6.13.13.8 Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.

6.14 Wet-Pit Configuration Mounting:

6.14.1 Pump Discharge Connection Seal:

6.14.1.1 The connection between the pump discharge connection seal shall be a metal-to-metal seal to affect a complete closure between the pump discharge flange and the mating connection on the anchor fitting.

6.14.1.2 Leakage through the seal shall not exceed 1.5 percent of the flow specified for Condition Point A when operating at pump shutoff head.

6.14.1.3 The seal shall be subject to field test for acceptance in accordance with the requirements of this Section.

6.14.2 Pump Anchorage and Guide System:

6.14.2.1 The pump shall be provided with a guide system to allow easy removal of the pump without entering the wet well.

6.14.2.2 The guide rail system shall be a dual rail type.

6.14.2.3 The discharge connection shall be bolted to the structure as indicated and shall serve as a lower attachment for the guide rails.

6.14.2.4 The discharge connection shall be either horizontal or elbow discharge type.

6.14.2.5 Adapters shall be provided to connect pump base to standard flanges

6.14.2.6 The anchorage system shall be designed to transmit the forces specified in this Section safely to the structure.

6.14.2.7 Calculations and supporting documentation justifying the support design shall be provided.

6.14.2.8 The pump and guide rail system shall be designed to automatically connect the pump to the discharge piping when lowered into place on the discharge connection.

6.14.2.9 The design shall be non-sparking and shall conform to UL requirements for installation in a location classified in accordance with NFPA 70, Article 500 for Class 1, Group D, Division 1 locations, unless indicated otherwise.

6.14.2.10 The pump shall be easily removable for inspection or service:

A. Requiring no bolts, nuts or other fastenings to be removed for this purpose.

B. No need for personnel to enter the pump wet well or sump.

6.14.2.11 Sealing of the pumping unit to the discharge connection shall be accomplished by a simple linear downward motion of the pump with the entire weight of the pumping unit guided to and pressing tightly against the discharge connections.

6.14.2.12 No portion of the pump shall bear directly on the floor of the sump and no rotary motion of the pump shall be required for sealing.

6.14.2.13 Guide bars provided for directing the pump into position or for removing the pump for maintenance shall steer the pump into proper contact with the discharge elbow.

6.14.2.14 Once the pump has been positioned on its support fitting at the discharge fitting, the guide bar system shall not be required for pump support.

6.15 Dry-Pit Configuration Mounting:

6.15.1 Inlet Elbow:

6.15.1.1 Provide a flanged suction elbow to provide a smooth transition of flow from the connected suction piping to the impeller eye.

6.15.1.2 Inlet elbow shall be of the concentric reducing type, sized to connect directly to the suction pipe diameter shown on the Drawings.

6.15.1.3 Handhole:

A. Provide a handhole, not less than 4 inches in diameter, for access to the impeller and wearing rings.

B. Contoured to match the inner contours of the elbow.

C. Bolted-in-place design.

D. Drilled and tapped and fitted with a valved 2-inch diameter drain.

6.15.2 Pump Base Design and Supports:

6.15.2.1 Pumps shall be mounted to parallel concrete pedestal supports or metal pump stand, both designed by pump manufacturer.

6.15.2.2 Provide a suitable base plate, frame or other mounting provisions for anchorage to the concrete supports such that the anchor bolt holes shall be centered on the concrete pedestal supports.

6.15.2.3 Note that configuration requirements may not accommodate the pump manufacturer's standard equipment mounting design.

6.15.3 Mounting Coordination:

6.15.3.1 Coordinate required height of concrete pedestal supports with required discharge piping elevations shown on the Drawings.

PART 7 MANUFACTURERS

7.1 FCPW has standardized on specific types of pumps for use at pump stations in an attempt to minimize the operation and maintenance costs associated with these pump stations.

7.2 Chopper or screw type pumps shall be considered preferable and shall be the type used unless determined inadequate for the application. Manufacturers generally found acceptable are:

7.2.1 Hidrostal

7.2.2 Vaughan

7.2.3 Barnes

7.2.4 Flygt (N-series impeller)

7.2.5 KSB

7.2.6 Grandfos

7.2.7 FCPW approved equal.

PART 8 ACCESSORIES

8.1 Guide Rails and supports

8.1.1 Guide rails shall be Type 316 stainless steel.

8.1.2 Diameter shall be as specified by the pump manufacturer.

8.1.3 Guide rail systems must use minimum of two rails.

8.1.4 Upper and intermediate guide rail supports shall be Type 316 stainless steel.

8.1.5 The pump manufacturer shall provide the recommended quantity and locations of the guide rail supports to the Developer's Design Engineer.

8.2 Cable Holder & Supports

8.2.1 Cable holder shall be Type 316 stainless steel. A minimum of one cable holder for each cable shall be provided.

8.2.2 Power and pilot cable supports shall be provided and consist of a stainless steel wire braid sleeve with attachment loops or tails to connect to cable holders on the underside of the access frame.

8.2.3 Support for the cables shall be such that the bend radius of the cables shall not be exceeded.

8.3 Lifting Chain

8.3.1 Each pump shall be provided with adequate length of Type 316 stainless steel lifting chain.

8.3.2 The capacity of the lifting system shall be a minimum of 200 percent of the combined weight of the pump and motor assembly.

8.4 Anchor Bolts

8.4.1 Pump manufacturer shall provide all anchor bolts for pump manufacturer provided components based on manufacturer's calculations.

PART 9 SPARE PARTS

9.1 Provide the following spare parts for each model and size of pump furnished.

9.1.1 One (1) O-ring kit.

9.1.2 One complete set of all gaskets and seals.

9.1.3 Two complete sets of all bearings

9.1.4 Two complete sets of mechanical seals.

9.1.5 Two complete sets of discharge connection sealing devices.

9.1.6 One removable cable seal chamber cap with cable length as required in this Section.

9.1.7 Three complete O&M manuals. Two in hard copies and one in searchable electronic copy.

9.1.8 One phase monitor relay and one (1) motor starter with overload block.

9.1.9 Five spare fuses for each type and rating provided.

9.1.10 Five spare lamps for each type provided.

9.1.11 Five spare relays and relay sockets for each type provided.

9.2 If a submersible transducer and controller are used, a spare transducer and controller shall be provided.

9.3 Additional spare parts may be identified by FCPW during the review phase based on the design of the pump station.

9.4 Spare parts shall be boxed and clearly labeled as to specific equipment it is provided for.

9.5 Spare parts shall be of the same type and quality as the parts provided in the original equipment package.

PART 10 SHOP TESTING

10.1 Quality Assurance

10.1.1 Impeller, motor rating and electrical connections shall first be checked for compliance to Developer's purchase order.

10.1.2 A motor and cable insulation test for moisture content and/or insulation defects shall be made.

10.1.3 Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.

10.1.4 The pump shall be run at minimum submergence.

10.1.5 After the operational test, the insulation test shall be performed again.

10.2 Certification tests shall be performed on the actual assembled pumps to be supplied.

10.2.1 Pumps shall be tested in the manufacturer's facility and in accordance with the latest test code of the Hydraulic Institute Level A.

10.2.2 Tests shall cover a range from shut-off to a minimum of 20% beyond the specified design performance capacity.

10.2.3 Certification tests shall be conducted on each pump being supplied.

10.3 Pump performance curves for each condition point specified showing head, power, efficiency and NPSHR plotted against capacity.

10.3.1 Curves shall be provided to demonstrate operation at all speeds required to achieve the specified reduced speed operating conditions.

10.3.2 All curves shall clearly display the specified operating conditions, POR and the manufacturer's limits for the AOR.

10.4 A State of Georgia registered Professional Engineer shall certify each pump curve. Certified pump curves shall be submitted to FCPW.

10.5 All pumps that are not part of the manufacturer's standard offering (custom-engineered) shall have a witnessed test.

10.6 All expenses for witnessing the shop testing for 3 representatives of FCPW's choosing shall be included.

PART 11 FIELD TESTING

11.1 After completion of the installation, the equipment shall be field tested to demonstrate compliance with the specified performance requirements.

11.2 Refer to Section 13, Part 4, Paragraph 4.2

PART 12 TRAINING

12.1 Each pump station installation in Fulton County requires a minimum of 12 hours of on-site Operation and Maintenance training to be provided by the pump manufacturer to FCPW maintenance personnel and shall be paid for by Developer. The pump manufacturer shall be present for the duration of the training.

PART 13 MANUFACTURER'S CERTIFICATION

13.1 Provide a certification by a qualified representative of the pumping system manufacturer that the equipment is installed properly, operating within the design parameters and will be warranted as specified herein.

13.2 Certification shall be based on a detailed inspection of the installation following the successful start-up of the systems.

PART 14 WARRANTY

14.1 The pump manufacturer shall warrant the units against defects in materials and workmanship in accordance with the following provision:

14.1.1 As provided by the manufacturer's standard warranty.

14.1.2 Minimum 2 years.

14.1.3 Warranty shall begin with the date of beneficial use.

14.2 This warranty shall be delivered, in writing, to FCPW and shall include, as a minimum, 100 percent full payment coverage for parts and labor.

SECTION 5
MINIMUM HYDRAULIC REQUIREMENTS

PART 1 PUMP STATIONS

1.1 Flow Considerations

1.1.1 Developer shall complete and submit pump station design calculations using the "Pump Station Design Calculation Form" (See Appendix A).

1.1.2 Calculations shall be done at "Pump On", “Operating Elevation”, "Pump Off" and "Alarm" levels.

1.1.3 Flow Calculations shall be based on the following:

1.1.3.1 Average annual daily flows.

1.1.3.2 2.5 peaking factor. FCPW may modify this value based on collection system and use, such as Inflow and Infiltration or non-residential users.

1.1.4 All influent sewers shall connect at a manhole upstream of the wet well. This upstream manhole and the wet well shall be connected by a single approach pipe.

1.1.5 The “approach pipe” shall be sized for storage and for future expansion of the pump station.

1.1.6 The invert of the approach pipe shall discharge at the low water level in the wet well.

1.1.6.1 The flow into the wet well shall not be allowed to “free-fall.”

1.1.6.2 The maximum velocity of flow entering the pump station through the gravity sewer shall be limited to prevent entrainment of air and off-gassing and to prevent gasses from being sucked into the pump.

1.1.7 Wet well and pump intake design shall be designed for solids bearing liquids per ANSI/HI 9.6 and 9.8.

1.1.8 Circular wet wells shall have a conoidal bottom.

1.1.9 The flow of water into the pump shall be uniform, steady, without swirl and without entrained air.

1.1.10 Flow velocity into the pump intake bell, shall be targeted to be 5 fps at design flow, unless recommended otherwise by the selected pump manufacturer.

PART 2 WET WELL SIZING REQUIREMENTS

2.1 Wet well volumes and geometry and size shall be dependent on station type and hydraulic requirements.

2.1.1 Submersible stations wet wells shall be eight (8) foot diameter minimum and sized in accordance with Hydraulic Institute (HI) Standards, latest edition.

2.2 For pumps stations with constant level control, the wet well shall be sized based on the assumption that additional future pumps will be installed (unless approved otherwise) and to meet the emergency storage requirements stated later.

2.3 Based on pump design operating point, wet well shall be designed to provide available NPSH (NPSHA) with a margin of safety over the published Required NPSH (NPSHR) value based on the latest revisions of Hydraulic Institute (HI) Standards.

2.3.1 The following are the margins of safety:

2.3.1.1 NPSHA > 130% of the NPSHR, if the design operating flow is within the pump's Preferred Operating Range (POR: 70% to 120% of the pump's best efficiency point flow).

2.3.1.2 NPSHA > 180% of the NPSHR, if the design operating flow is in the pump's Allowable Operating Range (AOR).

2.4 Pumping Cycles

2.4.1 The wet well volume shall be sized to prevent excessive cycling of the pumps. The pump start/stop cycling shall be limited by the pump manufacturer's recommendation but no more than one start per ten minutes with all pumps in service.

2.4.2 Stations designed for constant level control (variable speed) shall run continuously to maintain the level set point.

2.4.3 Constant speed pumping stations shall cycle to limit the number of pump starts. The minimum time between pump starts shall be 10 minutes at design flow.

2.5 Emergency Storage Requirements

2.5.1 Storage shall be provided above the high-level alarm equal to three (3) hours at peak flow.

2.5.1.1 Storage volume is calculated to be that volume between the high-level alarm and the lowest point of overflow (including basement and service tap elevations regardless of any backflow valves in the service lines).

2.5.1.2 Said storage may consist of any combination of line capacity, manhole capacity and wet well volume.

2.5.2 Additional storage tanks are not allowed unless authorized by Fulton County Technical Services as the last option for the station.

PART 3 FORCE MAINS

3.1 Refer to Section 6

PART 4 DOWNSTREAM GRAVITY SEWER

4.1 An analysis of the hydraulic effects on downstream gravity sewers shall be completed by Developer's Design Engineer.

4.2 If it is necessary to collect flow data for the existing sewer which will receive the flow from the pump station, Developer will be required to have flow meters installed per the direction of FCPW.

SECTION 6

FORCE MAIN REQUIREMENTS

PART 1 GENERAL

1.1 Unless specifically requested by the FCPW a force main shall only serve one (1) pump station.

1.2 Force mains shall be constructed using existing approved FCPW standard details and specifications.

1.3 Force mains with multiple diameter piping will not be allowed unless specifically approved by FCPW.

1.4 Force mains will not be allowed to discharge directly into the wet well of another pump station.

1.5 Within the proposed development:

1.5.1 The force main shall be located in a 10-foot wide utility easement immediately adjacent to the proposed right-of-way.

1.6 Outside of the proposed development:

1.6.1 The force main shall either be located within the State or County Road right-of-way

1.6.2 In the case that the State or County Department of Transportation will not approve locating the force main within their right-of-way, a 20-foot-wide utility easement immediately adjacent to the proposed right-of-way.

1.7 Separation from Potable Water Sources

1.7.1 Horizontal and Vertical Separations

1.7.1.1 Force mains shall maintain ten (10) feet horizontal and eighteen (18) inches vertical separation below potable water mains.

1.7.1.2 Measurement shall be from outside of pipe to outside of pipe.

1.7.1.3 If site conditions do not allow such minimum separations, FCPW may allow deviation on a case-by-case basis if supported by data from Developer's Design Engineer.

1.7.1.4 Such deviation may allow installation of the force main closer to a potable water main under the following conditions:

A. The force main is in a separate trench or

B. The potable water main is on an undisturbed earth shelf located on one side of the force main and at an elevation such that the bottom of the potable water main is at least eighteen (18) inches above the top of the force main.

1.7.1.5 If it is impossible to obtain proper horizontal and vertical separation as described above, both the force main and potable water main must be constructed of HDPE DR 11 pipe or ductile iron pipe (by approved exception) meeting FCPW Standards and shall be pressure tested to two hundred (200) psi to assure water-tightness prior to backfilling.

1.7.2 Crossings

1.7.2.1 Force mains crossing over or under potable water lines shall be laid to provide a minimum vertical distance of eighteen (18) inches between the outside of the force main and the outside of the potable water main.

1.7.2.2 The crossing shall be arranged so that the force main joints will be equidistant and as far as possible from the water main joints.

1.7.2.3 Where a force main crosses over a potable water main, adequate structural support shall be provided for the force main to maintain line and grade.

1.7.2.4 When it is impossible to obtain the proper vertical separation as stipulated above, one of the following methods must be specified:

A. The force main shall be designed and constructed equal to the potable water main and shall be pressure tested to two hundred (200) psi to assure water tightness.

B. Either the force main or potable water main may be encased in a watertight casing pipe or concrete encasement which extends ten (10) feet on both sides of the crossing, measured perpendicular to the potable water main.

C. The casing pipe shall meet the material requirements of steel casing for bore and jack crossings.

1.8 Force Main Sizing

1.8.1 All force main piping shall be designed to convey wastewater at a velocity between three (3.0) feet per second (fps) and six (6.0) fps.

1.8.2 Wastewater velocity occurring in a force main shall be calculated using the continuity equation:

$$V = 0.049\left(\frac{Q_{PUMP}}{\mathrm{D}^2}\right)$$

Where:

V is the velocity in feet per second

Q is the flow rate of a single pump in gallons per minute

D is the diameter of the force main pipe in inches

1.9 Force mains will not be approved to flow downhill into the receiving manhole.

1.9.1 Gravity sewer lines must be installed to convey flow downhill to the existing receiving sewer system.

1.9.2 Exceptions to this requirement may be granted on a case-by-case basis if, in the opinion of FCPW, there is no benefit to FCPW of having gravity sewer in the particular location involved.

1.10 Velocity Requirements

1.10.1 Force main velocities shall be a minimum of 3 fps and maximum 6 fps with a target velocity of 5 fps.

1.10.2 Minimum size for force mains shall be 6 inches in diameter.

1.10.3 The minimum velocity of 3 fps shall be achieved with one pump operating.

1.11 Operating Pressures

1.11.1 Force mains shall be designed for maximum allowable total dynamic head (TDH) of 150 feet.

1.11.2 Heads greater than 150 feet shall be coordinated with FCPW.

1.12 Head loss Calculations

1.12.1 Refer to Paragraph 2.5 of Section 3 for force main head loss calculation requirements.

1.13 Transient Analysis

1.13.1 A transient analysis shall be completed for each pump station and force main design.

1.13.2 Transient analysis calculations shall be submitted along with a statement by Developer's Design Engineer (registered in the State of Georgia) that the surge (water hammer) for the proposed pumping station and force main will be within acceptable limits.

1.13.3 The analysis shall include results for operation of the following:

1.13.3.1 With one pump running.

1.13.3.2 With all pumps running simultaneously.

1.13.4 Analysis shall be made under an emergency shutdown scenario (e.g. full loss of power at maximum anticipated flow rate.

1.13.5 The Developer's Design Engineer shall show the following:

1.13.5.1 The transient surge will not exceed the working pressures of all pumps, force main, valves and appurtenances.

1.13.5.2 The factor of safety between the pipe pressure class and the maximum pipe pressure is greater than or equal to 1.5 for each section of the station and force main.

1.13.6 The analysis shall also address the following:

1.13.6.1 Placement of air release/vacuum valves.

1.13.6.2 The need for surge relief.

1.13.6.3 The proposed force main restraints.

1.13.7 Force main design shall be such that active devices for control of transient hydraulic conditions are minimized to the greatest extent possible.

1.13.8 The following, with justification, may be acceptable control strategies after review of the transient analysis:

1.13.8.1 Control valves that open and close slowly.

1.13.8.2 Construction of the force main using a higher-strength pipe.

1.13.8.3 Vacuum relief valves.

1.13.8.4 Specialized control and/or release valves and other devices designed to prevent transient pressures from reaching levels that could damage the pump station and force main systems.

1.14 Special Design Considerations

1.14.1 Freeze Protection

1.14.1.1 Protection from freezing should be provided for pipes above ground (such as bridge crossings).

1.14.2 Thrust Restraint

1.14.2.1 Thrust blocking underground should be considered whenever pipe changes direction (tees and bends) and where unbalanced thrust forces (pressure and momentum) exist.

1.14.2.2 Refer to FCPW Standard Specifications Section 04 05 01 for thrust restraint requirements.

1.14.2.3 Refer to FCPW Standard Details 132A and 132B for thrust blocking details.

1.14.2.4 Pipe thrust restraints need to be considered for pipelines above ground as well.

1.14.2.5 Refer to FCPW Standard Details 126, 127 and 128 for tie-rod details.

1.14.3 Cathodic Protection

1.14.3.1 Cathodic protection of ductile iron pipe should be considered whenever the following conditions exist:

A. Corrosive soils.

B. Stray current from MARTA or Atlanta Gas Light (AGL) facilities.

1.14.3.2 Testing for corrosive soils or stray currents shall be at no cost to FCPW and shall be at the discretion of the same.

PART 2 PIPING

2.1 All force mains, including the pump discharge through the meter and valve vault, shall be constructed using High Density Polyethylene (HDPE) pipe and fittings.

2.1.1 Epoxy lined ductile iron pipe may be used on exception basis, prior FCPW approval shall be required.

2.2 High Density Polyethylene (HDPE) Pipe

2.2.1 Material

2.2.1.1 Resins for HDPE pipe and fittings shall conform to the following Standards:

A. ASTM D3350 - “Standard Specification for Polyethylene Plastics Pipe and Fitting Materials”.

B. ASTM F412 - “Standard Terminology Relating to Plastic Piping Systems”.

2.2.1.2 Pipe and fittings shall be made from the resin meeting the requirements of the PPI material designation PE 4710.

2.2.1.3 PE4710 material (compound) shall conform to material requirements specified in ASTM F412 for pipe and ASTM D3261 for fittings as applicable for the pipe or fitting.

2.2.1.4 PE4710 material (compound) shall meet the requirements of ASTM D3350 and shall meet or exceed a cell classification of 445574 per ASTM D3350.

2.2.1.5 PE4710 material (compound) shall have a hydrostatic design stress (HDS) rating for water at 73°F (23°C) of not less than 1000

psi that shall be listed in PPI TR-4 in the name of the pipe manufacturer.

2.2.1.6 PE4710 material (compound) shall have a hydrostatic design basis (HDB) rating at 140°F (60°C) of not less than 1000 psi that shall be listed in PPI TR-4 in the name of the pipe manufacturer.

2.2.1.7 PE4710 pipe and fitting material (compound) in PE4710 pipe and fittings shall contain color and ultraviolet (UV) stabilizer meeting the requirements of Code C or E per ASTM D3350.

A. Code C material shall contain 2 to 3 percent carbon black to provide indefinite protection against UV degradation when material from the pipe is tested in accordance with ASTM D1603 or ASTM D4218.

B. Code E material used for coextruded OD color stripes, or a coextruded ID color layer shall contain sufficient UV stabilizer to protect the pipe against UV degradation for at least 24 months of unprotected outdoor exposure. Coextruded color PE compound material shall be PE4710 pipe material compound, varying only by color and UV stabilizer.

2.2.1.8 Clean rework materials derived from pipe production by the same manufacturer are acceptable as part of a blend with new material for the production of new pipe provided that the rework material is the same PE4710 material designation as the new material (compound) to which it is added. Finished products containing rework material shall meet the requirements this specification.

2.2.2 Pipe and Fittings

2.2.2.1 All pipe and fittings shall be manufactured in ductile iron pipe sizes (DIPS) in accordance with the following Standards.

A. ANSI/AWWA C906 - “Polyethylene Pipe and Fittings, 4 in. (100 mm) through 63 in. (1,575 mm) for Water Distribution”.

B. ASTM D3035 - “Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter”.

C. ASTM F714 - “Standard Specification for Polyethylene (PE) Pipe (SDR-PR) Based on Outside Diameter”.

D. ASTM F2619 - “Standard Specification for High Density Polyethylene (PE) Line Pipe”.

E. ASTM F2206 - “Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock or Block Stock”.

F. ASTM D3261 - “Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing”.

G. ASTM F1055 - “Standard Specification for Electrofusion Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing”.

2.2.2.2 Pipes

A. HDPE pipes shall be DR 11 with a minimum pressure class rating of 200 psi.

B. HDPE pipe and butt fusion fittings shall have plain ends for butt fusion.

C. The pipe shall contain no recycled compound except for rework material generated in the manufacturer’s own plant that has the same cell classification as the material to which it is being added.

D. The pipe shall be homogeneous throughout and free of visible cracks, holes, voids, foreign inclusions or other defects that may affect the wall integrity.

E. Permanent identification of piping service shall be provided by co-extruding longitudinal green, lavender or purple stripes into the pipe outside surface.

1) The striping material shall be the same material as the pipe material except for color.

2) Stripes printed or painted on the outside surface shall not be acceptable.

F. The nominal pipe diameter shall be specified on the Drawings. The DR (dimension ratio) and the pressure rating of the pipe shall be as noted on the Drawings.

G. HDPE pipes may be deflected subject to approval by FCPW.

1) The following table shows maximum deflection based upon the allowable strain of the pipe wall.

2) Potential flow restrictions, surge and other non-trench stability and pipe strain issues may reduce the values shown here per FCPW recommendations.

3) The bend radius multiplier determines the minimum radius of the pipe curvature and is calculated by multiplying the outside diameter of the pipe by the multiplier from the appropriate DR used.

4) Bending radius allowed by the manufacturer can vary. Verify the multiplier with the manufacturer. In no case shall the radius be less than 125% of the manufacturer's permitted multiplier.

HDPE Pipe Dimension Ratio (DR)	Allowable deflection (percent)	Bend Radius Multiplier
32.5	8.1	50
26.0	6.5	45
21.0	5.2	40
19.0	4.7	37.5
17.0	4.2	32.5
15.5	3.9	30
13.5	3.4	27.5
11.0	2.7	25

H. Pipe Markings

1) Pipe shall be permanently marked using heated indent printing in accordance with ASTM F714 as applicable for the pipe size including:

a) Nominal size and sizing system, e.g., DIOD.

b) SDR 11.

c) Extrusion production-record code.

d) Manufacturer's Trademark or trade name.

e) Standard Designation, ASTM F714, material designation and pressure rating or pressure class for water at 73°F.

f) Marking the Standard Designation on the pipe shall serve as the manufacturer's certification that the pipe has been manufactured, sampled and tested, and has been found to comply with the requirements of the Standard.

g) The ASTM D3035 or ASTM F714 pipe pressure rating for water at 73°F shall be "PE4710 PRXXX" where XXX = pressure rating in psi.

h) The AWWA C901 pipe pressure class for water at 73°F shall be "PE4710 PCXXX" where XXX = pressure class in psi.

i) The AWWA C906 pipe pressure class for water at 73°F shall be "PE3408 PCXXX[1]" where XXX = pressure class in psi.

2.2.2.3 Fittings

A. Butt fusion, saddle fusion, electrofusion and fabricated fittings shall be manufactured from PE4710 material (compound) in accordance with this specification.

B. Molded fitting shall be used for 12-inch or smaller pipe.

C. Fabricated fittings shall be used for pipes larger than 12-inch.

D. Fittings shall comply with the following Standards:

1) ASTM D3261 for molded butt fusion and saddle fusion fittings, flange adapters and MJ adapters

2) ASTM F2206 for fabricated butt fusion fittings

3) ASTM F1055 for electrofusion fittings.

E. Fittings shall comply with the marking requirements of the following Standards:

1) ASTM D3261 for molded butt and saddle fusion fittings, flange adapters and MJ adapters.

2) ASTM F2206 for fabricated butt fusion fittings.

3) ASTM F1055 for electrofusion fittings.

F. Fittings shall have pressure class ratings not less than the pressure class rating of the pipe to which they are joined.

G. Plain end butt fused fittings shall be used when joining polyethylene materials.

[1] Per AWWA C906, PE3408 marking and PE3408 PCXXX is required. Pipe may be manufactured using PE4710 material (compound) that is listed in PPI TR-4 as meeting PE3408 requirements.

H. Mechanical fittings shall be used only when joining polyethylene materials to different piping materials and approved by FCPW.

I. The fittings shall contain no recycled compound except for rework material generated in the manufacturer's own plant that has the same cell classification as the material to which it is being added.

J. The fittings shall be homogeneous throughout and free of visible cracks, holes, voids, foreign inclusions or other defects that may affect the wall integrity.

K. Butt fusion fittings shall comply with ASTM D3261.

L. Mechanical fittings used with polyethylene pipe shall be specifically designed for, or tested and found to be acceptable for, use with polyethylene pipe.

2.2.2.4 Fusion Joints

A. Unless otherwise specified, PE4710 pipe and fittings shall be assembled in the field with butt fusion, saddle fusion or electrofusion joints.

B. ASTM F2620 and the pipe manufacturer's recommended procedure (WL Plastics WL101) shall be observed for butt fusion and saddle fusion joints.

C. ASTM F1290 and the electrofusion fitting manufacturer's recommended joining procedure shall be observed for electrofusion joints.

D. Field butt fusion, saddle fusion and electrofusion joints shall be made by Fusion Technicians that are qualified in accordance with this specification to make the specific fusion joint type.

E. Field fusion joints shall be recorded and documented in accordance with this specification.

2.2.2.5 Fusion Technician Requirements

A. Each Fusion Technician shall be separately qualified to make each type of fusion joint.

1) Fusion joint types are butt fusion, saddle fusion and electrofusion.

2) Qualification to make one type of fusion joint shall not qualify a Fusion Technician to make a different type of fusion joint.

B. Each Fusion Technician making butt fusion joints shall be qualified to make butt fusion joints in accordance with ASTM F2620.

1) Qualification shall have occurred no earlier than 12 months before performing fusion joining on site in accordance with this specification.

2) Qualification shall be a documented demonstration of proficiency by making joints in accordance with ASTM F2620 that are proved to be satisfactory by destructive testing in accordance with ASTM F2620.

C. Each Fusion Technician making saddle fusion joints shall be qualified to make saddle fusion joints in accordance with ASTM F2620.

1) Qualification shall have occurred no earlier than 12 months before performing on-site fusion joining in accordance with this specification.

2) Qualification shall be a documented demonstration of proficiency by making joints in accordance with ASTM F2620 that are proved to be satisfactory by destructive testing in accordance with ASTM F2620.

D. Each Fusion Technician making electrofusion fitting joints shall be qualified to make electrofusion fitting joints in accordance with ASTM F1290 and the electrofusion fitting manufacturer's recommended procedure.

1) Qualification shall have occurred no earlier than 12 months before performing on-site fusion joining in accordance with this specification.

2) Qualification shall be a documented demonstration of proficiency by making joints in accordance with ASTM F1290 and the electrofusion fitting manufacturer's recommended procedure that are proved to be satisfactory by destructive testing in accordance with ASTM F1290 and the electrofusion fitting manufacturer's recommended procedure.

2.2.2.6 Connections and Fittings for Pressure Applications

A. Connections shall be defined in conjunction with the linking of project piping as well as the tie-ins to other piping systems.

B. Mechanical Fittings

1) Acceptable mechanical fittings for use with PE4710 pipe and fittings shall be mechanical fittings that are qualified by the mechanical fitting manufacturer for use with HDPE pipe and fittings.

2) Mechanical fittings for use with HDPE pipe shall provide restraint against longitudinal separation that is inherent to the design of the joint.

3) Mechanical joints that do not provide restraint against pull-out or push-off are prohibited.

4) Mechanical connections to non-HDPE devices and appurtenances shall be by bolted flange adapter or MJ adapter.

5) Flange adapter and MJ adapter connections shall be assembled, installed and tightened in accordance with flange adapter or MJ adapter manufacturer's instructions.

6) Flange bolt tightening shall be in accordance with PPI TN-38.

7) Where PE4710 pipe is connected to gasketed mechanical/flange joint fittings or appurtenances, the connection shall be made by butt fusing a PE4710 MJ/flange Adapter to the PE4710 pipe and connecting the PE4710 MJ/flange Adapter to the mechanical joint/flange fitting or appurtenance.

C. Gasketed Push-On Fittings

1) Gasketed push-on fittings shall be fitted with external mechanical restraints that span across the joint and are assembled in accordance with restraint manufacturer's instructions.

2) Thrust blocking does not provide acceptable restraint and is prohibited.

3) Where plain-end PE4710 pipe is assembled with push-on fittings, the PE4710 pipe end shall be fitted with electrofusion restraints so that external mechanical restraint may be secured to the PE4710 pipe

D. Sleeve-type couplings

1) Sleeve-type mechanical couplings shall be manufactured for use with HDPE pipe and shall be restrained as indicated on the Drawings and in these specifications.

2) Unrestrained sleeve-type couplings are prohibited.

E. Expansion and flexible couplings

1) Expansion-type mechanical couplings are prohibited.

F. Connection hardware

1) Bolts and nuts for buried service shall be made of non-corrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21.11, regardless of any other protective coating.

2.2.2.7 Connection to non-pressure manholes and structures

A. PE4710 pipe and fittings shall be connected to manholes and other structures to provide a leak-free, properly graded flow into or out of the manhole or structure.

B. Connections to existing manholes and structures shall be as specified and shown on the Drawings.

1) For a cored or drilled opening provide a flexible, watertight connection that meets and/or exceeds ASTM C923.

2) For a knockout opening, provide a watertight connection (waterstop or other method) meeting the material requirements of ASTM C923 that is securely attached to the pipe with stainless steel bands or other means.

3) Grout opening in manhole wall with non-shrink grout. Pour concrete collar around pipe and outside manhole opening.

C. Connections to a new manhole or structure shall be as specified and shown on the Drawings.

1) A flexible, watertight gasket per ASTM C 923 shall be cast integrally with riser section(s) for all precast manhole and structures.

2) Drop connections shall be required where shown on Drawings.

3) Grout internal joint space with non-shrink grout.

D. Approved suppliers

1) Pipe and fitting suppliers shall be approved by the FCPW.

2) The following pipe manufacturers are approved:

a) WL Plastics

b) Chevron

c) Phillips 66 Driscopipe

d) Or approved equal

2.2.2.8 Warranty

A. Pipe and fitting suppliers shall provide a two-year warranty covering defects in product material and workmanship.

1) A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.

B. Fusion providers shall provide a two-year warranty from the date of installation acceptance, covering defects in fusion joining workmanship and shall provide for remaking defective butt fusion, saddle fusion or electrofusion joints.

1) A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the installer of warranty responsibility for the full warranty term.

2.3 Ductile Iron Pipe (DIP)

2.3.1 DIP requirements shall be per established FCPW Standards or as listed herein; whichever requirement is more stringent.

2.3.2 DI pipe, appurtenances and fittings shall conform to the latest requirements of ANSI/AWWA C151/A21.51, “Ductile Iron Pipe, Centrifugally Cast in Metal Molds for Water or Other Liquids”. All pipes, valves and fittings shall be epoxy lined.

2.3.3 The thickness and pressure class of DI pipe required for the installation and operating conditions during the expected service life of the force main shall be determined in accordance with the latest requirements of ANSI/AWWA C150/A21.50, “Thickness Design of Ductile Iron Pipe”.

2.3.4 Flanged DI pipe shall conform to the latest requirements of ANSI/AWWA C115/A21.15, “Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges”.

2.3.5 Fittings for DI pipe shall conform to the latest requirements of one of the following:

2.3.5.1 ANSI/AWWA C110/A21.10, “Ductile-Iron and Gray- Iron Fittings, 3 In. through 48 In. for Water and Other Liquids”

2.3.5.2 ANSI/AWWA C153/A21.53, “Ductile Iron Compact Fittings, 3 In. through 24 In. and 54 In. through 66 In., for Water Service”.

2.3.6 Pipe Joints

2.3.6.1 Buried DI pipe shall have mechanical or gasketed push-on type joints.

2.3.6.2 Exposed DI pipe shall have flanged joints.

2.3.6.3 Restrained joint DI pipe may be used for anchoring purposes.

2.3.6.4 Gaskets shall be manufactured of vulcanized natural or synthetic rubber in accordance with the latest requirements of ANSI/AWWA C111/A21.11, “Rubber Gasket Joints for Ductile Iron and Gray- Iron Pressure Pipe and Fittings”.

2.3.7 Corrosive Environments

2.3.7.1 Consideration shall be given to the existence of, or the potential for, development of corrosive environments within and outside the force main shall be performed.

2.3.7.2 Sources of corrosion may include:

A. Acidic soils.

B. Septic wastewater.

C. Air entrainment within the force main.

D. Stray currents.

2.3.7.3 Where corrosion is deemed to be a serious problem, DI pipe shall be provided with the following as appropriate:

A. Cathodic protection.

B. An internal/external encasement.

C. Lining or coating appropriate for the pipe material and situation.

1) Such encasements, linings and coatings shall be manufactured or applied in accordance with the appropriate ANSI and AWWA Standards.

2.3.8 Cleaning / Maintenance

2.3.8.1 A self-cleansing velocity of at least three (3.0) feet per second shall be provided throughout the length of the force main. This will resuspend any solids that may have settled out.

2.3.8.2 If the length of force main exceeds five thousand (5,000) feet, Developer shall provide all of the following to further prevent the accumulation of solids:

A. Drain or blow-off valves provided at all low points in the force main. Such valves shall be either connected to an available entry point into the wastewater collection system, provided with a connection for a vacuum pumper truck, and designed with some other method to prevent an intentional discharge of wastewater during their operation.

B. Flushing ports along the length of the force main as well as a water supply of sufficient quantity and pressure. Such ports shall either be connected to an available entry point into the wastewater collection system, provided with a connection for a vacuum pumper truck, and designed with some other method to prevent an intentional discharge of wastewater during their operation.

2.3.9 Stream Crossings

2.3.9.1 Force mains shall be routed such that the number of stream crossings is minimized. When a stream crossing is required by the design, the crossing shall be as nearly perpendicular to the stream flow as possible and shall be buried under the stream bed with 3-ft minimum cover from top of pipe or casing.

2.3.9.2 DI pipe with joints equivalent to water main standards or a watertight ferrous encasement pipe shall be used to construct force mains that cross streams.

2.3.9.3 Force main bedding, haunching, and backfill shall be appropriate for the installation location and pipe material. However, the ability of the bedding and backfill material to readily erode, cause siltation, damage the force main during installation and corrode the force main after installation shall also be considered.

2.3.9.4 No aerial stream crossing will be allowed.

2.3.10 Slope

2.3.10.1 No segments of the force main can have zero slopes, to limit the accumulation of gasses. Low points shall also be avoided to prevent the accumulation of solids.

2.3.10.2 High points shall have air release combination valves as determined by specifics of the design.

2.3.11 Additional requirements are presented in Section 3 of these Guidelines.

2.3.12 The required pipe class shall be such that the “manufacturer’s allowable working pressure” is not less than either of the following:

2.3.12.1 A minimum of twice the design working pressure

2.3.12.2 One- and one-half times the design surge pressure,

2.3.12.3 Whichever is greater.

2.3.13 Internal Lining Requirements

2.3.13.1 Force mains shall have a corrosion resistant internal lining. Lining shall be Protecto 401 ceramic epoxy or FCPW approved equal.

2.3.14 External Coating Requirements

2.3.14.1 Developer shall conduct an assessment of the proposed route of the force main to determine if there are potential sources of external corrosion such as stray currents or corrosive soils.

2.3.14.2 The results of the analysis shall be submitted to FCPW for review and approval.

2.3.14.3 The force main shall be wrapped in polyethylene if such corrosion sources exist.

2.3.14.4 If sources of potential corrosion exist which are not mitigated by wrapping, the force main shall be provided with the required means for protecting the force main from corrosion.

2.3.15 The top third of the pipe shall be painted green.

2.3.16 Thrust Restraint

2.3.16.1 Pipe under pressure shall be adequately restrained to resist thrusts that may develop at bends, tees, plug and at any other location where a change in flow direction occurs.

2.3.16.2 Requirements shall be per established FCPW standards or as listed herein; whichever requirement is more stringent.

2.3.16.3 Thrust restraint devices shall be designed to withstand force main pressures of at least twenty-five percent (25%) greater than the maximum pump shut-off head plus an allowance for water hammer and an appropriate factor of safety.

2.3.16.4 All fittings, valves and dead ends shall have two (2) forms of thrust restraint.

A. Acceptable thrust restraint shall include the following:

1) Restrained joint glands,

2) Field lock gaskets (on piping only)

3) Threaded rods

4) Concrete blocking

B. Concrete Thrust Blocks

1) Concrete thrust blocks shall be located between the fitting to be anchored and undisturbed soil material.

2) Appropriate thrust reaction block bearing areas shall be calculated based not only on the maximum expected force but also on the soil material.

3) Concrete thrust blocks shall have a minimum compressive strength of three thousand (3,000) pounds per square inch.

4) For thrust blocking details, refer to Fulton County Standard Details 132A and 132B.

5) For thrust restraint installation with tie-rod details, refer to Fulton County Standard Details 126, 127 and 128.

C. Self-restrained joints or joints restrained with tie rods and clamps shall both be acceptable.

D. In both cases, component parts shall either be manufactured of corrosion-resistant materials or coated liberally with a corrosion-retarding product

E. Developer's Design Engineer shall be responsible for calculating the length of pipe from each fitting that requires restrained joints. Calculations shall be submitted to FCPW for review.

2.3.16.5 Pipe thrust restraints need to be considered for pipelines above ground as well.

2.3.16.6 Restrained Joint Pipe.

2.3.16.7 The table below shows the acceptable restrained joint options. However, restrained joined pipe does not waive the required thrust blocking below ground. Above ground piping shall be designed using restrained joint piping with expansion and contraction considerations and shall be approved by FCPW

Acceptable Restrained Joints				
Diameter (inches)	**ACIPCO**	**U.S. Pipe**	**McWayne**	**Generic**
4 - 12	Fast-Grip Flex Ring	Field LokTR Flex	Push-On Restrained Joint Type A	MJ with Retainer Gland
16 - 24	Fast-Grip Flex Ring	Field LokTR Flex	Push-On Restrained Joint Type A	MJ with Retainer Gland
30 - 36	Flex Ring	TR Flex	Push-On Restrained Joint Type B	MJ with Retainer Gland
42 - 48	Lok-Ring	TR Flex	N/A	MJ with Retainer Gland
54 - 64	Lok-Ring	TR Flex	N/A	N/A

2.4 Marking

2.4.1 3M™ Ball Marker 1404-XR, EMS 6 ft Extended Range, Wastewater, shall be programed by the Contractor for installation along the force main. Marker balls shall be installed at all horizontal and vertical bends 45-degree and larger. The marker balls shall be buried 2-feet above the force main but no more than 5-feet deep.

2.4.2 3M™ Electronic Marking System (EMS) Warning Tape 7904-XT, Green, 6 in, WWater, shall be continuously installed along the top of the force main. The tape shall be buried 2-feet above the force main but no more than 4-feet deep.

2.4.3. Contractor shall obtain a 3M™ Electronic Dynatel™ Locator 7550X-ID/ U12 Pipe/ Cable/ EMS Locator w/ 4.5” Coupler-12 Watt locator to program and locate the force main marker balls.

PART 3 VALVES

3.1 Isolation valves

3.1.1 Acceptable isolation valves shall be plug valves.

3.1.2 Refer to Section 3, Part 5, Paragraph 5.5.3 for provisions applicable to buried valves.

3.1.3 Valves shall be Dezurik, Val-Matic, or approved equal.

3.2 Air/Vacuum Valves

3.2.1 Refer to Section 3, Part 5, Paragraph 5.5.4 for details.

PART 4 DISCHARGE MANHOLES

4.1 The discharge manhole shall be designed to transition the discharge from the force main into the gravity sewer to mitigate the release of gases from the wastewater.

4.2 Existing Manholes

4.2.1 When a proposed force main will discharge into an existing manhole on a gravity sewer, the existing manhole shall have a corrosion resistant coating installed in it or be replaced with a composite manhole.

4.2.2 An existing precast concrete manhole shall be lined with coating capable of resisting corrosion caused by hydrogen sulfide gases and other constituents found in wastewater.

4.2.3 An existing precast concrete manhole shall be coated with one of the following:

4.2.3.1 Two (2) coats of three (3) mills epoxy,

4.2.3.2 Three (3) mm of 40% fiberglass and 60% resin spray liner

4.2.3.3 Precast lined with three (3) mm of HDPE.

4.2.4 Precast section joints/seams shall be wrapped with eight (8) inch joint wrap.

4.2.5 Surface preparation, thickness, mixing and application shall be in accordance with the manufacturer's instructions.

4.2.6 The receiving manhole shall have a four (4) inch vent with an activated carbon filter canister attachment to control odor. The activated carbon filter requirements are provided in Section 3, Paragraph 7.6.

4.2.7 An existing brick manhole shall be replaced with a new manhole.

4.3 New Manholes

4.3.1 When a new manhole is installed as the discharge manhole, the manhole shall be constructed of composite materials capable of resisting corrosion caused by hydrogen sulfide gases and other constituents found in wastewater.

4.3.2 Composite or HDPE manholes shall be manufactured by:

4.3.2.1 U.S. Composite Pipe, Inc.

4.3.2.2 Sewer Shield Composite, LLC

4.3.2.3 FCPW approved equal

PART 5 TESTING

5.1 Pressure and Leakage Testing

5.1.1 Refer to Section 13, Part 4, Paragraph 4.1

SECTION 7
ELECTRICAL GUIDELINES

PART 1 ELECTRICAL DESIGN CRITERIA

1.1 Governing Codes and Standards

1.1.1 NFPA 70 – National Electric Code

1.1.2 NFPA 70E – Standard for Electrical Safety in the Workplace

1.1.3 NFPA 820 – Standard for Fire Protection in Wastewater Treatment and Collection Facilities

1.1.4 NFPA 110 – Standard for Emergency and Standby Power Systems

1.1.5 ASTM A510, Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.

1.1.6 ASTM B633, Specification for Electrodeposited Coatings of Zinc on Iron and Steel.

1.1.7 TIA/EIA-485, Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems (known as RS-485).

1.1.8 UL 13, Power-Limited Circuit Cables.

1.1.9 UL 1581, Electrical Wires, Cables and Flexible Cords.

1.1.10 UL VW-1, Vertical Wire Flame Test.

1.1.11 UL 910, Safety Test for Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air

1.1.12 All applicable federal, state and local codes.

1.2 Underground and above ground power service installation is presented in Standard Detail P-002 and P-003, respectively, in Appendix B.

1.3 Common Work

1.3.1 Raceway

1.3.1.1 Exposed, Outdoor: Aluminum/PVC Coated Rigid Steel, 3/4-inch minimum size

1.3.1.2 Exposed, Indoor: Aluminum/Galvanized Rigid Steel, 3/4-inch minimum size

1.3.1.3 Underground: Schedule 40 PVC conduit, encased in steel reinforced concrete ductbanks, 1-inch minimum size.

1.3.1.4 Coat the top of ductbanks with red dye.

1.3.1.5 Provide marker tape for utility location services.

1.3.1.6 Separate conduits shall be supplied for analog, discrete, communication and power conductors.

1.4 Wire and Cable

1.4.1 480V feeder and motor circuit:

1.4.1.1 Conductor and cable applications

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted or required.

C. Nonmetallic-sheathed cable is not permitted.

1.4.1.2 Conductor and cable general requirements

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductors for Grounding and Bonding: Comply with NFPA 70 ARTICLE 250.

H. Conductor Material:

1) Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.

2) Tinned Copper Conductors: Comply with ASTM B33.

3) Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.

1.4.2 240V/208V/120V Branch Circuits:

1.4.2.1 Minimum conductor size:

A. Branch Circuits: 12 AWG.

B. Exceptions:

1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.

2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.

1.4.2.2 Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

1.4.3 Control Circuits: Stranded Conductors.

1.4.4 Instrumentation signal circuits:

1.4.4.1 Type of Cables:

A. Shielded instrumentation cables.

B. Data communication cables.

1.4.5 Medium Voltage Power Cables (where applicable):

1.4.5.1 Quality Standards: IEEE C2 and NFPA 70.

1.4.5.2 Cable:

A. Type: MV105.

B. Conductor: Copper.

C. Conductor Stranding: Compact round, concentric lay.

D. Strand Filling: Conductor interstices are filled with impermeable compound.

E. Conductor Insulation: Ethylene-propylene rubber:

1) Voltage Rating: 1kV and 35 kV.

2) Insulation Thickness: 133 percent for operating voltages for one hour at the corresponding voltage.

F. Shielding: Copper tape.

G. Shielding and Jacket: Corrugated copper drain wires embedded in extruded, chlorinated, polyethylene jacket.

H. Three-conductor cable assembly with ground conductors.

I. Cable Sheath: Interlocked aluminum.

J. Cable Jacket: Sunlight-resistant PVC.

1.4.5.3 Connectors:

A. Copper-Conductor Connectors: Copper shear bolted.

1.4.5.4 Solid Terminations:

A. Multi-conductor cable sheath seals.

B. Shielded-cable terminations.

1.4.5.5 Separable insulated connectors with

A. Splice Kits

B. Fault indicator

1.4.5.6 Field Quality Control

A. Tests and Inspections:

1) Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.

a) All conductors are to be checked for continuity. Inspect and test in accordance with NETA ATS

b) Insulation resistance testing using a megohmmeter on all low voltage feeder circuits.

2) Perform DC high potential tests on all 5kV conductors. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

1.4.6 Wire identification: provide wire/cable markers for all conductors and cables at each end and at intermediate pull points. Wire tag shall include source and destination equipment tags plus terminal numbers.

1.4.6.1 Conductor Color Coding:

A. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.

B. Color Coding Method: Integrally colored insulation.

1) Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.

C. Color Code:

1) 208Y/120 V, 3 Phase, 4 Wire System:

a) Phase A: Black.

b) Phase B: Red.

c) Phase C: Blue.

d) Neutral/Grounded: White.

2) 480/277 V, 3 Phase, 4 Wire System:

a) Phase A: Yellow

b) Phase B: Orange

c) Phase C: Brown

d) Neutral/Grounded: Gray

3) Equipment Ground, All Systems: Green.

4) Medium Voltage Color Code

a) Phase A: Black.

b) Phase B: Red.

c) Phase C: Blue.

d) Neutral/Grounded: White.

5) Travelers for 3-Way and 4-Way Switching: Pink.

6) For control circuits, comply with manufacturer's recommended color code.

1.5 Enclosures, Pull Boxes, etc.

1.5.1 Enclosures for electrical and control components for the pump station shall be located outside of the wet well and in a location such that they are readily accessible, ensure maximum electrical and personnel safety and are

protected from damage due to vehicular traffic and flooding up to 500-year flood level.

1.5.2 All electrical and control panels shall be installed at a minimum five (5) feet from the fence. Reference Standard Detail P-001 in Appendix B.

1.5.3 Electrical and control enclosure example layouts are provided in Standard Detail P-023, 240 V and 480V, Appendix B.

1.5.4 Switching gear (transfer switch, breakers, etc.) shall be mounted in a panel box of NEMA 4X Stainless Steel rating with a hinged three (3) point latched door with locking handle.

1.5.4.1 Panel is to be set on painted galvanized, aluminum or stainless steel legs mounted to a concrete base, with conduit stubs to enter at the bottom of the panel, and to be set in the concrete base for support.

1.5.4.2 Any deviation must have FCPW approval.

1.5.4.3 All enclosures as well as all switches and indicator lights, whether mounted on an inner door or face of the enclosure, shall be provided with a label that conforms to U.L. descriptions and procedures.

1.5.5 Control panels shall be a lockable dead front type to provide protection against unauthorized access and vandalism.

1.5.6 No conduit runs or junction boxes are to be installed inside or on top of the wet well. Splicing of cables inside the wet well will not be permitted.

1.5.7 All electrical and control panels shall be provided with an awning to allow access during inclement weather.

1.5.7.1 The width of the awning shall be five (5) feet or the same as the concrete pad whichever is greater.

1.5.7.2 The length of the awning shall be determined by the total length of electrical and control panels.

1.5.7.3 The awning shall be eight (8) feet high.

1.5.7.4 The front side shall be supported by four vertical supports and the back side shall be supported by four vertical supports.

1.5.7.5 Eight (8) inch to ten (10) inch base plates shall be installed on vertical supports.

1.5.8 Enclosure materials

1.5.8.1 Indoor, wet and/or corrosive process areas: 316 Stainless steel, NEMA Type 4X.

1.5.8.2 Indoor, dry, non-corrosive process areas and electrical rooms: Mile steel with epoxy coating, NEMA Type 12.

1.5.8.3 Outdoors – 316 Stainless Steel, NEMA Type 4X.

1.6 Supporting Materials

1.6.1 Indoor, process areas: Stainless steel with stainless steel straps and hardware.

1.6.2 Indoor, finished areas: Galvanized or painted steel with corrosion resistant hardware.

1.6.3 Outdoors: Stainless steel with stainless steel straps and hardware.

1.7 Grounding electrode system:

1.7.1 A grounding system shall be installed as per the National Electrical Code, local codes and ordinances.

1.7.2 An underground perimeter cable grounding system shall be installed with connections to at least the following equipment:

1.7.2.1 Wet well cover.

1.7.2.2 Vault cover.

1.7.2.3 Control panel mounting rack.

1.7.2.4 Main disconnect switch.

1.7.2.5 Pump station fence.

1.7.3 Bare copper wire (#4) is to be connected to the wet well cover and the valve and meter vault cover by way of an approved mechanical connection.

1.7.3.1 Wire (#4) shall also be poured into top slab of the wet well and the valve and meter vault at the foundry with a twelve (12) inch stub-out for field connection.

1.7.3.2 Under no circumstances shall wire be allowed to run across the outside top slabs.

1.8 Power

1.8.1 Each pump and motor unit shall be provided with a separate electrical supply, motor starter, alarm sensors as well as electrical and instrumentation/control systems and components.

1.8.1.1 Electrical and instrumentation/control systems and components shall be located such that they may be disconnected from outside the wet well.

1.8.1.2 Cables and conduits

A. Shall be provided with seals that are both water-tight and gas-tight.

B. Shall be protected from corrosion.

C. Shall allow separate strain relief.

1.8.2 Three-phase power shall be provided for all pumps.

1.8.2.1 No phase converters or single-phase power will be allowed.

1.8.2.2 The standard power source shall be 480V.

1.8.2.3 Lower voltages (240V) only allowed if 480V is not possible and must be approved by FCPW.

1.8.3 A main circuit breaker shall be used.

1.8.3.1 A fused main disconnect shall not be allowed on the main power feed.

1.8.3.2 The main circuit breaker shall meet the following requirements:

A. Be of a type that can be locked in both On and Off positions.

B. The switch shall be U.L. listed for service entrance.

C. The enclosure material shall be as specified in Section 7, Part 1, Paragraph 1.5 and shall have a lockable cover

D. The enclosure shall be NEMA 12 Indoor and NEMA 4X outdoor. The breaker may be installed within the MCC if used.

E. The switch must be mounted in a secure area at a designated location in the station.

F. Breaker shall have Long, Short, and Instantaneous (LSI) adjustment and ground fault protection as required by the NEC.

1.9 Equipment Starters and Drives

1.9.1 For Pumps less than 20 HP

1.9.1.1 Use soft starters.

1.9.1.2 Must have soft stop capability.

1.9.1.3 Must include integral bypass contactor.

1.9.2 For Pumps greater than or equal to 20 HP

1.9.2.1 Use variable frequency drives.

A. VFD shall be rated for 122º F.

B. Provide in-line harmonic filter which shall comply with IEEE 519 and provide THD less than 5%.

C. Must include integral bypass contactor.

1.9.2.2 Manufacturers

A. Amtech

B. Schneider

C. Danfoss

D. FCPW approved equal

1.10 Main Service Surge Suppressor

1.10.1 A surge suppressor shall be provided at the power service entrance coupled to the main service disconnect switch.

1.10.2 The surge suppressor shall have voltage characteristics to match the power service.

1.10.2.1 The surge suppressor shall provide line to line, line to neutral, line to ground and neutral to ground protection modes as applicable for the power service.

1.10.2.2 The surge suppressor shall be U.L. listed and labeled under UL1449 and UL1283.

1.10.3 The surge suppressor shall be in a NEMA 4X Stainless Steel enclosure.

1.10.4 The surge suppressor shall be provided with a disconnect.

1.10.5 Minimum surge current rating shall be 100-KA per mode and 200-KA per phase per NEMA LS-1.

1.10.6 The surge suppression system shall be duty cycle tested to survive 20-KV, 10-KA, IEEE C62.41 category surge current with less than five percent (5%) degradation of clamping voltage.

1.10.7 The surge suppressor shall have minimum repetitive surge capacity of two thousand five hundred (2,500) impulses per mode and five thousand (5,000) impulses per phase.

1.10.8 Status indicating lights and form “C” dry alarm contacts shall be provided.

1.11 Phase Monitor

1.11.1 A phase monitor shall be provided.

1.11.2 The pump operation shall be inhibited when an open phase/phase reversal condition is detected.

1.11.3 A contact of the phase monitor shall be wired to the PLC for remote indication of the open phase/phase reversal condition.

1.12 Prior to any pump station approval, Developer shall request the appropriate power company to have 3-phase power installed to the site.

1.13 Single-phase motors will not be allowed

PART 2 GENERATOR REQUIREMENTS

2.1 General Requirements

2.1.1 All pump stations are required to have continuous standby power to power the full load of the station regardless of flow storage capacity.

2.1.2 The pump station shall be connected to an automatically activated stand-by power generation source with automatic transfer switch and reset.

2.1.3 Design and installation of the continuous standby power shall conform to the requirements of NFPA 110, NFPA 30, NFPA 37 and all other applicable codes and ordnances.

2.1.4 The engine generator set shall be a factory-assembled unit that is a standard production model with existing torsional analysis data.

2.1.4.1 Mixing and matching engine and generator by a third-party supplier is not acceptable.

2.1.4.2 The engine and generator shall be directly connected with a flexible coupling and shall be free from injurious torsional or other vibration

2.1.5 Generators 125 KW and less are to be installed to operate on natural gas if available. Otherwise, diesel fuel may be used.

2.1.5.1 All gas piping and connecting equipment shall be installed in accordance with the Georgia State Amendments to the Standard Gas Code, latest edition.

2.1.5.2 All gas supply lines must include a drip loop as well as all other equipment required for a safe and complete hook-up.

2.1.5.3 All conduits and gas lines shall be installed underground.

2.1.5.4 If gas is unavailable, a letter of exception must be obtained from FCPW.

2.1.5.5 Developer shall coordinate with the natural gas utility company for appropriate gas meter size based on peak gas generator consumption.

2.1.5.6 Provide gas pressure sensor for pressure monitoring.

2.1.6 Generators above 125 KW shall be diesel powered with 100 gallons minimum fuel storage capacity or 72-hour operating time, whichever is greater.

2.1.6.1 Fuel storage shall be accomplished by the use of corrosion–resistant double wall sub-base fuel tank only. No underground storage will be allowed.

2.1.6.2 A leak detection device shall be provided in the interstitial space for sensing fuel leakage.

2.1.6.3 Provide fuel tank level signal.

2.1.6.4 Contacts for the above devices shall be connected to the generator control panel terminals for telemetry.

2.1.6.5 The diesel engine generator set shall be bermed and shall be designed to contain 110% of fuel tank volume. Berm volume calculations shall be shown on pump station submittal drawings.

2.1.6.6 Each generator shall be furnished with a FCPW approved High Hazard, A 4-A:60-B:C rated, rechargeable fire extinguisher suitable for industrial facilities with processes involving flammable liquids/gas. Class A-B-C.

2.1.7 Acceptable standby power generator manufacturer:

2.1.7.1 Cummins

2.1.7.2 Generac

2.1.7.3 Caterpillar

2.1.7.4 Kohler

2.1.7.5 Onan

2.1.7.6 FCPW approved equal

2.1.8 A two (2) year, from the date of commissioning, comprehensive warranty shall be provided by the manufacturer to include parts and labor.

2.1.9 Generators shall meet all applicable, current U.S. Environmental Protection Agency (USEPA) air emission standards.

2.1.10 Generators shall be supplied with all auxiliary systems necessary for operation (i.e. batteries, battery charger, block heater, etc.) installed.

2.1.11 Generators shall be properly grounded. A generator ground grid must be provided. Design of the grounding system shall comply with NEC, IEEE and all other applicable codes and ordnances

2.1.12 All generators shall be equipped with the quiet run package, including sound attenuating weather enclosure and critical grade muffler.

2.1.12.1 The generator shall be housed in a weatherproof enclosure. Quiet site soundproofing shall be capable to reduce noise to sixty (60) db at a distance of 23 feet from the generator, or at fence line if generator is less than 23 feet from fence.

2.1.13 Generators shall be capable of powering the pump motors' starting current, electrical systems, instrumentation/controls and alarm systems and other auxiliary equipment as may be necessary to provide for the safe and effective operation of the pump station.

2.1.13.1 Generators shall have the appropriate power rating to start and continuously operate under any connected loads.

2.1.13.2 Generators shall be provided with special sequencing controls to delay lead and lag pump starts. Pumps shall start with a minimum 15 seconds lag time. Simultaneous starting of two (2) pumps shall be prevented.

2.1.13.3 A connection shall be provided so that the generator can power an external, portable load bank for maintenance purposes.

2.1.14 Voltage regulation for step load from no load to rated load shall be within +/- four percent (4%) of rated voltage for units up to and including twenty-five (25) kW and within +/- 5 percent (5%) of rated voltage for units rated thirty (30) kW or higher.

2.1.14.1 Voltage variation shall be within +/- 1 percent (1%) of the mean value for constant loads, from no load to rated load.

2.2 Generators shall be protected from operating conditions that would result in damage.

2.2.1 Generators shall be capable of shutting down and activating the audible and visual alarms and telemetry if a damaging operating condition develops.

2.2.2 Individual dry contacts shall be provided at the generator via optional relay output board to be used for connection to the PLC.

2.2.3 Contacts must be provided to remotely indicate the following:

2.2.3.1 Generator running

2.2.3.2 Generator fault

2.2.3.3 Generator warning

2.2.3.4 Low fuel level

2.2.3.5 Low gas pressure for natural gas generators

2.2.3.6 Overrun condition

2.2.3.7 High engine temp

2.2.3.8 Low engine temp

2.2.3.9 Low coolant

2.2.3.10 Low oil pressure

2.2.3.11 Fuel tank rupture basin alarm

2.2.3.12 Not in auto

2.2.4 Generators shall be protected from damage when restoration of the power supply occurs.

2.2.5 The generating unit shall be adequately ventilated.

2.2.6 The housing shall have hinged side access doors and a rear control door. All doors shall be lockable.

2.2.7 All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color.

2.2.8 Enclosure shall be rated for 150 mph winds

2.2.9 Enclosure shall be provided with intrusion detection switches to be wired into SCADA.

2.2.10 The generator must be mounted far enough away from obstructions to allow all doors to be fully opened.

2.2.11 Vibration isolators as recommended by the generator set manufacturer shall be provided.

2.2.12 Three complete sets of operation and maintenance manuals, two hard copies and one searchable electronic copy, are to be provided to FCPW for the generator and automatic transfer switch.

2.2.13 Generators shall be load tested at 100% full load on site for a period of four hours using resistive load banks. Notify FCPW Inspector prior to test and provide certification letter from the manufacturer.

2.2.14 A demonstration that the generator is capable of providing the required power with all installed pumps operating simultaneously shall be performed at the time of startup.

2.2.15 Generators shall be placed on a reinforced concrete pad to be designed by Developer's Design Engineer based on the specific generator selected. The generator pad is depicted in Standard Detail P-009, in Appendix B.

2.3 Control System

2.3.1 Generator control system shall include a programmable control device to allow automatic start-up and test functions.

2.3.2 Test functions shall be programmable for daily, weekly or monthly testing.

2.3.3 Connections for remote monitoring of function and failure shall be provided.

2.4 Automatic Transfer Switch

2.4.1 The standby power system shall include an automatic transfer switch to automatically start the generator in the following events:

2.4.1.1 Loss of any phase of power

2.4.1.2 Reverse power

2.4.1.3 Low voltage brownout.

2.4.2 The standby power transfer switch shall not engage until after thirty (30) seconds of continuous power loss or low voltage, occurs.

2.4.3 Automatic transfer switch shall be rate for 100% of full load.

2.4.4 The transfer switch shall be selectable for load or no load.

2.4.5 The transfer switch shall be provided with three phase voltage and frequency sensors with adjustable settings.

2.4.6 Exercise clock shall be provided as a configurable function.

2.4.7 The transfer switch shall be provided with indicators for all phases of operation and be equipped with a fully programmable timer for exercising the equipment.

2.4.8 The automatic transfer switch shall be configured to switch back when power is restored to the pump station.

2.4.9 Automatic transfer switches shall be in a NEMA 4X Stainless Steel enclosure.

2.4.10 Acceptable Transfer Switch manufacturers

2.4.10.1 ASCO

2.4.10.2 Onan

2.4.10.3 FCPW approved equal

2.4.10.4 ATS supplied with the generator as a package by the generator manufacturer shall be as approved by FCPW.

2.4.11 Individual dry contacts shall be provided at the transfer switch via an optional Onan relay output board to be used for connection to the PLC.

2.4.12 A schematic depicting the transfer switch and generator run alarm is provided in Standard Detail P-022, Appendix B.

2.4.13 The control shall provide time delay functions for the following:

2.4.13.1 “Engine Start”

2.4.13.2 “Normal to Emergency Transfer”

2.4.13.3 “Retransfer Emergency to normal”

2.4.13.4 “Genset Stop”

2.4.13.5 “Programmed Transition”

2.4.14 Transfer switch position shall be monitored by the PLC.

2.4.15 Contacts shall be provided to remotely indicate the following:

2.4.15.1 Source 1 available

2.4.15.2 Source 1 connected

2.4.15.3 Source 2 available

2.4.15.4 Source 2 connected

2.4.15.5 Transfer switch Normal position

2.4.15.6 Transfer switch Emergency position

2.4.15.7 AC Line failure

2.4.15.8 High battery voltage

2.4.15.9 Low battery voltage

2.5 Pump Station Controls Electrical Requirements

2.5.1 Developer shall furnish and install one and one-quarter (1-¼) inch conduit connecting the pump station control panel to the generator transfer switch and to the generator control panel.

2.5.2 Developer shall install two (2) ten (10) conductor shielded cables in the one and one-quarter (1-¼) inch conduit to the generator and one (1) ten (10) conductor shielded cable in the one and one- quarter (1-¼) inch conduit to the transfer switch.

2.5.3 The ten (10) conductor cables shall be installed with eight (8) feet of slack in the pump station control pane and four (4) feet of slack in the generator and transfer switch panels.

PART 3 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) REQUIREMENTS

3.1 Applicable Requirements

3.1.1 The design and construction of the pump station shall comply with all requirements of NFPA 820 – Fire Protection in Wastewater Treatment and Collection Facilities.

3.1.2 At a minimum, the Developer's Design Engineer shall identify all areas with hazardous classifications on the submittal plans and any equipment within those areas requiring special features for being located in a hazardous area.

3.2 Interpretation of Code

3.2.1 When there is a question as to whether a portion of the code is applicable, FCPW shall have the final judgment as to the meaning of the code. Developer and its Design Engineer shall comply with the interpretation of the code as instructed by FCPW.

PART 4 MARKING

4.1 3M™ Ball Marker 1422 CE-XR/ID/CE, 5 ft Range, Power, shall be programed by the Contractor for installation along the underground power lines. Marker balls shall be installed at all horizontal and vertical bends 45-degree and larger. The marker balls shall be buried 1-foot above the power lines but no more than 5-feet deep.

4.2 3M™ Electronic Marking System (EMS) Warning Tape 7902-XT, Red, 4 in, Power, shall be continuously installed along the top of the power lines. The tape shall be buried 1-foot above the power lines but no more than 4-feet deep.

4.3. Contractor shall obtain a 3M™ Electronic Dynatel™ Locator 7550X-ID/ U12 Pipe/ Cable/ EMS Locator w/ 4.5" Coupler-12 Watt locator to program and locate the power line marker balls.

SECTION 8
INSTRUMENTATION & CONTROL GUIDELINES

PART 1 GENERAL

1.1 The pump station shall be supplied with dedicated pump station control panel(s) (PSCP.)

1.1.1 The PSCP may not house the pump VFDs and protection equipment.

1.1.2 Electrical and controls systems shall have separate panels.

1.2 Dry-pit pump stations shall have a dedicated Motor Control Center (MCC).

1.3 All work and materials shall comply with the National Electrical Code and applicable local regulations and ordinances.

1.3.1 Where required by applicable codes, cabinet assemblies, materials and equipment shall be approved, identified, labeled or listed by Underwriters' Laboratories.

1.4 The cabinet shall be designed to absorb vibrations or mechanical movement from the motor starters or other active equipment.

1.4.1 These movements shall not cause undue vibrations in the control panel.

1.4.2 As a minimum any size 3 or greater starters shall include additional stiffeners or other vibration dampening equipment.

PART 2 COMMUNICATION METHOD

2.1 Site Survey

2.1.1 The Pump Station Control Panel (PSCP) shall be evaluated for communication by Developer. Using the actual location and finished floor elevation of the PSCP location, Developer shall conduct a site survey to determine the Received Signal Strength Indicator (RSSI) (ideal value of -85 dBm to -100 dBm) on 5G Modems or most current compatible technology using the carrier as chosen by FCPW.

2.1.2 The results of the site survey shall be submitted to FCPW for determination of the feasibility of cellular communication at the pump station site. After the conclusion of the field site survey, FCPW will make a determination if cellular communication is feasible.

2.1.2.1 If cellular communication is determined to be feasible, Developer shall include a cellular modem, an antenna and other necessary equipment for successful communication with the PSCP.

A. Developer shall supply, install and configure the equipment to achieve satisfactory cellular communication.

B. As a minimum this equipment will include a cellular modem, antenna, antenna cable and antenna surge suppressor.

2.1.2.2 If cellular communication is determined to be unavailable, Developer shall include an Ethernet modem in the panel.

A. The Ethernet modem shall be an Allen Bradley 9300-RADES or as directed by FCPW.

B. A 5G cellular system shall be installed from the system interface to the panel.

2.2 The Pump Station Control Panel (PSCP) shall include means of communication with FCPW pump station SCADA system.

2.2.1 Primary: Mission Control MYDRO 850 or current model as directed by FCPW. Contact FCPW at time of design.

2.2.2 Secondary

2.2.2.1 High speed internet

2.2.2.2 Cellular.

2.2.2.3 As determined by availabilities at the station site.

PART 3 CONTROL SYSTEM

3.1 General Requirements

3.1.1 All equipment furnished under this section shall be selected for its superior quality and intended performance.

3.1.2 Equipment and materials used shall be subject to review and shall comply with the following requirements:

3.1.2.1 Unless specified otherwise, electrical power supply to the instrumentation equipment will be unregulated 120 volts AC at the locations noted on the one-line and functional diagrams.

3.1.2.2 All transmitted electronic analog instrument signals shall be 4-20 mA DC, unless noted otherwise, and shall be linear with the measured variable.

3.1.2.3 Cabinet Construction and Interior Wiring: In accordance with the National Electrical Code (NEC), state and local codes and applicable sections of NEMA, ANSI, UL, and ICEA.

3.1.2.4 PSCP shall include physical barriers inside panel to prevent accidental access between telemetry and pump control areas of the panel.

3.1.2.5 Control panel shall be fabricated at the System Integrator’s panel shop. No field fabrication will be allowed.

3.1.2.6 Cabinet shall be built to UL 508 standards and bear UL listing mark stating, “LISTED ENCLOSED INDUSTRIAL CONTROL CABINETS”.

3.2 System Responsibility

3.2.1 Developer shall ultimately be responsible for the performance of the System Integrator.

3.2.2 System Integrator (SI):

3.2.2.1 All instrumentation and industrial electronic systems shall be furnished and installed under the supervision of a single SI who is regularly engaged in the design and installation of such systems of similar scope and complexity.

3.2.2.2 Developer is responsible to the FCPW for the performance of all systems.

3.2.2.3 System Integrators who are pre-approved are as follows:

A. Global Control Systems, Smyrna, GA.

B. M/R Systems, Norcross, GA.

C. Southern Flow, Inc., Alpharetta, GA

D. FCPW pre-approved equal.

3.2.3 Where applicable, SI shall coordinate and provide with other suppliers under other sections of the specifications and drawings on the following:

3.2.3.1 Interface requirements.

3.2.3.2 PLC input and output (I/O) requirements.

3.2.3.3 Consistency of instrumentation.

3.2.3.4 PLC communication requirements.

3.2.3.5 Transfer of data.

3.2.3.6 Control requirements.

3.2.3.7 Programming Logic

3.2.4 SI shall coordinate and schedule all required testing and training with the Developer, its Design Engineer and FCPW in a timely manner.

3.2.5 SI shall submit a weekly status report and updated project schedule to the Developer so that Developer can integrate the SI work into the overall project schedule.

3.2.6 SI shall supply all necessary programming and configuration to demonstrate that the mission system is working during the Factory Acceptance Test (FAT).

3.3 Control Cabinets

3.3.1 Enclosure Type

3.3.1.1 Exterior installation: NEMA 4X

3.3.1.2 Interior installation: NEMA 12 (non-hazardous)

3.3.2 Materials

3.3.2.1 Exterior installation: 304 stainless steel.

3.3.2.2 Interior installation: Mild steel.

3.3.3 Doors

3.3.3.1 Rubber-gasketed with continuous hinge.

3.3.3.2 The enclosure shall have a lockable handle on the outside of each door.

3.3.4 Cabinet

3.3.4.1 The cabinet shall be sized to allow access around all the instruments for ease of operation and maintenance.

3.3.4.2 Exterior cabinets shall be powder-coated white.

3.3.4.3 The cabinet shall be designed to prevent overheating of instruments with an ambient air temperature of 122 degrees Fahrenheit with 100% humidity (noncondensing).

3.3.5 Control panel shall be provided with a single dead lockable front door.

3.3.6 If additional space is required to house this equipment the panel depth may be increased, or a double door configuration may be utilized.

3.3.7 The control panel shall generally be laid out as shown on Standard Detail P-027, Appendix B.

3.3.8 Power and control devices shall be separated in the cabinet where one cabinet is used for both power and control.

3.3.9 Manufacturers: Hoffman Engineering Co., Saginaw, or Approved equal

3.4 Door Mounted Components

3.4.1 The following items shall be mounted on the interior door of the PSCP:

3.4.1.1 HMI screen.

3.4.1.2 Level element selector switch.

3.4.1.3 ATS remote annunciator.

3.4.1.4 Pump MAS unit (or other manufacturer’s equivalent if used) if not mounted at the pump motor drive cabinet.

3.4.1.5 A six-digit non-resettable elapsed time meters for each pump to show individual pump running time to the 1/10th of an hour.

3.5 Control Power Transformers

3.5.1 Control power transformer(s) shall be installed inside the panel in the motor control section.

3.5.2 The transformer shall be sized at 125% of the rated load and rated for machine tool service.

3.6 Cabinet Wiring shall meet the following requirements:

3.6.1 Wires for AC circuits shall be 600-volt, Type THHN stranded conductor copper and shall be sized for the current to be carried, but not smaller than No. 16 AWG.

3.6.2 Wires for analog signal circuits shall be 300-volt stranded copper and shall be twisted shielded pars not smaller than No. 16 AWG.

3.6.3 Wires for other DC circuits shall be 600-volt, Type THHN stranded copper not smaller than No. 16 AWG.

3.6.4 Wiring shall be numbered and tagged at each termination on both ends.

3.6.5 Wiring for special signals such as communications, digital data and multiplexed signals shall use manufacturer's standard cables.

3.6.6 All control wiring shall be stranded.

3.6.7 Restrained by plastic ties or wire management system.

3.6.8 Hinge Wiring: Secure at each end so that bending or twisting will be around longitudinal axis of wire. Protect bend area with sleeve.

3.6.9 Arrange wiring neatly, cut to proper length, and remove surplus wire.

3.6.10 Provide abrasion protection for wire bundles that pass-through holes or across edges of sheet metal.

3.6.11 Provide wire labels at both ends of terminated wire.

3.6.12 If cellular communications is deemed to be unavailable, provide one RJ-11 telephone jack in the control panel. Phone wire from telephone interface to jack to be gel filled direct burial cable.

3.7 Compression Clamp Type Terminals

3.7.1 Strip, prepare, and install wires in accordance with terminal manufacturer's recommendations.

3.7.2 Wires installed in a compression screw and clamp, maximum of one for field wires entering enclosure, otherwise maximum of two.

3.7.3 Splicing and tapping of wires allowed only at device terminals or terminal blocks.

3.7.4 Separate analog and DC circuits by at least 6 inches from AC power and control wiring, except at unavoidable crossover points and at device terminations.

3.7.5 Arrange wiring to allow access for testing, removal, and maintenance of circuits and components.

3.7.6 Plastic Wire Duct Fill: Do not exceed manufacturer’s recommendations.

3.8 Terminal Blocks

3.8.1 Provide sufficient terminations to accommodate both present and future needs.

3.8.1.1 Wire spare PLC module I/O points to their cabinet's terminal blocks. Provide 300-volt screw clamp compression, dead-front barrier type terminal blocks with current bar providing direct contact with wire between the compression screw and yoke.

3.8.1.2 Provide yoke, current bar and clamping screw constructed of high strength and high conductivity metal. Use yoke that guides all strands of wire into the terminal.

3.8.1.3 Use current bar providing vibration proof connection.

3.8.1.4 Supply terminals that allow connection of wire without any preparation other than stripping.

3.8.1.5 Rail mount individual terminals to create a complete assembly.

3.8.2 Provide terminal constructed such that jumpers can be installed with no loss of space on terminal or rail.

3.8.3 Size all terminal block components to allow insertion of all necessary wire sizes and types.

3.8.4 Supply terminal blocks with marking system allowing the use of UL approved terminal blocks manufactured by Allen Bradley, Cutler Hammer, Phoenix Contacts or approved equal.

3.9 Grounding

3.9.1 Cabinets isolated copper grounding bus for all signal and shield ground connections.

3.9.1.1 This ground bus shall be grounded at a common ground point.

3.9.1.2 The signal grounding system shall meet National Electrical Code requirements.

A. Each analog loop shall be grounded at a single point for the loop. This single point shall be at location of the DC power supply for the loop.

B. Each analog loop shall have its wire shields connected to ground at a single point for the loop.

C. Discrete signals between cabinets shall be dry isolated contacts rated for 5 amps continuous at 120 V AC.

3.10 Network Cables

3.10.1 Network cables shall be as required for a complete and operational system.

3.11 Electrical Transient Protection

3.11.1 General

3.11.1.1 Protect all elements of the PSCP against damage due to electrical transients induced in interconnecting lines by lightning and nearby electrical systems.

3.11.1.2 As a minimum, provide surge suppressors for the following:

A. At any connection at AC power to PSCP.

B. At analog or digital monitoring or controls (DI, DO and AI).

C. Output of DC power supply.

D. Ethernet cables.

3.11.2 Suppressor on 120 V AC Power Supply Connections

3.11.2.1 Construction: First stage high energy metal oxide varistor and second stage bipolar silicon avalanche device separated by series impedance. Grounding wire, stud or terminal provided.

3.11.2.2 Occurrences: Suppressor tested and rated for a minimum of 50 occurrences of IEEE 587 Category B test waveform.

3.11.2.3 Clamping voltages: 350 volts or less for first stage, 210 volts or less for second stage.

3.11.2.4 Response: 5 nanoseconds maximum.

3.11.2.5 Recovery: Automatic.

3.11.2.6 Continuous operation: 5 amps minimum at 130 volts AC for suppressor on power supply for one (1) 4-wire transmitter or receiver, 20 amps minimum otherwise.

3.11.2.7 Temperature range: -20 degrees C to + 85 degrees C.

3.11.2.8 Manufacturers: EDCO HSP-121, Phoenix Contact FSP-1, Schneider Electric TVS120LC, or approved equal.

3.11.3 Suppressor on Analog Signal Lines

3.11.3.1 Construction: First stage high energy metal oxide varistor and second stage bipolar silicon avalanche device separated by series impedance. Grounding wire, stud or terminal provided.

3.11.3.2 Test waveform: Linear 8 microsecond rise in current from zero amps to a peak current value followed by an exponential decay of current reaching for half the peak value in 20 microseconds.

3.11.3.3 Surge rating: Suppressor tested and rated for a minimum of 50 occurrences of 2000 amp peak test waveform.

3.11.3.4 DC clamping voltage: Twenty to forty percent above operating voltage for circuit. Clamping voltage tolerance less than plus or minus 10 percent.

3.11.3.5 Response: 5 nanoseconds.

3.11.3.6 Recovery: Automatic.

3.11.3.7 Maximum loop resistance: 18 ohms per conductor.

3.11.3.8 Temperature range: -20 degrees C to + 85 degrees C.

3.11.3.9 Approved vendor EDCO PC-642 or SRA-64 Series or equal.

3.12 Ethernet Switch

3.12.1 Provide an 8 port Ethernet switch for connection between automation equipment and telemetry connection.

3.12.2 Ports – 8 RJ-45

3.12.2.1 Speed shall be the latest available.

3.12.2.2 10Gbe (autosensing; Full Duplex).

3.12.3 Rugged Industrial Design.

3.12.4 DIN-RAIL mounted.

3.12.5 Environmental Specifications: -40° C to 70°C.

3.12.6 Redundant Power Inputs.

3.12.7 Unmanaged Operation.

3.12.8 Status LEDs – Power On, and link/activity

3.12.9 Manufacturer and Model: N-TRON 308TX or equal

3.13 Corrosion Protection

3.13.1 Corrosion-Inhibiting Vapor Capsule

3.13.2 Manufacturers: Northern Instruments; Model Zerust VC, Hoffmann Engineering; Model A- HCI, Or approved equal.

3.14 Cabinet Fabrication

3.14.1 Power Distribution within Cabinets

3.14.1.1 One 120 V AC, 60-Hz feeder circuits.

3.14.1.2 Make provisions for feeder circuit conduit entry.

3.14.1.3 Furnish terminal board for termination of wires.

3.14.1.4 Provide 120 VAC Circuit Breaker in each cabinet for incoming AC Power.

3.14.2 Signal Distribution

3.14.2.1 Within Cabinets: 4 to 20 mA dc signals may be distributed as 1 to 5V DC.

3.14.2.2 Outside Cabinets: Isolated 4 to 20 mA DC only.

3.14.2.3 All signal wiring shall be twisted shielded pairs.

3.15 Signal Switching

3.15.1.1 Use dry circuit type relays or switches.

3.15.1.2 No interruption of 4 to 20 mA loops during switching.

3.15.1.3 Switching Transients in Associated Signal Circuit:

3.15.1.4 4 to 20 mA dc Signals: 0.2 mA, maximum.

3.15.1.5 1 to 5V dc Signals: 0.05V, maximum.

3.16 Relays

3.16.1 General

3.16.1.1 Relay Mounting: Plug-in type socket.

3.16.1.2 Relay Enclosure: Furnish dust cover.

3.16.1.3 Socket Type: Screw terminal interface with wiring.

3.16.1.4 Socket Mounting: Rail.

3.16.1.5 Provide hold-down clips.

3.16.2 Signal Switching Relay

3.16.2.1 Type: Dry circuit.

3.16.2.2 Contact Arrangement: 2 Form C contacts.

3.16.2.3 Contact Rating: 10 amps at 28V dc or 120V ac.

3.16.2.4 Contact Material: Gold or silver.

3.16.2.5 Coil Voltage: As noted, or shown.

3.16.2.6 Coil Power: 0.9 watts (dc), 1 .2VA (ac).

3.16.2.7 Expected Mechanical Life: 10,000,000 operations.

3.16.2.8 Expected Electrical Life at Rated Load: 100,000 operations.

3.16.2.9 Indication Type: Neon or LED indicator lamp.

3.16.2.10 Seal Type: Hermetically sealed case.

3.16.2.11 Manufacturer: Potter and Brumfield, Allen Bradley, Siemens, Cutler Hammer or approved equal.

3.16.3 Control Circuit Switching Relay, Non-latching

3.16.3.1 Type: Compact general-purpose plug-in.

3.16.3.2 Contact Arrangement: 2 Form C contacts.

3.16.3.3 Contact Rating: 10A at 28V dc or 240V ac.

3.16.3.4 Contact Material: Silver cadmium oxide alloy.

3.16.3.5 Coil Voltage: As noted or shown.

3.16.3.6 Coil Power: 1.8 watts (dc), 2.7VA (ac).

3.16.3.7 Expected Mechanical Life: 10,000,000 operations.

3.16.3.8 Expected Electrical Life at Rated Load: 100,000 operations.

3.16.3.9 Indication Type: Neon or LED indicator lamp.

3.16.3.10 Push-to-test button.

3.16.3.11 Manufacturer and Product: Allen Bradley 700-HC14A1 or approved equal.

3.16.4 Control Circuit Switching Relay, Latching

3.16.4.1 Type: Dual coil mechanical latching relay.

3.16.4.2 Contact Arrangement: 2 Form C contacts.

3.16.4.3 Contact Rating: 10A at 28V dc or 120V ac.

3.16.4.4 Contact Material: Silver cadmium oxide alloy.

3.16.4.5 Coil Voltage: As noted, or shown.

3.16.4.6 Coil Power: 2.7 watts (dc), 5.3VA (ac).

3.16.4.7 Expected Mechanical Life: 500,000 operations.

3.16.4.8 Expected Electrical Life at Rated Load: 50,000 operations.

3.16.4.9 Manufacturer: Potter and Brumfield, Siemens, Allen Bradley or approved equal.

3.17 Power Supplies

3.17.1 Furnish as required power to instruments requiring external DC power, including two-wire transmitters and DC relays. Regulated DC power supplied for instrument loops shall be provided. Power supplies shall be suitable for an input voltage variation of +/- 10 percent, and the supply output shall be fused or short-circuit protected. Output voltage regulation shall be as required by the equipment supplied.

3.17.2 Convert 120V AC, 60-Hz power to DC power of appropriate voltage(s) with sufficient voltage regulation and ripple control to assure that instruments being supplied can operate within their required tolerances.

3.17.3 Provide output over voltage and over current protective devices to protect instruments and power supplies from damage due to power supply or external failure.

3.17.4 Enclosures: Shall be in accordance with the requirements of Paragraph 1.5.8 in Section 7.

3.17.5 Mount such that dissipated heat does not adversely affect other components.

3.17.6 Supply indicating-type fuses for each DC supply line to each individual two-wire transmitter and mount such that fuses can be easily seen and replaced.

3.17.7 Include fused push-to-test circuitry for each push-to-test indicating light.

3.17.8 Provide internal cabinet light. Light shall be LED rated at 1600 lumens minimum and shall be operated by a door switch.

3.17.9 Provide service outlet with a breaker protected 120-volt, 15-amp, GFCI duplex receptacle and weatherproof enclosure on the outside of the “mini power center” box or support.

3.17.10 Uninterruptible Power Supply (UPS)

3.17.10.1 Provide UPS system, sized for 120 minutes backup time under 150% cabinet load (including all Loop-powered instruments).

3.17.10.2 UPS shall be installed in the PSCP.

3.17.10.3 UPS shall be ferro-resonant type and shall include contact outputs for low battery, loss of utility power, and UPS operating.

3.17.10.4 UPS shall contain a network management card capable of communicating status parameters via Ethernet using Simple Network Management Protocol (SNMP).

3.17.10.5 Manufacturers: Allen Bradley 1609-U500NHC or equal.

3.18 Indicating Lights

3.18.1 AC indicating lights shall be the push-to-test transformer type with LED lamps.

3.18.2 They shall be heavy-duty with NEMA rating to match enclosure type.

3.18.3 The escutcheon and lens color shall be as specified.

3.18.4 Unless otherwise specified, indicating lights shall be equipped with colored lenses in accordance with the following schedule:

Control light Colors		
Color	**Function**	**Example**
Red	Run, open valve	Equipment operating, motor running
Green	Ready, closed valve	Equipment ready to run
White	Normal condition	Control power on, status OK
Amber	Abnormal condition	Failure of equipment or abnormal status, fault condition

PART 4 CONTROL EQUIPMENT

4.1 The PSCP shall include an Allen Bradley PLC, associated I/O and a local operator interface.

4.2 System Integrator shall provide PLC & HMI application programming for the pump station PLC and HMI based on FCPW's operating requirements.

4.3 System Integrator shall setup the software for the pump station including configuring the following for a complete and operational PSCP:

4.3.1 Device ranges.

4.3.2 IP address.

4.3.3 Motor current range.

4.3.4 Wet well level.

4.3.5 Set points.

4.3.6 Other settings.

4.4 Allen Bradley (Control/Micro) Logix PLC

4.4.1 Analog and Discrete I/O modules shall be of the current model and installed as needed

4.5 Allen Bradley Panel View Plus, Automation Direct C-More, or equal. Minimum size 12 inches.

4.6 Communication Module

4.6.1 PLC I/O shall be configured for Modbus communications using RS45.

4.7 Programmable Logic Controller Functional Requirements:

4.7.1 PLC Inputs and Outputs (I/O) are shown in the table below.

4.7.2 Note that the items as listed are typical, not all I/O may be listed or all used.

TYPICAL STATION CONTROL SYSTEM I/O LIST		
ITEMS	**DESCRIPTION**	**I/O**
Pressure Transducer	Level	Analog
Electromagnetic Flow Meter	Flow	Analog
Electromagnetic Flow Meter	Totalizer Reset	Analog
Electromagnetic Totalizer Pulse	Output Signal	Analog
PLC UPS	Fail	Discrete
Generator	Fuel Leak Warning	Discrete
Generator	Running	Discrete
Generator	Summary Fault	Discrete
Generator	Switch Not in Auto Warning	Discrete
Generator	Low Fuel Level Warning	Discrete
Generator	Over speed Shutdown Fault	Discrete
Generator	Pre-High Engine Temperature	Discrete
Generator	Low Coolant Level Warning	Discrete
Generator	Pre-Low Oil Pressure Warning	Discrete

TYPICAL STATION CONTROL SYSTEM I/O LIST		
ITEMS	**DESCRIPTION**	**I/O**
Generator	Pre-High Engine Temperature Warning	Discrete
Generator	Over crank Shutdown Fault	Discrete
Generator	High Engine Temp Fault	Discrete
Generator	Low Oil Pressure Fault	Discrete
Utility	Power Phase Loss	Discrete
Transfer Switch	Source One Available	Discrete
Transfer Switch	Source One Connected	Discrete
Transfer Switch	Source Two Available	Discrete
Transfer Switch	Source Two Connected	Discrete
Transfer Switch	Transfer Switch Normal Position	Discrete
Submersible Pumps	High Level Alarm	Discrete
Submersible Pumps	Low Level Alarm	Discrete
Submersible Pumps	Seal Failure Each Pump	Discrete
Submersible Pumps	Motor Over Temp Each Pump	Discrete
Submersible Pumps	Pump Running Each Pump	Discrete
Submersible Pumps	Not In Auto Each pump	Discrete
Submersible Pumps	Wet Well Level Signal	Analog
Submersible Pumps	Control Panel Phase Monitor	Discrete
Submersible Pumps	Control Panel Surge Suppressor Status	Discrete
Submersible Pumps	Soft Starters Each Pump	Discrete
VFD 1	Common Fault	Discrete
VFD 1	Speed Control	Analog
VFD 2	Common Fault	Discrete
VFD 2	Speed Control	Analog

TYPICAL STATION CONTROL SYSTEM I/O LIST		
ITEMS	**DESCRIPTION**	**I/O**
Camera 1	Entrance Gate	Discrete
Camera 1	Fault	Discrete
Camera 2	Overall Site	Discrete
Camera 2	Fault	Discrete
Odor Control	H2S Discharge	Analog
Odor Control	Control Fan Air Flow	Discrete
Odor Control	ODOR CONTROL FAN RUNNING	Discrete
Odor Control	ODOR CONTROL FAULT	Discrete
PROCESS_INST	Discharge Pressure	Analog
PROCESS_INST	Discharge Pressure high	Analog
PROCESS_INST	PUMP STATION DISCHARGE FLOW	Analog
PROCESS_INST	Suction Pressure	Analog
PROCESS_INST	WET WELL LEVEL ALARM HIGH	Discrete
PROCESS_INST	WET WELL LEVEL ALARM LOW	Discrete
PROCESS_INST	WW Level PRESSURE TRANSDUCER	Analog
PROCESS_INST	WW Level ULTRASONIC	Analog
PUMP	PUMP 1 CALL-TO-RUN	Digital
PUMP	PUMP 1 E-STOP	Digital
PUMP	PUMP 1 FAULT	Digital
PUMP	PUMP 1 IN AUTO	Digital
PUMP	PUMP 1 IN HAND	Digital
PUMP	PUMP 1 MOISTURE HIGH	Digital
PUMP	Pump 1 Motor Current	Analog

TYPICAL STATION CONTROL SYSTEM I/O LIST		
ITEMS	**DESCRIPTION**	**I/O**
PUMP	PUMP 1 RUNNING	Digital
SAFETY	DRY-WELL FLOOD	Digital
SAFETY	Emergency Eyewash	Digital
SAFETY	MAN-DOWN SWITCH	Digital
SAFETY	STATION VENTILATION FAN FLOW LOW	Digital
SAFETY	WET WELL COMBUSTABLE GAS ALARM	Digital
SECURITY	Cabinet Intrusion	Digital
SECURITY	Generator Intrusion	Digital
SECURITY	Site Lights On	Digital
SECURITY	Station Intrusion (Gate Open)	Digital

4.7.3 Provide inputs, outputs functions or operations required to provide a completely operational system.

4.7.4 Note that this list does not show the PLCs diagnostic fault detection points, which are required.

4.8 Developer shall provide all PLCs and associated equipment and cables to form a complete and functional controller with SCADA remote monitoring, control and data logging capability as required for this project.

4.9 Furnish and install all cables for interconnecting all components of the PLC inside the cabinet. These cables shall include cables to network bridge, power supplies and central processing unit.

4.10 Furnish all network cables needed to interface all applicable PLCs with network.

4.11 Exception to this section: Duplex pump stations with reduced voltage starter (soft start) drives may use a dedicated duplex pump controller.

PART 5 CONTROL LOOP DESCRIPTIONS

5.1 Refer To Block Diagrams.

5.2 Wet Well Level

5.2.1 Failure of one redundant continuous level transmitter causes the PLC to use the backup level transmitter.

5.2.2 Failure of PLC will cause control by backup relay logic and will control pumps based on le0vel set points and VFDs will operate at 100% speed when called to run.

5.2.2.1 Backup relay logic shall be able to be tested through HMI.

5.2.3 Level transmitters shall be operator selectable by switch mounted on control panel door and through HMI.

5.3 Pump Operation

5.3.1 Pumps shall start and stop based on wet well level set points.

5.3.1.1 As the flow increases or decreases, the pump speed shall be adjusted to maintain a constant level in the wet well.

5.3.2 On rising wet well level:

5.3.2.1 Lead pump will increase speed to maintain the set point level.

5.3.2.2 If pump is running at maximum speed for an adjustable period of time without maintaining the wet well set point level (wet well level is increasing) the lag pump shall start.

5.3.2.3 The PLC will increase the speed of the lag pump and decrease the speed of the lead pump to both pump's minimum speed (based on pump and system curve, user adjustable.)

5.3.2.4 The PLC will increase speed of both pumps to maintain the wet well level set point.

5.3.2.5 In the event that both lead and lag pumps are running at maximum speed for an adjustable period of time without maintaining the wet well set point level, the PLC will start the standby pump (if provided) and cause the SCADA to generate an alarm.

5.3.3 On falling wet well level:

5.3.3.1 The PLC will reduce the speed of all operating pumps to maintain the wet well set point level.

5.3.3.2 When the minimum speed is reached and the pumps are not able to keep the wet well level from lowering, after an adjustable period of time, the PLC shall turn off pumps in a first on, first off scheme.

5.3.4 Each pump shall be shut down on high moisture or temperature.

5.4 Odor Control

5.4.1 Odor control fan shall run continuously.

5.5 Emergency Power

5.5.1 Automatic transfer switch (ATS) shall monitor utility power.

5.5.2 Upon loss of utility, phase loss or voltage outside of range, ATS will send start signal to generator. ATS will automatically switch from NORMAL to EMERGENCY source.

5.5.3 Upon re-establishment of utility, ATS will automatically transfer to NORMAL.

PART 6 INSTRUMENT SPECIFICATIONS

6.1 Pump station cycles shall be controlled through the use of wastewater level sensing equipment in the wet well. Wastewater levels within the wet well shall be detected through the use of submersible pressure level transducer with backup ultrasonic transducer.

6.2 Wastewater level sensing equipment shall be used to indicate the following levels and operate the pump station correspondingly:

6.2.1 Low-level alarm

6.2.2 Pumps-off

6.2.3 Lead pump-on

6.2.4 Lag pump-on

6.2.5 High-level alarm

6.3 Wastewater level sensing equipment shall be located so as not to be affected by flows entering the wet well or the turbulence created by the suction of the pump. They shall also be installed in an accessible location.

6.4 Submersible Level Transducer

6.4.1 Provide a submersible level transducer for measurement of the wet well water depth.

6.4.2 The transducer shall be of the solid-state head-pressure sensing type, suitable for continuous submergence and operation and shall be installed in accordance with manufacturer's instructions.

6.4.3 The transducer cable shall be of adequate length to reach the transmitter without splicing.

6.4.4 The bottom diaphragm face of the sensor shall be installed at elevation recommended by the manufacturer.

6.4.5 The sensor shall be mounted using a stainless steel cable system.

6.4.6 The level sensing equipment shall be provided with a digital indicating meter to be mounted above grade, adjacent to the wet well.

6.4.7 Output: 4-20 mA

6.4.8 Acceptable Manufacturer:

6.4.8.1 Siemens

6.4.8.2 Endress & Hauser

6.4.8.3 Approved equal.

6.5 Ultrasonic Level Sensor

6.5.1 Type:

6.5.1.1 Microprocessor based ultrasonic level transmitter.

6.5.1.2 Unit shall have input or output filter capability.

6.5.2 Sensor:

6.5.2.1 Sensors shall have minimum 26 foot range and shall be supplied with sufficient cable length for arrangement indicated.

6.5.2.2 Sensor shall have a NEMA 4X (minimum) enclosure.

6.5.2.3 Unit shall be supplied with automatic temperature compensation as required below.

6.5.2.4 Sensor face material shall be Kynar or Teflon as required.

6.5.3 Accuracy:

6.5.3.1 ± 1.0 percent of calibrated range or better for ranges greater than 25-inches (with temperature compensation).

6.5.4 Output: 4-20 mA

6.5.5 Enclosure: NEMA 4X, polycarbonate or fiberglass.

6.5.6 Mounting:

6.5.6.1 Developer shall coordinate mounting to ensure that the sensor is mounted away from walls and other obstructions in accordance with the manufacturer's recommendations.

6.5.6.2 Transmitter flanges, couplings, stanchions, piping, etc. shall be provided as required.

6.5.7 Acceptable Manufacturers:

6.5.7.1 Siemens Milltronics (Hydro-Ranger 200)

6.5.7.2 Endress & Hauser.

6.5.7.3 Approved equal.

6.6 Pressure Transmitter

6.6.1 Pressure elements shall be installed in an isolator ring, Onyx Isolator Ring PSR or equal.

6.7 Magnetic Flow Meter

6.7.1 A properly sized magnetic flow meter shall be installed on the force main inside the valve and meter vault.

6.7.2 System Description

6.7.2.1 System shall consist of all field and panel mounted instrumentation devices as noted, complete with all necessary signal converters, isolators, amplifiers, power supplies and other appurtenances necessary for interfacing with other components.

6.7.2.2 Flow meter must record and totalize in English units.

6.7.2.3 Meter sizing shall take into consideration the current capacity, flow ranges and future capacity of the pump station.

6.7.2.4 Acceptable Manufacturers:

A. Endress & Hauser PROlinr PROMAG 53

B. Krohne Model ENVIROMAG series,

C. Rosemount,

D. ABB Automation

E. FCPW approved equal.

6.7.2.5 The electromagnetic induction flow meter shall generate a voltage linearly proportional to flow for full-scale velocity settings from one to 33 ft/second.

6.7.2.6 Standard accuracy shall be +/- 2% of rate and +/- 2% of full-scale output for all meters.

6.7.2.7 The meters shall meet the following requirements:

A. Connection type: Flanged 150# ANSI

B. Tube Material: 304 SS

C. Liner Material: Polyurethane

D. Electrode Material: Stainless Steel (unless wastewater analyses dictate otherwise)

E. Enclosure Class: NEMA 6P (IP68)

F. Empty Pipe Detection: Yes

G. Fluid: Wastewater

H. Flow Units: US Gallons (Gallons/Minute)

I. Temp (Max/Norm/Min): -5 to +140 F

J. Electronics Mounting: Remote

K. Remote Distance: 650 feet

L. Type Span Adjustment: touch control/local

M. Power Supply: 110 VAC

N. Transmitter Output: 4-20mA and Pulse

O. Transmitter Digital Communication: Profibus

P. Aux. Input: Status input available for totalizer reset

Q. Display: 4 line backlit with 16-digit LCD

6.7.2.8 The flow meter shall be capable of measuring flow bi-directionally.

6.7.2.9 The flow meter shall be totalizer capable for forward, backwards and net (forward and backward) flow.

6.7.2.10 The flow meter shall be capable of displaying instantaneous flow rate as well as net totalizer value locally on its output screen.

6.7.2.11 The flow meter shall provide local operator HMI for configuration of parameters and reading of data not normally displayed of its screen.

6.7.2.12 The flow meter shall have a 10-year warranty and the sensors a 5-year warranty.

6.7.3 A bypass around the flow meter shall be provided for use during meter maintenance and repair.

6.7.3.1 Two (2) isolation valves shall be installed for complete isolation of the flow meter from the system.

6.7.3.2 One (1) on each side of the flow meter.

6.7.4 Flow meters shall have an adequate straight run of pipe both upstream and downstream of the meter in accordance with the manufacturer's recommendations.

6.7.4.1 Force main shall be straight a distance equal to five (5) times the nominal pipe diameter before and after the flow meter. Follow the manufacturer's recommendation for proper installation.

6.7.5 The flow meter shall be connected to the telemetry system via the control PLC for off-site monitoring.

6.7.5.1 The totalizers shall be password protectable to prevent unauthorized resetting.

6.7.5.2 The counters shall maintain their accumulated values even with power loss and continue counting when power resumes.

6.7.6 The flow transmitter shall be housed in a rugged, watertight, dust-tight, corrosion resistant (NEMA 4X and IP65) stainless steel enclosure suitable for conduit connections.

6.7.6.1 The enclosure shall include a polycarbonate window for viewing the LCD without opening the enclosure.

6.7.7 Flow transmitter shall be provided with enough cable to be installed remotely as indicated on the drawings.

6.7.8 The flow transmitter shall have a 2-year warranty.

6.8 Float Switches

6.8.1 Float switches are only allowed for high level alarms, they are not allowed for pump control in any configuration.

6.9 Air Flow Switch

6.9.1 Air flow switch shall be provided to prove air flow in ducts and have an adjustable trip point with a range from 200 to 1800 FP.

6.10 Combustible Gas Detector

6.10.1 Pump station shall include a combustible gas detector capable of detecting the presence of LEL gases.

6.10.1.1 Instrument Function: Ambient air pollution monitor.

6.10.1.2 Instrument Description: Combustible gas catalytic detector (single point).

6.10.1.3 Signal Output: A contact for gas level alarm indication and a 4 to 20 mA DC analog signal.

6.10.1.4 General

A. The gas detector system shall consist of a sensor, a transmitter, a relay module and a power supply.

B. The sensor shall be remotely mounted in the area to be monitored.

C. Up to fifty feet of cable shall be permitted between the sensor and the transmitter.

D. The sensor, transmitter and relay module shall share the same power supply.

E. The gas detection system shall have the capability to detect an over-range condition.

1) This condition shall be indicated on the transmitter LCD display and the output shall be locked at the maximum value.

F. All components of the system shall be approved for mounting in Class 1, Division 1, Group D hazardous locations.

G. All components of the system shall also be designed to meet NEMA 4X requirements.

H. All components of the system shall also be capable of operation in an ambient temperature range of -4 to +122 degrees F.

6.10.1.5 Installation

A. The sensor shall be installed in the location accessible by the operator and in clear view of the wet well.

B. The gas detection system shall be installed in accordance with the manufacturer's instructions and the specified functional requirements.

6.10.1.6 Test

A. The combustible gas detector shall be factory tested by the manufacturer prior to shipment.

B. The manufacturer shall provide three certified copies of the test report.

C. After installation, the unit shall be field tested.

6.10.1.7 Cable

A. The signal cable between the sensor and the transmitter shall be provided by the instrument manufacturer.

B. A sufficient length of cable shall be provided for installation of a continuous run between the sensor and the electronics package.

6.10.1.8 Application

A. Unit shall be setup to indicate an alarm at 5% above normal gas levels.

6.10.1.9 Calibration

A. Instrument shall be calibrated onsite using manufacturer’s recommended technique.

6.10.1.10 Approved Manufacturers

A. MSA Ultima

B. Sensidyne Sensalert

C. Approved equal

6.11 Telemetry/SCADA

6.11.1 All pump station must be equipped with a telemetry system.

6.11.2 The telemetry equipment shall be provided and installed by Developer in complete working order.

6.11.3 The telemetry system shall contact personnel capable of initiating a response to a pump station alarm condition twenty-four (24) hours per day, three hundred and sixty-five (365) days per year.

6.11.4 All pump stations shall be equipped with a Mission Communications, or current model and currently FCPW approved device.

6.11.4.1 A schematic of the I/O connections shall be provided and posted on the inside of the enclosure door.

6.11.4.2 RTU connections shall follow the requirements depicted in Standard Details P-020 and P-021, in Appendix B**.**

6.11.4.3 A legend for electrical acronyms and terms is provided in Standard Detail P-019, Appendix B.

6.11.4.4 RTU unit shall be installed inside its own NEMA 4X Stainless Steel enclosure.

6.11.5 Developer is responsible for complete wiring and programming of the PLC and RTU.

6.11.6 Developer shall provide a field Operation and Maintenance Manual for the RTU and Control Equipment.

6.11.7 Human Machine Interface (HMI) Requirements

6.11.7.1 The pump station System Integrator shall provide complete HMI. Developer shall assume all the associated cost.

6.11.8 Relays

6.11.8.1 Relays to be included in pump station control/operation:

A. Generator Operation

B. Power Failure

C. Pump One Failure

D. Pump Two Failure

E. High Water Level Alarm

F. Flow Meter Output

G. Low Level Alarm

6.12 Enclosures

6.12.1 Refer to Section 7, Paragraph 1.5

6.13 Instrumentation and Controls

6.13.1 Components

6.13.1.1 All conduit work shall be in accordance with the Electrical Conduit and Accessories Specifications for the Fulton County Wastewater Treatment and Collection System, provided in Appendix A.

A. A depiction of the control panel cables is provided in Standard Detail P-016, Appendix B.

B. Once wiring is installed, conduits shall be insulated (sealed) at each end - at the wet well and the enclosures. This will prevent moisture transfer from the wet well into the electrical and control panel enclosures.

C. Conduits shall be Red2hot with PVC coating on the inside throughout the entire length.

6.13.1.2 A phase monitor shall be provided in the pump control panel.

A. The pump operation shall be inhibited when an open phase/phase reversal condition is detected.

6.13.1.3 Control Panel layout to be determined by I&C Specialist and shall be consistent among all new pumping stations.

6.13.1.4 Allen-Bradley Programmable Controller shall be used to control and monitor all pump station functions.

A. PLC to be connected to RS45 MODBUS protocol connection per Mission availability.

B. Example pump station control block diagrams are provided in Standard Detail P-023, 240V and 480V, Appendix B.

6.13.1.5 Allen-Bradley PanelView Plus panel mounted human-machine interface (HMI) connected to the PLC shall be used to set pump control parameters and to monitor pump station status. A lockable cover shall be provided to protect the HMI from vandals.

6.13.1.6 I/O (Input/Output) modules shall be provided to monitor and control all pump station equipment in accordance with the I/O list in “Station Control I/O List” table above.

A. Equipment located outside of the pump control panel (generator, transfer switch, flow meter and pressure gauge) shall route telemetry data to/from the pump station

control panel PLC for integration with the telemetry system.

6.13.1.7 Pump Soft Starts shall be used for pumps less than 20 HP with piping systems that see a large elevation difference or pressure surge greater than the pipe design pressure when the pump is turned on. This may occur when only one pumping station is providing flow to a force main.

6.13.1.8 Pumps 20 HP or larger shall use VFDs.

6.13.1.9 All pump control components including PLC, phase monitor and HMI shall be installed in a single NEMA 4X Stainless Steel enclosure.

6.13.1.10 Controls and instrumentation circuitry shall be separated from the pump motor starters.

6.13.1.11 Each pump installed at the pump station shall be provided with a “Hand-Off-Auto” selector switch so that the operational mode of the pump may be selected.

6.13.1.12 Each pump installed at the pump station shall have a pump run timer that is capable of keeping a cumulative log of the operational time of each pump. Timers shall be factory installed six (6) digit non-resettable elapsed time meters to show individual pump running time to the one-tenth (1/10th) of an hour.

6.13.1.13 Sufficient indicator lights shall be used to demonstrate the operational status of the pump station.

A. The indication lights shall be specific to the condition detected.

B. At a minimum, indicator lights shall be provided for each pump to indicate a pump-on condition and a pump alarm/failure condition.

C. Paragraph 3.18 of this Section for further details.

6.13.1.14 Sufficient 110-volt electrical receptacles shall be provided to facilitate maintenance at the pump station.

A. If located in an outdoor area, the receptacles shall be of the ground fault interruptible type and shall be protected from the weather elements.

6.13.1.15 Phase converter, when utilized, shall be stationary type Duo Add-A-Phase, manufactured by Ronk Electrical Industries, distributed

by IMS, Mayer Electric, Hughes Supply and Rexel Southern Supply.

6.13.1.16 Control Panel Wiring

A. All power wire shall be stranded copper and sized as required for load and application according to the National Electric Code (NEC).

B. Electrical work shall be in accordance with the latest edition of the NEC and subject to all codes.

C. All control and signal wire shall be a minimum of #16 AWG, 90 degree insulated and color-coded.

1) Red for all AC control.

2) Blue for all DC source voltage.

3) Gray for all DC return, orange for all DC control.

4) Yellow for external source control.

5) White for AC neutral.

6) Green for equipment ground wiring.

D. All wiring on the rear of the inner door shall be neatly bundled using tie wraps or other means.

E. All internal wiring on the backplate shall be neatly routed in wire duct with removable covers.

F. All wiring shall be continuous point-to-point (no splices) and be totally accessible with permanent number marking on each end to match the control schematic drawings.

PART 7 MARKING

7.1 3M™ Ball Marker 1421-XR/ID, 5 ft Range, Telephone, shall be programed by the Contractor for installation along the underground communication lines. Marker balls shall be installed at all horizontal and vertical bends 45-degree and larger. The marker balls shall be buried 1-foot above the communication lines but no more than 5-feet deep.

7.2 3M™ Electronic Marking System (EMS) Warning Tape 7901-XT, Orange, 4 in, Telco, shall be continuously installed along the top of the communication lines. The tape shall be buried 1-foot above the communication lines but no more than 4-feet deep.

7.3. Contractor shall obtain a 3M™ Electronic Dynatel™ Locator 7550X-ID/ U12 Pipe/ Cable/ EMS Locator w/ 4.5” Coupler-12 Watt locator to program and locate the communication line marker ball.

SECTION 9

SITE GUIDELINES

PART 1 PUMP STATION SITE LAYOUT

1.1 An example pump station site layout is provided in Standard Detail P-001, Appendix B.

PART 2 SITE SIZE REQUIREMENTS

2.1 Size of the property to be dedicated to Fulton County for submersible pump stations shall be a minimum of 340 feet by 340 feet minimum in size, and 150-feet from fence around pump station.

2.2 Dry-pit pump station property sizing or for pump stations requiring special equipment shall be subject to approval by FCPW.

2.3 The area outside the fenced perimeter shall be even sloping grade away from the pump station fence, free of “dips” and “hills” that could impede storm water flow away from the pump station.

2.4 The dedicated pump station property shall not overlap lot lines, detention ponds, drainage easements or other similar elements.

2.5 A twenty (20) foot wide Sanitary Sewer easement must be provided along the length of the force main unless it is located within the right-of-way.

PART 3 SITE ACCESS

3.1 A minimum access easement of 30 feet wide is required for access to the pump station.

3.1.1 This easement can be combined with the 20' wide sewer easement or other utility easement.

3.2 Access Road and Turnaround

3.2.1 An access road and turnaround must be provided for all pump stations.

3.2.2 On all design plans and as-builts, show a separate pump station site plan detail with access road and turnaround.

3.2.3 Access road is to be paved at a twenty (20) foot width minimum.

3.2.4 Turnarounds are to have a forty-five (45) foot turning radius, extending sixty (60) feet from the edge-of pavement of the access road, to provide sufficient room for a vac-jet truck-sized vehicle (SU-30) to turn around.

3.2.5 Driveway and turnaround shall be constructed of concrete.

3.2.6 Concrete access road and turnaround shall be constructed on a six-inch layer of compacted aggregate base course stone.

3.2.6.1 Concrete access road shall be eight (8) inches minimum and have a twenty-eight-day (28) compressive strength of three thousand (3,000) psi and be reinforced with Number 5 (#5) rebar spaced twelve (12) inches on center on both the top and bottom faces and in each way as well, i.e. longitudinal and transverse.

3.2.6.2 Pavement design shall consider loading exerted by an eighty thousand (80,000) pound tanker truck.

3.2.6.3 Contraction joints shall be spaced a maximum of fifteen (15) feet in each direction.

3.2.6.4 Expansion joints shall be installed as needed in the access road and turn around.

3.2.6.5 In no case shall uncompacted gravel or stone material be allowed for access road construction.

3.2.7 A cross section of the access road is provided in Standard Detail P-013, Appendix B.

3.2.8 An example of the access road and turnaround are provided in Standard Detail P-012, Appendix B.

3.2.9 If the station property is adjacent to a road, adequate guard rails must be provided to protect the station.

3.2.10 Access road slope shall not exceed 12%.

3.2.11 If the access road is sloped greater than five (5) percent, Developer shall install guard rails and/or bollards to prevent vehicles from rolling off the access road and turnaround.

3.2.11.1 The guard rail/bollards are to be installed maximum five (5) feet from edge of access road and/or turnaround.

3.2.12 The access drive must have adequate line of sight to allow the safe ingress and egress of maintenance vehicles.

3.2.13 Pump station access road subgrade shall be constructed in layers not exceeding six (6) inches in depth and each layer shall be thoroughly compacted to minimum ninety-five percent (95%) of the Modified Proctor maximum dry density as determined by ASTM D1557.

3.2.13.1 This operation shall include any reshaping and wetting required to obtain proper compaction.

3.2.14 All soft or otherwise unsuitable material shall be removed and replace with suitable material.

3.2.15 Protective bollards shall be installed between the edge of the access road and the pump station wet wells and vaults, as necessary, to prevent trucks from driving over the wet well and vaults.

3.2.15.1 Protective Bollards shall be concrete filled 6-inch steel pipe and coated with OSHA Safety Yellow epoxy paint.

3.3 Provide a 20-foot vehicle access rolling gate.

PART 4 GRADING AND DRAINAGE

4.1 Site plan shall show finished grade contour lines at 2-foot intervals in and around pump station and access road.

4.2 Spot elevations shall be provided on station pad and paving to show proper drainage.

4.2.1 No storm runoff/drainage will be allowed to enter the pump station structures.

4.2.2 Storm runoff/drainage shall be diverted away from the pump station during construction.

4.3 Developer shall install a system in front of the gate to divert water away from the station and into storm drain.

4.4 Developer shall not install the pump station within twenty (20) feet of a storm drain catch basin.

4.5 Earth slopes around the pump station created by "fill" that are steeper than 3 to 1 must be stabilized with Juniper or equivalent as approved by FCPW.

4.6 Backfill shall be placed and compacted in 8-inch lifts (maximum) in horizontal layers 8 inches (maximum) in depth.

4.7 All fill shall be compacted minimum to 95% of maximum dry density at not less than 2% below nor more than 2% above the optimum moisture content as determined by ASTM D698.

4.7.1 A minimum of two compaction tests shall be taken at every five feet of backfill around any structure is required.

4.7.2 A certified letter of compaction shall be provided to FCPW’s inspector prior to final inspection.

PART 5 SITE UTILITIES

5.1 Site plan shall show all existing and proposed utilities. All utility meters must be properly mounted just inside of the station fence to allow reading without entering the station.

5.2 If gas is required, gas pipe must be buried underground and provided with 3M™ Electronic Marking System (EMS) Warning Tape 7905-XT, Yellow, 4 in, Gas.

5.3 Electric service to the station shall be run underground.

5.4 Developer shall provide, as separate circuits, two (2) 110-volt 20 amp electrical outlets (receptacles) in industrial metal weather proof boxes.

5.4.1 One outlet shall be located near the pump station jib crane.

5.4.2 The second shall be located on the control panel support frame.

5.5 If potable water is required, a copper potable water service with an acceptable double check valve backflow RPZ prevention device must be provided.

5.5.1 Developer shall be responsible for installing the service line from the water meter to the pump station site and purchasing the three-quarter (3/4) inch meter at his expense.

5.5.2 Water meters shall be set at the right-of-way.

5.5.3 Backflow devices can be located within the station fence or building and be protected from freezing.

5.5.4 Backflow prevention device shall be installed in a hot box with heat tracing wire to prevent freezing.

5.5.5 3M™ Electronic Marking System (EMS) Warning Tape 7903-XT, Blue, 4 in, Water, shall be buried 1-foot above the water line but not more than 4-feet deep.

5.6 A freeze-proof yard hydrant with fifty (50) feet of three-quarter (3/4) inch UV resistant red rubber two hundred and fifty (250) psi commercial grade hose with brass nozzle must be installed with stainless steel hanger.

5.6.1 The yard hydrant shall be a freeze-proof above ground type, Simmons #4802 Yard Hydrant or approved equal.

5.6.2 The yard hydrant shall not be installed directly into the concrete pump station pad.

5.6.3 A one-foot diameter, six inch deep, gravel area shall be provided centered on the yard hydrant, see Standard Detail P-004 in Appendix B.

5.6.4 All exposed piping shall have freeze-proof insulation.

5.7 Developer shall provide freeze-proof eye wash station complete with vacuum breaker attached to the potable water hose connection. All exposed piping shall have freeze-proof insulation.

PART 6 SITE SECURITY

6.1 Security

6.1.1 All ports of entry into the pump station facility and structures shall be locked.

6.1.2 Safety placards for all pump station structures and equipment, as required by OSHA, shall be provided and be readily visible.

6.1.3 The gate shall be equipped with an audio and visual alarm connected to the SCADA system.

6.2 Lighting

6.2.1 The pump station facility shall be provided with adequate lighting to facilitate normal and emergency operation and maintenance activities.

6.2.2 Light shall be selected to prevent light trespass.

6.2.2.1 Lighting shall be designed so as not to extend past the pump station.

6.2.3 At a minimum, lighting must provide at the wet well, control panel and generator.

6.2.4 Area Lighting: Install two (2) 120-volt LED security lights on a twenty (20) foot breakdown pole with automatic eye and pole lowering winch

6.2.5 The light shall be located near the pump station wet well, see Standard Detail P-001 in Appendix B for illustration.

6.2.6 The pole shall be aluminum**.**

6.2.7 The light shall turn on automatically from dusk to dawn or by motion sensor depending on location. The light pole is depicted in Standard Detail P-006, Appendix B.

6.2.8 Fixture lighting shall be provided as needed. Follow guidelines set in Standard Detail P-006, Appendix B.

6.3 Fencing

6.3.1 All submersible wastewater pumping stations shall be enclosed by a minimum forty (40) foot by forty (40) foot fence, or as required for pump station, and shall be as specified below:

6.3.1.1 Provide a twenty (20) foot wide single rolling gate on six (6) inch diameter posts.

6.3.2 Chain link security fences shall be installed as follows:

6.3.2.1 8-foot high.

6.3.2.2 #4 chain link wire fabric with top rails and bottom tension wires.

6.3.2.3 3 strands of barbed wire at the top on angled extension arms.

6.3.2.4 Fence posts shall be set into three (3) feet of concrete and spaced ten (10) feet apart. An example security fence with access gate is presented in Standard Detail P-010, Appendix B.

6.3.2.5 HDPE fence slats and blinds (color to be chosen based on local architecture, with FCPW approval) by TopLock with bottom locking, as directed by FCPW.

6.3.2.6 A two (2) foot chain that can be locked with a #2 Masterlock must be provided. Chain lengths shall be permanently welded to the fence.

6.3.3 Station identification sign

6.3.3.1 The sign shall be as shown in the detail drawings, indicating:

A. Station name and number and address.

B. FCPW and operator.

C. Emergency phone number.

PART 7 PUMP STATION AND SITE AESTHETICS

7.1 Landscaping

7.1.1 Developer shall clear tree limbs or other shrubbery that extends over the fence prior to acceptance.

7.2 Noise Barrier

7.2.1 Noise level shall not exceed 60 dB at 23 feet from generator, or at fence line if generator is less than 23 feet from fence.

7.2.2 A noise wall may be required, in lieu of a privacy fence, depending on the following:

7.2.2.1 Station’s proximity to residential area.

7.2.2.2 FCPW discretion.

7.2.3 Materials and Installation

7.2.3.1 Noise barrier material should have a minimum surface weight of 2.2 lbs/ft^2

7.2.3.2 The wall shall be constructed of eight (8) inch thick concrete blocks.

7.2.3.3 The wall shall be painted with outdoor grade paint, color to be chosen based on local prevailing architecture, with FCPW approval.

7.2.3.4 The wall shall be eight (8) feet tall.

7.2.4 A section view of the noise wall is depicted in Standard Detail P-011 in Appendix B.

PART 8 FLOOD PROTECTION

8.1 Pump station structures as well as all associated equipment and appurtenances shall be protected from the one hundred (100) year flood.

8.2 Generator, electrical, instrumentation and odor control equipment shall be protected from five hundred (500) year flood. All equipment shall be a minimum of one- (1-) foot above the five hundred (500) year flood.

8.3 Such protection measures shall ensure that the pump station shall remain fully functional, operational and free from physical damage during a one hundred (100) year flood.

8.4 The pump station shall be protected from inundation of floodwaters by elevating structures at least two (2) feet above and twenty-five (25) feet horizontally away the one hundred (100) year flood elevation.

8.5 The one hundred (100) year flood elevation shall be as identified on the most recent FEMA Flood Insurance Rate map.

8.6 All manholes shall be 3 feet above the base flood elevation.

8.6.1 Manholes installed with top elevations less than 3 feet above the base flood elevation shall be provided with watertight ring and covers.

PART 9 EARTHWORK

9.1 Temporary Sedimentation and Erosion Control

9.1.1 Limitation of Exposure of Erodible Earth:

9.1.1.1 Developer is to provide erosion and/or pollution control measures

A. To prevent contamination of any river, stream, lake, reservoir, canal or other water impoundments

B. To prevent detrimental effects on property outside the project right-of-way or damage to the project.

9.1.2 Use temporary erosion control features to:

9.1.2.1 Correct conditions that develop during construction which were not foreseen at the time of design.

9.1.2.2 Control erosion prior to the time it is practical to construct permanent control features.

9.1.2.3 Provide immediate temporary control of erosion that develops during normal construction operation.

9.1.3 Schedule operations such that the area of unprotected erodible earth exposed at any one time is not larger than the minimum area necessary for efficient construction operations.

9.1.3.1 The duration of exposure of uncompleted construction to the elements shall be as short as practicable.

9.1.4 Acceptable Erosion Control Measures:

9.1.4.1 Temporary Mulching:

A. Furnish and apply a two (2) to four (4) inch thick blanket of straw or hay mulch to areas, as needed, then mix or force the mulch into the top two (2) inches of the soil in order to temporarily control erosion.

B. When beginning permanent grassing operations, plow under temporary mulch materials in conjunction with preparation of the ground.

9.1.4.2 Artificial Coverings:

A. Use artificial coverings composed of natural or synthetic fiber mats, plastic sheeting or netting as protection against erosion during temporary pauses in construction caused by inclement weather or other circumstances. Remove the material when construction resumes.

B. Use artificial coverings as erosion control blankets to facilitate plant growth while permanent grassing is being established.

C. For the purpose described, use non-toxic, biodegradable, natural or synthetic woven fiber mats.

D. Install all sediment control devices in a timely manner to ensure the control of sediment and the protection of lakes, streams or any wetlands associated therewith and to any adjacent property outside the right-of-way as required.

E. At sites where exposure to such sensitive areas is prevalent, complete the installation of any sediment control device prior to the commencement of any earthwork.

9.1.5 Acceptable Sedimentation Control Measures:

9.1.5.1 Sandbags:

A. Furnish and place sandbags in configurations to control erosion and siltation.

9.1.5.2 Berms:

A. Construct temporary earth berms to divert the flow of water from an erodible surface.

9.1.5.3 Baled Hay or Straw:

A. Provide bales having minimum dimensions of fourteen (14) by eighteen (18) by thirty (36) inches at the time of placement.

B. Construct Baled Hay or Straw dams as needed to protect against downstream accumulations of sediment.

9.1.5.4 Temporary Silt Fences:

A. Furnish, install, maintain and remove temporary silt fences, in accordance with the manufacturer's directions.

9.1.5.5 Rock Bags:

9.1.6 Furnish and place rock bags to control erosion and siltation.

9.2 Bedding

9.2.1 Bedding materials shall be in accordance with GDOT Standard Specification Section 812, Type II Foundation Backfill.

9.2.2 The bedding material shall be placed in the bottom of the trench after it has been excavated to an elevation sufficient to permit the placing of not less than six (6) inches or as directed.

9.2.2.1 The surface of the bedding material shall be spread to form a uniform support for the pipe and appurtenances.

9.2.2.2 After installing each section of the pipe, additional bedding material shall be placed on either side of the pipe to an elevation consistent with the bedding type specified herein, as indicated on the plans or specifications or as directed by FCPW.

9.2.2.3 This material is to be well tamped and compacted into place so as to secure a firm, even bearing.

9.2.3 Bedding material shall be placed for the full width of the trench bottom.

SECTION 10
GENERAL CONSTRUCTION GUIDELINES

PART 1 GENERAL CONSTRUCTION REQUIREMENTS

1.1 Locating Existing Utilities

1.1.1 On February 3, 2009, the Georgia Public Service Commission (PSC) approved the adoption of new utility rules 515-9-4-.02 and 515-9-4-.13 under the Georgia Utility Facility Protection Act. These new rules define Large Projects and describe the procedures to be taken should a project meet the specifications of a Large Project. Fulton County requires that the projects submitted for approval by FCPW that meet the criteria set by the PSC for a Large Project follow the procedures set out by the Georgia Utility Facility Protection Act.

1.1.2 Furthermore, FCPW requires that if the project submitted for approval meets the criteria for Large Project status, a utility-locating schedule be submitted with the plans to be approved. This schedule shall describe in detail the FCPW utilities that need to be located and at what phase of the project's completion this field location shall take place. This schedule shall be an individual document in the submittal and shall be submitted at the same time as the project documents. It shall be clearly labeled as the "Locating Schedule for Project Name," where "Project Name" is the name of the project submitted for approval

1.2 Maintenance of Traffic

1.2.1 The Developer is responsible for obtaining all road opening permits, including providing any required restoration bonds.

1.2.2 When a pumping station and/or force main is to be installed within the travel way of a local municipality or GDOT controlled road, a traffic control plan (TCP) shall be required.

1.2.3 The TCP, with the construction plans, shall be submitted to the reviewing agency for review and approval.

1.2.4 The following roadway features shall be shown on the TCP:

1.2.4.1 Pavement Width

1.2.4.2 Pavement Type

1.2.4.3 Speed Limit

1.2.4.4 Traffic Lane Designation

1.2.4.5 Pavement Markings

1.2.4.6 Traffic Signs/Signals

1.2.4.7 Side streets/Intersection Location

1.2.4.8 A TCP shall include the following:

A. Legend

B. Work Hour Restrictions

C. Construction Sequence/Phasing

D. Work Zone Designation

E. Sign Placement

F. Taper Length

G. Traffic Movement Designation

H. Drum/Cone/Barricade/Barrier Placement

I. Flagging Requirement/Location

J. Uniformed Police Officer Requirement/Location

1.2.5 The following agency shall be contacted when preparing a TCP**:**

1.2.5.1 GDOT.

1.2.5.2 Local authorities having jurisdiction.

1.2.6 The following publications govern the design and installation of TCP's and devices:

1.2.6.1 Manual on Uniform Traffic Control Devices (latest edition)

1.2.6.2 GDOT Standard Specifications for Roads and Structures (latest edition)

1.2.6.3 GDOT Roadway Design Manual (latest edition)

1.2.7 FCPW will obtain all road opening permits required by the GDOT.

1.2.7.1 Developer will not permitted to make any type cuts on roadways requiring a permit from the GDOT until such time as the permit is provided and prominently displayed on-site.

1.2.8 All highway utilities and traffic controls are to be maintained, and work shall conform to the rules and regulations of the authorities, including the use of standard signs.

1.3 Rock Excavation / Blasting

1.3.1 Rock Excavation

1.3.1.1 Where rock is encountered within excavation for structures, it shall be excavated to the lines and grades indicated on the FCPW approved drawings or as otherwise directed by FCPW.

1.3.1.2 Disposal of Rock: Developer, in a lawful manner shall dispose of rock, off site, that is surplus or not approved by FCPW as suitable for use as riprap or backfill.

1.3.2 Blasting

1.3.2.1 No Blasting shall occur until Developer has received written approval from FCPW. Developer shall notify FCPW in writing the date, time of day of the first blast and the duration the blasting is to occur. Developer shall notify FCPW and local fire department before any charge is set.

1.3.2.2 Developer shall exhaust other practical means of excavating prior to utilizing blasting as a means of excavation. Developer shall provide a blaster certified/licensed in the State of Georgia, and experienced workmen to perform blasting. Developer shall conduct blasting operations in accordance with all existing State and County ordinances and regulations and gain all required permits at its cost. Developer shall protect all buildings, structures and utilities from the effects of the blast. Developer is responsible for any damage due to the blasting and shall repair any resulting or associated damage at its cost.

1.3.2.3 Developer shall employ an independent, qualified specialty subcontractor, to monitor the blasting by use of a seismograph; identify the areas where charges shall be used; conduct pre-blast and post-blast inspections of structures, including photographs or videos; and maintain a detailed written log that may be reviewed by FCPW.

1.4 Trenching and Excavation

1.4.1 All excavation shall be open cut unless otherwise indicated on the "approved" design or directed by FCPW.

1.4.1.1 In general, topsoil may be removed by machine method.

1.4.1.2 Excavation below topsoil may also be performed by machine but shall be supplemented by such hand dressing or leveling as may be required to conform to lines and grades as given by FCPW.

1.4.1.3 Material so removed shall be used in backfill, making embankments, filling low area or as otherwise directed.

1.4.2 Hand tool excavation shall be used where necessary to protect existing utilities and structures.

1.4.3 All slopes shall be carefully cut or graded by hand to grades required by FCPW and shall be tamped or otherwise compacted to maintain the material in position.

1.4.4 The final trimming of the bottoms and sides of excavations which is to be adjacent to masonry shall be done just before the concrete is placed or poured.

1.4.5 In open or improved lawn areas, excavation should be done, if possible, utilizing a tractor-mounted backhoe and extreme care should be taken to avoid damage to adjoining lawn areas.

1.4.5.1 In areas not readily accessible by machinery and where excavation is required near existing trees and shrubberies which may be damaged by excavation equipment, the trench shall be excavated using hand tools.

1.4.6 For the minimum width of trench from an elevation of twelve (12) inches above the top of the pipe to the bottom of the trench, refer to Fulton County Standard Detail 103.

1.4.7 Excavation of pipe trenches with sides sloping to the trench bottom will not be permitted.

1.4.8 Should trenches be excavated more than the specified maximum widths, FCPW may require Developer to furnish concrete cradles or concrete encasement for the pipe.

1.5 Sheeting and Shoring

1.5.1 Developer shall be responsible for supporting and maintaining required excavations to the extent of sheeting and shoring the sides and ends of excavations with timber or other supports.

1.5.1.1 If the sheeting, braces, shores, stringers, walling timbers or other supports are not properly placed, or are insufficient, the Developer shall provide additional or stronger supports as may be required.

1.5.1.2 The requirement of sheeting or shoring, or of the addition of supports, shall not relieve Developer his responsibility of their sufficiency.

1.5.2 Trench sheeting shall be left in place until the backfilling has been completed to an elevation not less than twelve (12) inches above the top of the pipe.

1.5.2.1 Unless otherwise ordered by FCPW, sheeting shall be cut off at the top of the lowest set of bracing and the upper section shall be removed.

1.5.3 Where in the opinion of FCPW the removal of sheeting may endanger the work, such sheeting will be ordered to be left in place and the tops cut off as directed or as specified above.

1.5.4 Removal of the sheeting shall be done in such a manner as to prevent injurious caving of the sides. All voids left by the sheeting along trenches shall be carefully filled and rammed with suitable tools.

1.5.5 In quicksand or soft ground, sheeting shall be driven to such depth below the bottom of the trench as directed by the Developer's/Design Engineer. A Professional Engineer Registered in the State of Georgia shall design all sheeting/shoring to meet OSHA standards.

1.6 Removal of Water

1.6.1 Developer shall pump out, or otherwise remove and properly dispose of, any water (e.g. storm water and/or ground water) as quickly as it collects in the excavation.

1.6.1.1 Water shall not accumulate or be present in the excavated trench at any time.

1.6.1.2 This removal is required regardless of the source.

1.6.2 All necessary precautions shall be taken to prevent disturbance at, and to properly drain, any areas upon which concrete is to be poured or upon which pipe is to be laid.

1.6.3 Approved and appropriate equipment with sufficient capacity to remove water from the work shall be kept on site at all times.

1.6.3.1 Equipment shall be used in such a manner as to not withdraw sand or cement from concrete.

1.6.3.2 Developer shall also ensure that removal of any liquids will not interfere with the proper laying of pipe or prosecution of any of the required work for the complete construction of the project.

1.6.4 The flow in sewers, drains, gutters or water courses encountered during the construction shall be adequately provided for by Developer to ensure these flows do not interfere with the prosecution of the work and are maintained in such a manner as to ensure continuity of flow at all times.

1.6.5 Unless otherwise permitted, ground water encountered within the limits of excavation shall be depressed to an elevation not less than twelve (12) inches below the bottom of such excavation.

1.6.5.1 This depression is to be done before pipe laying, precast structure installation or cast-in-place concrete work is started and shall be so maintained until concrete and joint materials have attained initial set.

1.6.6 If raw sewage is encountered during performance of the Work, Developer shall immediately stop work and shall notify FCPW. FCPW will determine whether actions by Developer caused the leak. FCPW mitigation guidelines shall be followed:

1.6.6.1 FCPW will promptly notify the appropriate regulatory agencies if necessary.

1.6.6.2 In addition, FCPW will instruct the Developer as to what actions, if any, Developer can and cannot perform prior to any directives which may be issued by the regulatory agencies.

1.6.6.3 Any sewage shall be pumped and hauled to a manhole, pump station or advanced wastewater facility as directed by FCPW.

1.6.6.4 Any other liquids shall be properly disposed of as directed by FCPW and/or any regulatory agencies having jurisdiction.

1.6.7 If other hazardous liquids or materials, as defined by the Federal, State of Georgia, Fulton County and Local jurisdiction in conjunction with the Comprehensive Environmental Response, Compensation and Liability Act, (CERCLA) and Superfund Amendments and Reauthorization Act (SARA) Title III, are encountered during performance of the Work, Developer shall immediately stop work and shall notify the appropriate State agency and FCPW.

1.6.7.1 Hazardous liquids include, but are not limited to gasoline, diesel fuel and industrial solvents or cleaners.

1.6.7.2 The Federal, State of Georgia, Fulton County and/or Local jurisdiction(s) in conjunction with FCPW, will then determine whether actions by Developer caused the liquids or materials to leak or further dispersed.

1.6.7.3 Any hazardous liquids or materials shall be properly disposed of as directed by the Federal, State of Georgia, Fulton County and/or Local jurisdiction(s) in conjunction with FCPW.

1.7 Pipe Handling

1.7.1 Developer shall unload all pipe, fittings, and accessories from trucks with hoists or by skidding.

1.7.1.1 Pipe handled on skidways shall not be subjected to skidding or rolling against pipe already on the ground.

1.7.1.2 Under no circumstances shall said materials be dropped off any delivery vehicle.

1.7.1.3 Should any material be accidentally dropped, it shall be immediately labeled with indelible markings or tagged and set aside or rejected as directed by FCPW.

1.7.1.4 If FCPW has any questions regarding acceptability of said materials, Developer shall either remove and replace the questionable materials or obtain a signed written statement from the manufacturer certifying the pipe, fittings and/or accessories as "undamaged"

1.7.2 Developer shall use proper, suitable tools and appliances for the safe and convenient handling and laying of pipe and fittings. Developer shall take great care to prevent the coating and lining from being damaged.

1.7.3 Pipe shall not be "strung", or laid out, along the project within existing highway rights-of-way, unless specifically directed to do so by FCPW, and only then after receiving permission from the road authority that has jurisdiction.

1.7.4 Pipe shall be stored in such a manner as to keep the interior free of dirt and other foreign matter.

1.7.5 Developer shall carefully examine the pipe and fittings for defects just before laying.

1.7.5.1 No pipe or fitting that is known to be defective shall be laid.

1.7.5.2 In the event that defective pipe or fittings are discovered after having been laid, Developer shall remove and replace with sound pipe or fittings in a manner satisfactory to and at no addition cost to FCPW.

1.7.6 Developer shall maintain a clean Work site and clean materials throughout the project. Pipe and fittings shall be kept free from mud, dirt and debris while stored onsite and shall be thoroughly cleaned before being laid.

1.7.6.1 During any stoppage in the laying of pipe and when ending construction for the day, Developer shall install a mechanical or fitted plug in the open end of the pipe to prevent contamination of the pipeline.

1.7.6.2 Should any accidental contamination occur, the pipe shall be thoroughly cleaned and swabbed out and inspected by FCPW before new or further pipe installation can commence.

1.8 Pipe Laying

1.8.1 A minimum burial depth of four (4) feet (within the fence line) and five (5) feet (outside the fence line) as measured from the crown of the pipe to the ground surface shall be provided.

1.8.2 All pipes shall be thoroughly cleaned before being laid and shall be kept clean until final acceptance of the Work.

1.8.3 The pipe shall be laid and jointed in the following manner:

1.8.3.1 Clean Ring and Spigot – The gasket, groove, and pipe spigot shall be wiped clean of foreign material.

1.8.3.2 Install Gasket – The ring shall be inserted in the groove, taking care to see that the gasket is evenly seated and free from twists.

1.8.3.3 Apply Lubricant –The spigot end of the pipe from the pipe end to the full insertion mark shall be lubricated. Only the lubricant approved by the manufacturer shall be used. After the spigot end has been lubricated, it shall be kept clean and free of dirt, sand, or embedment material. If foreign matter adheres to the lubricated end, the spigot shall be wiped clean and relubricated.

1.8.3.4 Assembly – After the pipe sections are aligned, the spigot end shall be pushed into the bell or coupling until it hits the stop and/or the reference insertion mark is in the proper location. The recommended assembly method is the use of a bar and a block. Pullers such as a “come along” may also be used if the pipe is protected from the chain or cable. Pipe deflection/offset shall not exceed the values listed in Fulton County Standard Detail 120.

1.9 Bore and Jack for Force Mains

1.9.1 General

1.9.1.1 Working drawings shall show the size and location of bore and jack pits together with the sheeting and shoring to be used.

1.9.1.2 In addition, such drawings shall include large-scale plan and profile of the proposed installation and affected structures if requested by FCPW.

1.9.2 Casing Pipe

1.9.2.1 Casing pipe shall be new and unused pipe.

1.9.2.2 The casing shall be made from steel plate having a minimum yield strength of thirty-six thousand (36,000) psi.

1.9.2.3 The steel plate shall also meet the chemical requirements of ASTM A36, latest edition.

1.9.2.4 At the discretion of FCPW, the outside of the casing pipe shall be coated with epoxy having a minimum dry film thickness of sixteen (16) mils.

1.9.2.5 Surface preparation shall be SSPC-SP-10.

1.9.2.6 Epoxy shall have a minimum solids content of sixty-five (65) percent by volume and shall be air or airless spray applied.

1.9.2.7 Minimum drying time shall be seven days.

1.9.2.8 Brushing shall be permitted in small areas only.

1.9.2.9 All coating and recoating shall be done in strict accordance with the manufacturer's recommendations.

1.9.2.10 Epoxy shall be Tnemec, Carboline or Valspar.

1.9.2.11 The thicknesses of casing shown below are minimum thicknesses.

1.9.2.12 Actual thicknesses shall be determined by the casing installer, based on its evaluation of the required forces to be exerted on the casing when jacking.

1.9.2.13 Any buckling of the casing due to jacking forces shall be repaired at no additional cost to FCPW.

1.9.2.14 The diameters of casings listed below are the minimum to be used.

1.9.2.15 Larger casings, with FCPW's approval, may be provided at no additional cost to FCPW, for whatever reasons Developer may decide, whether casing size availability, line and grade tolerances, soil conditions, etc.

1.9.2.16 For casing sizes, under railroads and highways, and carrier pipe and pipe support installation requirements, refer to Fulton County Standard Detail 107 and 129.

1.9.2.17 Under railroads, Developer shall provide uncoated casings, unless otherwise required.

1.9.2.18 Developer shall supply casing in accordance with the encroachment permits that are issued.

1.9.3 Steel

1.9.3.1 Steel pipe shall be used for bore and jack casing.

1.9.3.2 Pipe shall conform to the latest revisions of ASTM A134 or ASTM A139 with a minimum yield of thirty-five thousand (35,000) PSI. Alloy shall be in accordance with the latest edition of ASTM A36.

1.9.3.3 Casing pipe may be uncoated and unlined with approval by FCPW.

1.9.4 Casing Spacers

1.9.4.1 Casing spacers shall meet one of the following requirements:

A. Casing spacers shall be flanged, bolt-on style with a two-section stainless steel shell lined with a PVC liner,

1) Minimum 0.09-inch thick having a hardness of eighty-five (85) to ninety (90) durometer,

2) Minimum fourteen (14) gauge band and ten (10) gauge risers, with two (2) inch wide glass reinforced polyester insulating skids.

B. Runners shall be attached to stainless steel risers which shall be properly welded to the shell.

C. The height of the runners and risers shall be manufactured such that the pipe does not float within the casing.

1.9.4.2 Casing spacers shall be as manufactured by one of the following:

A. Cascade Waterworks Manufacturing Company

B. Pipeline Seal and Insulator, Inc.

C. Advanced Products and Systems, Inc.

1.9.5 Installation

1.9.5.1 Where pipe is required to be installed under railroads, highways, streets or other facilities by bore and jack method, the operations of Developer shall be subordinate to the free and unobstructed use of highway and structures and shall not weaken the roadbed or structure. Refer to Fulton County Standard Details 107 and 129.

1.9.5.2 Developer shall proceed with the Work in such a manner as shall permit regular transaction of business by the highway department and/or property owners without delay or danger to life or property. Developer shall place necessary barricades, warning signs, signals, lights and, if necessary, watchmen for the protection of the public.

1.9.5.3 Jacks for forcing the casing pipe through the roadbed shall have a jacking head constructed in such a manner as to apply uniform pressure around the ring of the pipe. The pipe to be jacked shall

be set on guides, braced together to properly support the section of the pipe and direct it to the proper line and grade. In general, roadbed material shall be excavated just ahead of the pipe.

1.9.5.4 Whenever possible, the pipe shall be jacked from the low or downstream end.

1.9.5.5 Excavated material shall be placed safely near the top of the working pit and disposed of as required. Use of water or other fluids will be permitted only to the extent necessary for lubrication. Jetting shall not be permitted.

1.9.5.6 The diameter of the excavation shall conform to the outside diameter and circumference of the casing pipe as closely as feasible. Any voids that develop during the installation operation shall be pressure grouted.

1.9.5.7 After the steel casing pipe has been installed, the carrier pipe shall be installed in the casing pipe. Care shall be exercised to maintain tight, fully seated joints in the carrier pipe. At each end of the casing pipe, the void between the carrier pipe and casing shall be sealed with casing end caps.

1.9.5.8 When requested by FCPW, either grout shall be pumped between the carrier pipe and steel casing, or sand shall be blown into the casing to fill the voids. Alternate methods shall be submitted for approval.

1.9.5.9 All sheeting placed for the jacking/auguring shall be completely removed by Developer. All bore and jack designs shall include a manhole at or near each end of the jacked section.

1.9.5.10 When site conditions dictate, conventional tunneling techniques may be utilized as an alternate to bore and jack.

1.10 Work within GDOT ROW

1.10.1 All roadway restoration shall be done in accordance with the lawful requirements of the authorities within whose jurisdiction such pavement is located.

1.10.2 All highway utilities and traffic controls are to be maintained, and work shall conform to the rules and regulations of the authorities including the use of standard signs.

1.10.3 Developer shall furnish all such bonds or checks which may be required by the highway authorities to ensure proper restoration of paved areas.

1.10.4 Trench restoration within a GDOT right-of-way shall be in accordance with GDOT Standard Detail 1401 Pavement Patching Details.

http://mydocs.dot.ga.gov/info/gdotpubs/ConstructionStandardsAndDetails/1401.pdf

1.11 Backfilling

1.11.1 General

1.11.1.1 Backfill material shall be compacted to a density of not less than 95% of the maximum dry density as determined by the standard proctor test ASTM D698 (latest version).

A. When directed, Developer shall arrange to have such compaction tests conducted by an independent testing firm.

B. When directed, Developer, at its expense, shall arrange and bear the burden of the cost to have such compaction tests conducted by an independent testing firm. The minimum number of tests shall be one per 50 LF of pipeline installed and the locations shall be determined by FCPW.

1.11.1.2 Materials used for backfilling shall be free from all perishable organics or other objectionable materials and shall contain no stones larger than three (3) inches in its longest dimension.

1.11.1.3 No soil backfill shall be used in pipe trenches under roadways or other paved areas. In such paved areas, trenches shall be backfilled with crushed rock and compacted to the minimum required compaction of ninety-five percent (95%) of the maximum dry density. When allowed by FCPW, in non–paved areas the compaction may be less than ninety-five percent (95%) however no less than ninety percent (90%) of the maximum dry density.

1.11.1.4 Excavations shall be backfilled with No. 57 stone **or A-1** as directed by FCPW.

1.11.1.5 If, in the opinion of FCPW, the original excavated material is unsuitable for use as backfill, such as perishable matter, refuse, building materials, wire, brush, stumps, ashes, large stones, muck or other soft materials, Developer shall properly dispose of the objectionable materials and shall furnish, haul and place borrow material suitable for proper backfill as directed by FCPW.

1.11.1.6 Backfilling shall not be done in freezing weather, except by permission of FCPW, and shall not be done using frozen materials or upon frozen materials.

1.11.1.7 All backfilling shall be left with smooth, even surfaces, properly graded, and shall be maintained in such condition until final completion and acceptance of the Work, notwithstanding applicable warranty periods.

A. Where directed by FCPW, Developer shall mound the backfill slightly above the adjacent ground to allow for settlement.

1.11.2 Trenches

1.11.2.1 Backfill in trenches where pipe has been laid shall be placed continuously by hand in layers not exceeding six (6) inches in thickness and carefully and thoroughly consolidated by tamping simultaneously on both sides of the pipe to a height of twelve (12) inches above the top of the pipe.

A. This backfilling and compacting must be done promptly and before any backfill material is deposited directly from a machine bucket, loaders, trucks or other mechanical equipment.

B. When utilizing a machine bucket for backfilling, the bucket must be lowered into the trench to deposit the material in such a manner as to avoid the shock of falling earth which could injure or damage the pipe or structure.

C. Under no circumstances should the material be allowed to fall from the machine or loader bucket directly onto the pipe or conduit in the trench.

1.11.2.2 Except as otherwise ordered by FCPW, all forms, bracing and lumber shall be removed from the trench before backfilling.

1.11.2.3 Bottoms of trenches in earth must be shaped or molded and compacted to the contour of the outside of the pipe, using bedding materials, as directed or where indicated on the approved design, to give full support to the lower segment of the pipe.

A. This shall be done in such a manner as to prevent any subsequent settlement of the pipe.

B. Boulders or loose rock which might bear against the pipe will not be permitted in the trench bottom or in the backfill within the first two (2) feet above the top of the pipe.

C. Bottoms of excavations which are of loose granular soils shall be compacted by vibratory compactor prior to laying of pipe to a minimum density of ninety-five percent (95%) of the maximum dry density as determined by the standard proctor test ASTM D698 (latest version).

1.11.2.4 Where foundation conditions are such that proper bedding cannot be provided, such as in quicksand, Developer may be directed by FCPW to provide foundation cushion, concrete cradles or other special provisions to provide support for the pipe.

1.11.2.5 Only after the backfill has been placed and hand-compacted to at least twelve (12) inches above the top of the pipe may the work proceed in the placement of the remaining backfill material, which must be carefully placed and compacted.

A. In streets, other surfaced areas or where directed, the backfill shall be placed and compacted in lifts not to exceed twelve (12) inches in thickness.

B. All precautions must be taken to avoid having any unincorporated material which may result in future settlement in these areas.

C. Compaction shall be accomplished by approved mechanical tampers.

1.11.2.6 3M™ Electronic Marking System (EMS) Warning Tape 7904-XT, Green, 4 in, WasteWater, shall be placed a minimum of 1-foot above the wastewater line but no more than 4-feet deep.

1.12 Abandonment of Pipelines

1.12.1 All lines that are proposed for abandonment shall be approved by the FCPW. Developer shall submit a schedule and detail methods to be used on each pipeline to be abandoned.

1.12.2 Abandoned pipelines shall be inspected prior to filling.

1.12.3 No abandonment shall proceed until approval issued by FCPW.

1.12.4 Filling abandoned pipelines shall conform to the requirements of the submittal approved by FCPW. Developer shall have a minimum of five (5) years of documented experience in chemical grouting of pipe lines.

1.12.5 All Sanitary Sewer lines shall be cleaned before CCTV and abandoning. Where indicated on the approved plans or as directed by FCPW, Developer shall perform television inspection, smoke testing and/or dye testing to determine whether there are active service connections on sanitary sewer

lines. Developer shall not fill pipelines with active connections. Each line to be abandoned, at a minimum, shall have a brick bulkhead at each end. Flowable fill shall be pumped into the pipeline from the upstream end with sufficient pressure to ensure that the line is completely filled.

1.13 Flowable Fill

1.13.1 Reference www.dot.ga.gov - in the search engine bar type in - Section 600.

1.13.2 Developer shall follow the minimum requirements of GDOT Section 600 and shall submit a design mix to FCPW for approval.

PART 2 RESTORATION OF PAVEMENTS, SIDEWALK, AND CURBS

2.1 General

2.1.1 Fulton County Standard Detail 109 shall be followed for the repair of concrete and asphaltic concrete surfaces.

2.1.2 Work Included:

2.1.2.1 Developer shall furnish all materials for, and properly restore, all pavements, drives, sidewalks and curbs which may have been damaged, removed or disturbed as a result of accomplishing the Work.

2.1.2.2 Restoration and replacement shall be made to the satisfaction of FCPW. This shall include in general, but without limitation, all necessary concrete, reinforcing steel, stone, cinders, gravel, slag, asphalt or other bituminous material necessary for the proper completion and restoration of the Work as may be required, directed or specified.

2.1.3 Materials and Workmanship

2.1.3.1 Materials to be used in the repair and restoration of pavements, drives, sidewalks and curbs shall be first quality.

2.1.3.2 All materials removed while accomplishing the work shall be disposed by Developer meeting all Federal, State and County laws.

2.1.3.3 No existing material may be reused in the Work unless pre-approved by FCPW.

2.1.3.4 All workmanship shall be first class.

2.1.3.5 Concrete shall be Class B plain concrete with a twenty-eight (28) day compressive strength of three thousand (3,000) psi, unless otherwise specified in the drawings or specifications.

2.2 Restoring Pavements

2.2.1 After the pipe has been laid, appurtenant work constructed and backfill completed, Developer shall furnish, place, restore and maintain all pavements or roadway surfaces which have been removed, or damaged by, in pursuit of the Work.

2.2.1.1 The form and degree of restoration shall be as specified on the approved design, as specified herein and/or as directed by FCPW.

2.2.2 For backfilling roadway cuts, only No. 57 stone backfill shall be used. See Section 9, Paragraph 9.2 for bedding requirements and Section 10, Paragraph 1.11.2 for trench backfill requirements.

2.2.3 All roadway restoration shall be done in accordance with the lawful requirements of the authorities within whose jurisdiction such pavement is located.

2.2.3.1 All highway utilities and traffic controls are to be maintained, and work shall conform to the rules and regulations of the authorities, including the use of standard signs.

2.2.3.2 Developer shall furnish all such bonds or checks which may be required by the highway authorities to ensure proper restoration of paved areas.

2.2.4 When removal of pavement is required (other than gravel types) Developer shall outline the area to be removed by making saw-cuts.

2.2.4.1 Saw-cuts shall be vertical to allow the removal of the paving material in straight lines.

2.2.4.2 If pavement breakage occurs beyond the saw-cut, Developer shall make a new straight saw-cut beyond the furthest point of breakage.

2.2.5 The concrete base course shall extend the full width of the trench cut plus a minimum of twelve (12) inches on either side of the trench.

2.2.5.1 The existing pavement shall be neatly sawed along both sides of the ditch. The concrete used shall be Class A or B Concrete.

2.2.5.2 Once the concrete base course has properly set, the concrete surface shall be cleaned and a minimum of one (1) inch thick asphaltic concrete pavement shall be laid to match the level of the adjacent pavement.

2.2.6 At any time that an existing road is cut longitudinally for a distance greater than one hundred (100) feet, the concrete shall be poured flush with existing, and the street shall be resurfaced curb to curb with one (1) inch minimum of asphaltic concrete. Existing road shall be restored to preconstruction condition.

2.2.7 Developer shall be responsible for maintaining all pavement cuts prior to project acceptance and during the one-year maintenance period.

2.2.7.1 Should any failures be noted associated with any portion of the Work, Developer shall remove all such damaged surfaces and make full repairs. This includes adding and re-compacting approved backfill materials, placing and maintaining bituminous concrete pavement or stone road surfaces.

2.2.7.2 All required pavement repairs necessitated due to pavement failure, either prior to final project acceptance or during the one-year maintenance period, shall be completed by Developer within five (5) working days of notification by FCPW.

2.2.7.3 Bituminous concrete pavements or stone road surfaces which Developer is required to replace, shall be in at least as good condition at the end of the one-year maintenance period as it was before construction.

2.2.8 Roadway Permits

2.2.8.1 Developer is responsible for obtaining all road opening permits from the local authorities having jurisdiction, including providing any required restoration bonds.

2.2.8.2 FCPW will obtain all road opening permits required by the GDOT.

2.2.8.3 Developer is not permitted to make any type of cuts on roadways requiring a permit from the GDOT until such time as the permit is provided and prominently displayed on-site.

2.3 Restoring Driveway Pavements

2.3.1 Developer shall repair or replace all driveway sections disturbed by the process of the Work.

2.3.2 Driveways shall be constructed of the same materials and to the same thickness of the adjoining wearing surface.

2.3.3 In restoring driveways, the subsoil and foundation material shall meet a minimum of 95% compaction so as to prevent any future settlement or cracking of the driveway pavement.

2.3.4 In restoring concrete driveways, the base course shall be wetted prior to pouring new concrete.

2.3.5 Where necessary to cut a concrete driveway, the cuts shall be made with a masonry saw providing a smooth and straight line completely across the driveway.

2.3.6 Partial cut-outs, crooked cuts or cuts made by any methods other than masonry saw are not permitted.

2.3.7 In general, or where directed, concrete slab removal shall be made in entire pavement sections to the nearest existing expansion joint.

2.4 Restoring Curbs

2.4.1 Developer shall restore all curbs and combination curbs and gutters which have been removed or disturbed in the progress of the Work.

2.4.2 Curbing shall be made to conform accurately in size, line, grade and materials as the adjoining section.

2.4.3 In restoring curbs, the subsoil and foundation material shall meet a minimum of 95% compaction so as to prevent any future settlement of the concrete curbing.

2.4.4 The sub-base shall be thoroughly rolled or tamped and shall be wetted just before the concrete is placed but shall show no pools of water.

2.5 Restoring Sidewalks

2.5.1 Developer shall restore all sidewalks which have been removed or disturbed in the progress of the work.

2.5.2 Sidewalks shall be constructed to the same dimensions and materials as the adjoining sections.

2.5.3 Where necessary to cut a sidewalk, entire sections shall be removed and replaced unless otherwise directed by FCPW.

2.5.4 The sub-base shall be thoroughly rolled or tamped to a minimum of 95% compaction and shall be wetted just before the concrete is placed but shall show no pools of water.

2.6 Developer's Warranty of Restored Paved Surfaces

2.6.1 Developer shall make every provision to ensure a minimum of 95% compaction under areas to be paved by properly tamping any backfill under areas to be paved.

2.6.2 Any settlement which may occur during the one (1) year warranty period shall be corrected by Developer at his expense. Work shall include

removing, re-compacting and replacing any paved surfaces which show signs of settlement whether or not actual damage to the paved surface has occurred.

2.6.3 This shall apply to all paved surfaces including streets, drives, sidewalks and curbs and gutters.

2.6.4 Should settlement, cracks or other indications of failure or impending failure, appear in the paved surface, the adjoining paving shall be removed to the extent necessary to secure a firm, undisturbed bearing.

2.6.5 All removal, re-compaction and replacement shall be in accordance with the specifications concerning these operations as stated elsewhere.

PART 3 SEEDING / SOD REPLACEMENT

3.1 Work Included

3.1.1 Developer shall furnish all labor and materials to properly restore to the satisfaction of FCPW all ground surfaces, irrespective of type, which may have been disturbed in the progress of the Work.

3.1.2 Developer shall refer to the AASHTO “Green Book” for erosion and sedimentation control for additional standards and requirements not listed in these Guidelines.

3.1.3 This shall include in general, but without limitation, the spreading of topsoil, seeding, sod replacement, fertilizing and mulching required to restore disturbed areas as may be necessary, directed or specified herein.

3.1.4 On all "sod" type lawns and other improved, well established grass areas, the sod/grass shall be carefully removed, kept alive, and replaced after the backfilling and grading is finished.

3.1.5 Developer shall also remove all spoil from such areas as quickly as possible after the excavation has been backfilled. Developer shall leave the premises in as good condition as before undertaking the Work.

3.1.6 It is the intent of these Design Guidelines to restore all disturbed areas, to place seed and mulch in areas not specifically identified as improved lawns, to place topsoil and seed where improved lawns existed prior to construction, and to provide for "sod" removal and replacement in areas identified as such prior to construction.

3.2 Standard Specification for Seeding/Sod Replacement

3.2.1 The requirements of the GDOT "Standard Specifications - Construction of Roads and Bridges", Current Edition and as revised to date, shall apply to

the extent they are applicable for all seeding/sod replacement as directed by FCPW.

3.3 Topsoil

3.3.1 Where directed by FCPW, area to be seeded shall be covered with a layer of topsoil.

3.3.2 The topsoil shall be of sufficient thickness that when spread and compacted, a minimum of four (4) inches will be available.

3.3.3 Developer shall furnish natural topsoil of good condition and tillable structure.

3.3.4 Obtain topsoil as borrow from an outside source of uniform texture, drainage and other characteristics so as to constitute a homogeneous soil meeting the requirements of GDOT and as approved by FCPW.

3.3.5 Developer shall furnish topsoil that is free from objectionable materials such as hard clods, stiff clay, sods, hardpan, partially disintegrated rock, large roots or other materials that are not integrally a natural component of good agricultural soils and which are harmful or not beneficial for successful plant growth.

3.3.6 Do not use topsoil containing frost or in an excessively wet (muddy) condition.

3.3.7 If utilizing existing material obtained from the initial excavation of the Work site for re-use as topsoil, Developer must first obtain approval from FCPW as to suitability of its content, including approval of location and method of storage of topsoil for re-use.

3.4 Seeding

3.4.1 Seeding shall be accomplished by Developer using a properly proportioned mixture of inoculated seed approved for use in "Zone One" as detailed in the GDOT's Standard Specifications. Seeding shall only be permitted in the specified planting season for "Zone One" for the specified mixture.

3.4.2 All seeded areas shall be uniformly mulched immediately after seeding.

3.4.3 Developer shall maintain all seeded areas to include mowing, watering and re-seeding any bare areas until a satisfactory stand of grass has been obtained and final acceptance of the Work has been received from FCPW.

3.4.4 Areas showing evidence of settlement or loss of topsoil shall be rebuilt and re-seeded as required.

3.4.5 In general, Developer shall replace existing maintained lawn areas with the same type of grass as was established prior to construction.

3.4.6 Any deviations or alternatives proposed due to unavailability of seasonal grasses or inappropriateness of seeding due to time of year must be presented to the FCPW Inspector in writing with signed authorization of the impacted homeowner(s).

3.5 Preparation of Seeded/Sod Areas

3.5.1 The subgrade for any areas to be seeded shall be brought to a uniform grade by Developer and shall be free of stones larger than one (1) inch, roots, gravel or other debris.

3.5.2 Where topsoil is required by FCPW, the topsoil shall be uniformly graded, trimmed and raked free of unsuitable materials, ridges, bumps or depressions.

3.5.3 Over this area, Developer shall spread agricultural lime at the rate of one hundred (100) pounds per one thousand (1,000) square feet and shall spread a general fertilizer uniformly on the surface of the ground at a rate of thirty-five (35) pounds per one thousand (1,000) square feet.

3.5.4 The lime and fertilizer shall be mixed uniformly into the top four (4) inches of the soil using suitable harrows, tillers or other mechanical equipment.

3.6 Sod Removal/Replacement

3.6.1 On all well established and "sod" type lawns, the Developer may at his discretion, utilizing suitable sod cutting equipment, cut the sod into rolls, carefully remove and store the sod, and water and maintain the same in a viable condition for replacement after backfill.

3.6.2 Any such sod removed and replaced in this manner must be demonstrated to be living to the FCPW Inspector prior to final acceptance of project.

3.6.3 If sod is to be replaced with "new" sod, Developer shall only replace using sod of the same type as that removed.

3.6.4 Any deviations or alternatives proposed due to unavailability of seasonal grasses must be presented to FCPW Inspector in writing with signed authorization of impacted homeowner(s).

PART 4 CONSTRUCTION OVERSIGHT

4.1 General

4.1.1 When calling for an inspection, state whether it is preliminary, final or other specific type of inspection.

4.1.2 No approval of a project will be granted by FCPW until all inspections are conducted, all defects addressed, and all appropriate documents have been

received and accepted. Letters of preliminary and final inspection/approvals will be sent to Developer by FCPW and placed in Department files.

4.1.3 Any damage to the existing system occurring during construction activities shall be promptly reported to the proper authorities so that proper action may be taken. All associated costs due to damages by Developer shall be borne by Developer.

4.1.4 Cleaning of a newly installed system prior to inspection/approval shall not impair and/or damage an existing system.

4.1.5 Jobsites shall be landscaped to an equal and satisfactory condition as presented prior to start of construction activities.

4.2 Inspection Prior to Installation

4.2.1 Pipe shall be inspected and tested at the mill or warehouse by an independent testing laboratory to determine conformity with the requirements of ASTM standards. Signed and dated certificates stating results of inspection and tests shall be filed with FCPW.

4.2.2 Prior to lowering pipe and appurtenances into the trench, a field inspection may be conducted.

4.2.3 Inspections shall be as described in Section 1 Part 5 and Part 6 for pumping station approval and acceptance.

SECTION 11
FINAL APPROVAL

PART 1 GENERAL

1.1 Final pump station approval and acceptance shall follow the requirements set in Section 1, Paragraph 5.5 of these Design Guidelines.

1.2 Final pump station approval and acceptance submittals shall follow the requirements set in Section 1, Paragraph 6.4 of these Design Guidelines.

1.3 The Final Plat will be signed by FCPW after the following items have been submitted by Developer and accepted by FCPW:

1.3.1 Completion of installation, inspection(s) and testing(s) per FCPW:

1.3.1.1 Construction Project Log.

1.3.1.2 Signed record drawings.

1.3.1.3 Completed Construction Completion Form.

1.4 An Parcel will be created around the pump station site at time the Final Plat is recorded

PART 2 FORCE MAIN CONSTRUCTION COMPLETION FORM

2.1 Developer is to provide FCPW Inspector with Force Main Acceptance Report.

2.2 FCPW will send the “Construction Completion Form” once the as-built drawings are approved.

2.3 Developer must complete and submit the “Construction Completion Form” to FCPW prior to final plat approval.

2.4 A copy of the form is provided in Appendix A.

PART 3 RECORD DRAWINGS

3.1 Record drawings (as-builts) must be submitted to FCPW before a project can receive final approval and/or Certificates of Occupancy.

3.1.1 In order to avoid delays in the "approval process" of developments/ subdivisions, as-built drawings should be submitted as soon as the pumping station and/or force main installations are complete to allow sufficient time for review.

3.1.2 As-built drawing set shall be stamped and submitted in PDF format.

3.2 Record drawings must be sharp, clear, clean, legible and submitted on 22”x34” plain paper and the electronic AutoCAD files shall be submitted on USB flash drives.

3.3 The AutoCAD files shall follow the format and requirements presented in Appendix A – Fulton County As-Built CAD Standards of Section 01 78 38 – Record Documents of the “Fulton County Wastewater System Standard Specifications.” The files shall also contain x, y, and z coordinates for the appurtenances using the County’s approved coordinate plane.

3.4 Record drawings shall include a site plan and any supplemental or shop drawings as may be required by FCPW.

3.5 One (1) complete set of record drawings and one (1) copy of the electronic files shall be submitted by Developer or Developer’s Engineer of Record to FCPW for review and approval.

3.6 Two (2) sets of record drawings shall be submitted to FCPW after final approval.

3.7 Record drawings shall be stamped and signed by a Professional Engineer and/or Registered Land Surveyor licensed in the State of Georgia.

3.8 Refer to Section 13, Part 5 for additional requirements.

PART 4 GUARANTEE OF WORK

4.1 The Contractor shall provide a two (2) year comprehensive guarantee of work from the date of final acceptance (from date of final plat approval or Certificate of Occupancy in private developments).

4.1.1 The force mains, appurtenances, pump stations, trenches, roadway and surface restorations, landscaping, and any other areas disturbed by the construction of the project, to be free from defects and to be installed in compliance with the regulations, specifications, plans, directions and construction practices that govern said installations.

4.1.2 Developer shall be responsible for repairs to any leaking pipe, fittings, etc.

4.1.3 Should trenches settle during the guarantee period, Developer shall promptly furnish and place fill to the original grade and restore any damaged landscaping.

4.1.4 Should any leaks or trench settlement occur under new pavement, the Developer shall be held responsible for the cost of the permitting, traffic control, repairs, testing, temporary water to customers, including pavement replacement at the Developer’s expense.

4.2 The determination of the requirement for the Developer to perform work under this guarantee shall be at the sole discretion of FCPW.

4.3 If a project requires a series of pump stations, the guarantee of work period for all stations shall extend until the guarantee period for the last pump station expires.

SECTION 12
DESIGN DOCUMENTATION

PART 1 GENERAL

1.1 The following items shall be included with the Design Development Report and Final Design documents.

PART 2 DOCUMENTS REQUIRED

2.1 Geotechnical Reports and subsurface evaluations

2.2 Survey data

- 2.2.1 Topographic
- 2.2.2 Property lines & Easements

2.3 Phase 1 Environmental Assessment

2.4 Structural calculations

2.5 Utility Availability and Sizes

- 2.5.1 Electric
- 2.5.2 Water
- 2.5.3 Natural Gas

2.6 Electrical and power capacities

- 2.6.1 Connected loads
- 2.6.2 Utility
  - 2.6.2.1 Ultimate capacity available
- 2.6.3 Generator
  - 2.6.3.1 Total available generator capacity

2.7 Station Hydraulics

- 2.7.1 Station design flows
  - 2.7.1.1 Minimum, Average and Max Day
  - 2.7.1.2 Maximum Month
  - 2.7.1.3 Peaking factors
- 2.7.2 Station System Curves consisting of:
  - 2.7.2.1 Maximum static lift & worst pipe friction

2.7.2.2 Maximum static lift & best pipe friction

2.7.2.3 Lowest static lift & best pipe friction

2.7.2.4 Preliminary pump curves overlaid on the system curves

2.7.3 Pipeline design

2.7.3.1 Gravity

2.7.3.2 Force main

SECTION 13

CONSTRUCTION OBSERVATION, START-UP, TESTING, & RECORD DOCUMENTS

PART 1 GENERAL

1.1 Developer is responsible for installation and maintenance of all erosion control measures until expiration of two-year warranty period. Developer shall remove silt fence and other non-permanent erosion control measures at that time or before if directed by FCPW.

1.2 FCPW will not sign off on the final subdivision plat without the pump station being complete:

1.2.1 All associated fees have been collected.

PART 2 CONSTRUCTION OBSERVATION

2.1 The FCPW Inspector will coordinate with Developer's Contractor to review the construction and installation of the pump station and force main. Reviews and approvals of items of work by the FCPW Inspector are for general conformance with the requirements of these standards and the approved plans. In no way does the review and approval of an item of work relieve Developer of his responsibility to comply with all building codes, safety standards and environmental regulations.

2.2 Items of Work to be reviewed by Engineer of Record during the construction of the pump station and force main include:

2.2.1 Subgrade compaction testing.

2.2.2 Backfill compaction testing.

2.2.3 Pipe restraints.

2.2.4 Duct bank installation.

2.2.5 Driveway and pad subgrade.

2.2.6 Concrete reinforcement placement.

2.2.7 Concrete strength testing.

2.2.8 Structure leakage.

2.2.9 Electrical and I&C checkout and testing.

2.2.10 Pump checkout and testing.

2.3 Developer must notify FCPW Inspectors a minimum of 5 business days, which is minimum for all inspections, in advance of the activities to be inspected.

2.4 FCPW Inspectors are responsible for approval of items reviewed. Results of compaction testing, if required, must meet minimum specifications.

2.5 FCPW's failure to inspect does not relieve Developer of performing and documenting necessary inspection and testing.

PART 3 START-UP

3.1 The required force main tests must be complete and accepted by FCPW Inspectors prior to scheduling a start-up (See Testing below).

3.2 To schedule a start-up, call the FCPW Inspector a minimum of 5 business days in advance. See Appendix A for Pump Station Start-Up Checklist and specifications for detail requirements. Pre-start-up check sheet must be signed, completed and received by the FCPW Inspector 5 business days before start-up. The check sheet may be emailed to the FCPW Inspector.

3.3 All utilities must be working (i.e., water, electric, telephone and gas, if applicable). All utility information shall be brought to the start-up. Required information includes account numbers, phone numbers and any letters or tests performed which require written documentation (e.g., letter of compaction, 4-hour load bank test on generator, coatings dry & wet mill test, leak test of wet well, etc.).

3.4 The following personnel shall be on site during start-up:

3.4.1 General contractor or Developer

3.4.2 Electrical contractor

3.4.3 Pump manufacturer

3.4.4 Generator manufacturer

3.4.5 FCPW Inspector

3.4.6 FCPW pump station personnel

3.4.7 Design Engineer

3.4.8 Electrical Engineer.

3.4.9 Odor Control Manufacturer

3.5 A demonstration that the submersible pumps can be removed and installed in the wet well without special equipment or manipulation must be performed at the time of start-up.

3.6 A demonstration that the generator is capable of providing the required power with all installed equipment operating simultaneously must be performed at the time of start-up. Provide power failure test on the system.

3.7 A letter from the pump manufacturer stating the pumps are ready to be started and operated is required prior to operating the pumps.

3.8 All spare parts and O&M manuals including, but not limited to, O&M manuals for pumps and generator shall be provided to the County prior to start-up.

3.9 Keys for the generator shall be left in the transfer switch.

3.10 Flowmeter shall be used for pump testing.

PART 4 TESTING

4.1 Force Main

4.1.1 Prior to acceptance of the force main, Developer shall test the force main in accordance with the requirements of these Guidelines.

4.1.2 Force mains shall be subjected to a minimum test pressure equal to 150 percent of the total dynamic head or 100 psi (whichever is greater) for a minimum of two hours. The test shall be performed using potable water. (Use of a fire Hydrant requires a fire hydrant meter to be rented from local water utility). The entire force main pressure test must be witnessed and approved by the FCPW Inspector. The test shall be performed from the check valve vault to the discharge manhole. No leakage will be allowed

4.1.3 To schedule a test, Developer shall notify the FCPW Inspector at a minimum of 5 business days in advance. The inspector shall determine the test pressure and gauge location. Developer shall remove, valve off, or otherwise protect any equipment that might be damaged by the pressures used in the test. All piping shall be securely anchored prior to the test. Pipe laid in trenches shall be backfilled. Joints, fittings and valves may be left exposed to be examined during the test.

4.1.4 Before applying the test pressure, all air shall be expelled from the pipe through installed air release valves. Combination air release valves shall be available at high points.

4.1.5 The approval of the force main installation and pressure test by the FCPW Inspector shall become a part of the overall pump station/force main system approval.

4.1.6 Developer shall bear the complete cost of the test including temporary plugging and blocking, water usage and the repair of all leaks.

4.1.7 If a section of the force main fails, the pressure test Developer will be required to pay a re-inspection fee as determined by the FCPW Inspector prior to each additional retest required.

4.1.8 A copy of the Pressure Test Form is provided in Appendix A.

4.2 Pump Station

4.2.1 Prior to acceptance of the pump station, Developer shall conduct performance tests on all pumps and equipment provided in accordance with

the requirements of these Guidelines to demonstrate compliance with the specified performance requirements.

4.2.2 Pumps shall be individually operated at all specified operating conditions.

4.2.2.1 Developer and pump manufacturer shall coordinate to provide the means to recirculate pumped fluid.

4.2.2.2 Alternatively, throttle the pumps to achieve the specified head at specified flow.

4.2.3 No testing of the pumps will be permitted until the force main has been tested and accepted by the FCPW Inspector.

4.2.4 The following personnel shall be present on site during pertinent testing:

4.2.4.1 General contractor or Developer

4.2.4.2 Electrical contractor

4.2.4.3 Pump manufacturer

4.2.4.4 Generator manufacturer

4.2.4.5 FCPW Inspector

4.2.4.6 FCPW pump station personnel

4.2.4.7 Design Engineer

4.2.4.8 Electrical Engineer

4.2.4.9 System integrator

4.2.4.10 Odor control manufacturer

4.2.5 Tests to Conduct include:

4.2.5.1 Pump performance (flow and head) tests.

4.2.5.2 Automatic switchover to backup power.

4.2.5.3 Generator load bank test.

4.2.5.4 Remote Telemetry Unit Operation.

4.2.5.5 Remote Telemetry Unit Communication Test.

4.2.5.6 Pump control system.

4.2.6 Pump station will be accepted when proven to meet the design flow and head requirements and all components operate properly for a minimum of 4 weeks, as determined by FCPW pump station personnel.

4.2.7 Equipment supplier to provide within their price all labor and effort to support Pre-operational Check Out, Functional Testing and Start-Up Testing. Developer shall provide temporary flow meters and pressure gauges as necessary

4.3 Remote Telemetry Unit

4.3.1 All elements of the RTU hardware shall be tested to demonstrate that the total system satisfies all of the requirements of these Guidelines. System Integrator (SI) shall coordinate all tests with FCPW. SI shall notify FCPW two weeks in advance of any tests.

4.3.2 As a minimum, the testing shall include the following:

4.3.2.1 Functional onsite acceptance test.

4.3.3 Each test shall be in the cause-and-effect format. The person conducting the test shall initiate an input (cause) and upon the systems or subsections producing the correct result (effect), the specific test requirement will have been satisfied. Each of the inputs or conditions shall be tested:

4.3.3.1 Digital Inputs.

4.3.3.2 Digital Outputs.

4.3.3.3 Analog Inputs (minimum scale, midscale and maximum scale).

4.3.3.4 Power Faults.

4.3.3.5 Communication Faults.

4.3.4 All tests shall be conducted in accordance with, and documented on, prior Engineer-approved procedures, forms and checklists. Each specific test to be performed shall be described and a space provided after it for sign off by the appropriate party after its satisfactory completion.

4.3.5 Copies of these sign off test procedures, forms and checklists will constitute the required test documentation.

4.3.6 Provide all special testing materials and equipment.

4.3.7 Functional Onsite Acceptance Test :

4.3.7.1 Tests shall be witnessed by FCPW and System Integrator.

4.3.7.2 Tests shall demonstrate specified functions, both hardware and software, to the satisfaction of FCPW.

PART 5 RECORD DOCUMENTS

5.1 Developer shall maintain on the project site an updated set of record drawings. These drawings must be the latest revision and match that of the FCPW Project Inspector.

5.2 Developer’s Design Engineer shall submit as-built drawings upon completion of construction and acceptance of the pump station and force main by FCPW. Surveying shall be performed by the Design Engineer to assure elevations and placement of appurtenances on as-builts are correct.

5.3 **Two (2) sets** of pump station and force main as-built plans shall be submitted to FCPW prior to scheduling a start-up, and a digital copy on a flash drive. As-built plans must be approved by FCPW prior to conducting a start-up. An exception to this procedure may only be made if approval is given by FCPW. Allow two weeks for review.

5.4 Pump station and force main as-built plans shall include an original signed and dated stamp of a Professional Engineer (registered in the State of Georgia). Updated design calculations must also be submitted with as-builts.

5.5 Pump station and force main as-built drawings shall reflect the structures as they are actually installed. The as-builts should be completed from the approved construction drawings with redlines of construction changes, as well as notations of all variances from the approved plans.

5.6 As-built drawings shall include GPS coordinates for valves, fittings and other above grade appurtenances and elevation of top of force main at least every 100 feet or as directed by the FCPW Inspector.

5.7 A single line electrical drawing showing power distribution for the station shall be included in the as-built drawings.

5.8 If any changes were made to the force main route, wet well depth or pumps after the submitted plans were approved, new design calculations must be submitted with the as-built plans.

5.9 Submittals.

5.10 Construction Reports.

5.11 Equipment field tests.

5.11.1 Pumps, generator, I&C, electrical, etc.

5.12 Final pump system and pump curves based on as-installed configuration.

PART 6 OPERATION AND MAINTENANCE MANUAL

6.1 Developer shall prepare and submit a minimum of two (2) hard copies and one (1) searchable electronic copy of the Pump Station and Force Main Operation and Maintenance (O&M) Manual to FCPW.

6.2 Electronic O&M manuals copies shall be in PDF format and drawings are to be in AutoCAD (current Version as utilized by FCPW). O&M Manuals shall contain the following constituents:

6.2.1 Technical Data

6.2.2 Performance curves and Operation Elevations

6.2.3 Pump Outline Drawings

6.2.4 Control Drawings and Data

6.2.5 Submittal Drawings

6.2.6 Access Frame Drawings

6.2.7 Redline As-Built Drawings

6.2.8 Equipment Installation Guides

6.2.9 Technical Manuals

6.2.10 Specifications

6.2.11 Parts Lists

6.2.12 Equipment Usage Instruction Manuals

6.2.13 Applicable Printed Warranty

6.2.14 Manufacturer's Equipment Storage Instructions

6.2.15 Recommended Start-up Procedure Data Form

6.3 The O&M manuals are also to contain, the following information:

6.3.1 Approved shop drawings, including design data for all installed equipment and each major component, and a pump curve/system curve analysis showing the design operating points.

6.3.2 P&ID and Control panel wiring diagrams.

6.3.3 Warranty information for all installed equipment and each major component.

6.3.4 Inventory, functional descriptions and complete operating instructions and troubleshooting for all installed equipment and each major component.

6.3.5 Instructions for start-up/shut-down as well as for calibration and adjustment of all installed equipment and each major component.

6.3.6 Recommended maintenance management system, including preventative and predictive maintenance, for all installed equipment and each major component.

6.3.7 Contingency plan and analysis of critical safety issues.

6.3.8 Contact information for local service companies as well as instructions for replacement of all installed equipment and each major component.

6.3.9 Contact information for local contractors capable of performing emergency repairs.

6.3.10 Contact information for regulatory and other agencies.

6.3.11 A spreadsheet of the contract information shall be provided for entry into the asset management system.

APPENDIX A

FORMS AND CHECKLISTS

FULTON COUNTY

FORMS AND CHECKLIST SANITARY SEWER PUMP STATION AND FORCE MAIN	
DETAIL NUMBER	**TITLE**
A-1	PUMP STATION AND FORCE MAIN DESIGN REVIEW CHECKLIST
A-2	PUMP STATION DESIGN CONCEPT REVIEW FORM
A-3	PUMP STATION DESIGN REVIEW FORM
A-4	PUMP STATION DESIGN CALCULATION FORM
A-5	FORCE MAIN DESIGN PLAN CHECKLIST
A-6	ENGINEER'S CERTIFICATE CONSTRUCTION COMPLETION FORM
A-7	PUMP STATION AND FORCE MAIN STARTUP-READINESS CERTIFICATION
A-8	WASTEWATER AS-BUILT CHECKLIST
A-9	RELEASE FOR FORCE MAIN CONSTRUCTION FORM
A-10	REQUEST FOR EXCEPTION/CHANGE TO PUMP STATION CONSTRUCTION FORM
A-11	GEORGIA DEPARTMENT OF TRANSPORTATION CHECKLIST
A-12	MINIMUM INFORMATION REQUIRED FOR GUPS UTILITY PERMIT APPLICATION
A-13	PRESSURE TEST FORM

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN DESIGN REVIEW CHECKLIST		
PROJECT NAME:		DATE
PROJECT NUMBER:		
PROJECT ADDRESS:		REVIEW No.:
LAND LOT:	DISTRICT/SECTION:	
ENGINEER NAME:		
ENGINEER PHONE & EMAIL:		REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:		
CONTRACTOR/DEVELOPER PHONE:		
CONTRACTOR/DEVELOPER EMAIL:		

The engineer is referred to the Fulton County Public Works "Sanitary Sewer Pump Station and Force Main Design Guidelines".

This checklist is intended to be a guide in preparing the pump station and or force main plans. This checklist is not all compassing. It is left to the Engineer's discretion to decide what additional information may be needed to complete the plans. Approval of plans does not relieve the contractor of meeting the FCDPW "Sanitary Sewer Pump Station and Force Main Design Guidelines".

CHECKLIST PROCEDURES

1. ADDRESS THE CORPORATE COMMENTS MARKED IN RED.
2. RESPOND ON CHECKLIST IN GREEN TO INDICATE COMMENT WAS ADDRESSED.
3. MENTION DRAWING NUMBER WHERE COMMENT WAS INCORPORATED.
4. PLACE ALL LIFT STATION DRAWINGS IN ONE LOCATION.
5. RETURN CHECKLIST, RED LINE PLANS AND REVISED PLANS THE REVIEWER.

NOTE: All design drawings and associated calculations, are to be sealed, signed and dated by a Georgia–Licensed Professional Engineer.

ALL SHEETS

- ☐ Final plans shall be on 22" X 34" paper sheets.
- ☐ Each sheet except the cover sheet shall have a title block in the lower right corner containing:
  - ☐ Project name
  - ☐ Project number (if a Fulton County project)
  - ☐ Sheet number
  - ☐ Total number of sheets
  - ☐ Scale
  - ☐ Drawer's, Designer's and Checker's initials, and date
  - ☐ Date (month/day/year)
- ☐ All sheets shall be sealed, signed and dated by a Civil Engineer licensed in the State of Georgia.

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN DESIGN REVIEW CHECKLIST		
PROJECT NAME:		DATE
PROJECT NUMBER:		
PROJECT ADDRESS:		REVIEW No.:
LAND LOT:	DISTRICT/SECTION:	
ENGINEER NAME:		
ENGINEER PHONE & EMAIL:		REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:		
CONTRACTOR/DEVELOPER PHONE:		
CONTRACTOR/DEVELOPER EMAIL:		

COVER SHEET

The Engineer shall provide a cover sheet with the following information:

- ☐ Project name
- ☐ Drawing Index which provides sheet number and a description of the corresponding sheet
- ☐ Table of Quantities such as Pipe, MH's, etc.
- ☐ Vicinity Map
- ☐ District and Land Lot number
- ☐ Engineering firm's name, address and telephone number
- ☐ Developer's name, address and telephone number
- ☐ Date (month/day/year)
- ☐ Signature Approval Blocks

SHEET 2

The Engineer shall provide a general sheet containing the following information:

- ☐ General notes covering important parameters as outlined in the FCPW "*Sanitary Sewer Pump Station and Force Main Design Guidelines*".
- ☐ Other notes as necessary to cover situations not covered by the Design Standards or by the FCDPW Standard Details.
- ☐ Legend showing symbols and line types used within the drawings.
- ☐ Engineering's firm title block containing firm's name, address, and phone number.
- ☐ Elevation datum and benchmark information in State Plane Coordinates.
- ☐ Note to be shown on plan: Contractor shall notify Fulton County Public Works Inspector 5 business days prior to start of Construction.

PUMP STATIONS GENERAL

- ☐ Pump Station Service Area Map clearly showing basin delineation of the area draining to the pump station by gravity.
- ☐ Show all offsite areas that have the potential to discharge to the proposed pump station. Provide calculations used to determine offsite flows.
- ☐ Pump Station Driveway Plan & Profile.
- ☐ Non-standard, but structures approved to be built.
- ☐ Pump Station Gravity Sewer Influent Profile.

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN DESIGN REVIEW CHECKLIST	
PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONTRACTOR/DEVELOPER PHONE:	
CONTRACTOR/DEVELOPER EMAIL:	

PUMP STATIONS GENERAL (Continued)

- ☐ Pump Station to be located at the lowest point of the basin. Show ground contours and 100-year and 500-year flood contour as well as 25 foot and 75 foot stream buffers (if applicable).
- ☐ Average Daily Flow (ADF) to be calculated based on Sanitary Flow Contribution numbers specified in the table provided in FCDPW "*Sanitary Sewer Pump Station and Force Main Design Guidelines*".
- ☐ Capacity Calculations for the receiving downstream sewer, to justify it is not capacity limited.
- ☐ Install Safety Placards for all pump station structures and equipment as per OSHA standards. Show details on standard detail drawings for contractor to follow.
- ☐ Install station identification signs, including name and emergency contact information. Show details on standard detail drawings for contractor to follow.
- ☐ Refer to "*Sanitary Sewer Pump Station and Force Main Design Guidelines*".

PUMPS AND WET WELL

- ☐ Pumps to be manufactured by an approved vendor.
- ☐ System Head Curve for different "C" values for new and aged pipe conditions.
- ☐ Pump details, specifications and shop drawings as per standards. Explosion proof Submersible variable Speed Pumps shall be used.
- ☐ Pump size and dimensions, as part of pump schedule.
- ☐ Pump clearances between pump-to-pump and pump-to-sidewall, and pump-to-hatch as per manufacturer's recommendation. Show all dimensions on wet well cross section.
- ☐ Wells shall be cylindrical with a minimum 8-foot diameter.
- ☐ Rectangular wet wells may be allowed upon approval.
- ☐ Minimum depth of wet well to be 8 feet.
- ☐ Indicate high and low ground water elevations. Provide anti-flotation calculations.
- ☐ Indicate Pump Control Elevations in the Wet Well for the following conditions: High Level Alarm, Lag Pump On, Lead Pump On, Pumps Off, and Low-Level Alarm.
- ☐ Mark Storage Volume above the high-level alarm and up to the lowest point of overflow. This volume shall be greater than or equal to volume generated over three hours at peak design flow. Backflow of sewage into manholes upstream of the wet well is not permitted. In lieu of storing the total three-hour peak flow volume within the wet well.

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN DESIGN REVIEW CHECKLIST		
PROJECT NAME:		DATE
PROJECT NUMBER:		
PROJECT ADDRESS:		REVIEW No.:
LAND LOT:	DISTRICT/SECTION:	
ENGINEER NAME:		
ENGINEER PHONE & EMAIL:		REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:		
CONTRACTOR/DEVELOPER PHONE:		
CONTRACTOR/DEVELOPER EMAIL:		

PUMPS AND WET WELL (Continued)

- ☐ Provide calculations to justify adequacy of storage volume provided in the Wet Well. Overflow Vault calculations shall be provided if the County has approved an Overflow Vault for use. Entry hatch shall be large enough to remove pumps for servicing.
- ☐ No ladders shall be permitted in wet well.
- ☐ Provide hoist for equipment outside the wet well.
- ☐ Sump to be designed as per manufacturer's recommendation for a specific pump; however, wet well floor shall have a minimum slope of 1:1 to the hopper bottom.
- ☐ Only one sewer line to enter the wet well.
- ☐ Electric connections in the wet well shall be explosion proof.

VALVE & METER COMBINED VAULT

- ☐ Valve details, specifications, and shop drawings.
- ☐ Minimum 12 foot by 6 foot in size.
- ☐ Combined Vault shall be below grade, but adjacent to the wet well, have a 2% sloped concrete floor with sump, concrete side walls and aluminum hatches.
- ☐ Check Valves to be placed upstream of Shut-off Valves.
- ☐ Pressure Gauge Taps with diaphragm mounted seals shall be located on each pipe upstream of the check valve.
- ☐ Flow meter details, specifications, and shop drawings.
- ☐ Flow meter to be installed downstream of valves, minimum straight pipe length upstream and downstream of the meter shall be based on manufacturer's recommendations and meter sizes.

GENERATOR

- ☐ Standby Generator details, specifications, and shop drawings.
- ☐ The standby generator shall have adequate capacity to run a pumps, equipment, lifting hoist, lighting, telemetry, etc. simultaneously. The engineer shall provide submittals to justify adequate capacity for review and approval by FCDPW.
- ☐ Automatic Transfer Switch specifications and shop drawings.
- ☐ Automatic Transfer Switch to be rated for 100% of full load and placed in a NEMA 4X enclosure. Power outage, phase loss, or low voltage, shall be experience for 30 seconds before the station is switched to generator power.

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN DESIGN REVIEW CHECKLIST	
PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONTRACTOR/DEVELOPER PHONE:	
CONTRACTOR/DEVELOPER EMAIL:	

GENERATOR (Continued)

- ☐ Generators shall meet all new EPA air emission standards, and be equipped with auxiliary systems, such as batteries, battery charger, block heater, etc.
- ☐ Generators are to be installed to operate on natural gas if available.
- ☐ Leak detection device in the interstitial space for sensing fuel leakage. This device to be connected to generator telemetry.
- ☐ Provide Generator Calculations.

TELEMETRY

- ☐ Telemetry equipment details, specifications, and shop drawings.
- ☐ Telemetry system to be capable of sending signals to personnel 24 hours per day, 365 days per year.
- ☐ Standard system is Mission SCADA MyDro 850.

ELECTRICAL

- ☐ All Electrical Systems to comply with NFPA 70, "National Electric Code", NFPA 820 "Standard for Fire Protection in Wastewater Treatment & Collection Facilities", ANSI, as well as applicable federal, state and local codes.
- ☐ Include Electrical Legend on plans.
- ☐ Include labels on all electrical enclosures interior/exterior as required by code.
- ☐ Include Wiring Schedule on plans.
- ☐ Include the following warning sign in bold on plans:

  "Lock out all power while working on any equipment to avoid electrical shock or equipment activation."
- ☐ Main Power Feed to be above-grade, disconnect switch.
- ☐ Incoming Electrical Service to be equipped with Surge Protection installed in a NEMA 4X enclosure.
- ☐ Surge Suppressor shall be U.L. listed and labeled under UL 1449 and UL 1283. See "*Sanitary Sewer Pump Station and Force Main Design Guidelines*"
- ☐ Single Line Electrical Drawing showing power distribution for the proposed pump station, including pump control panel detail.
- ☐ Pump Station Power Riser Diagram.
- ☐ Electrical Conduits shall be at a minimum as stated within "*Sanitary Sewer Pump Station and Force Main Design Guidelines*"

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN DESIGN REVIEW CHECKLIST	
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PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONTRACTOR/DEVELOPER PHONE:	
CONTRACTOR/DEVELOPER EMAIL:	

ELECTRICAL (Continued)

- ☐ VFDs required for pumps greater than or equal to 20 horsepower rating and reduced voltage starters for less than 20 hp.
- ☐ Electrical enclosures, Switching Gears, and Conduits shall be outside the Wet Well area, and protected from vehicular traffic and flooding.
- ☐ Provide for electrical control panels 5'W x 8'H x 24'L awning and trim, 8" to 10" base plates on vertical supports. Four vertical supports front side, four vertical supports back side.

INSTRUMENTATION AND CONTROLS

- ☐ Wastewater levels within wet wells to be detected through the use of submersible pressure level transducer as primary and ultrasonic transducer as backup. No float switches will be allowed for pump control.
- ☐ Pump Station Control & Instrumentation Riser Diagram
- ☐ Phase monitor to be connected to the PLC for monitoring and remote indication of open phase/phase reversal condition.
- ☐ Allen Bradley Programmable Controller to control and monitor all pump station functions.
- ☐ Human Machine Interface (HMI) requirements to be fulfilled by pre-approved system integrator.
- ☐ Connect HMI to PLC.
- ☐ Provide separate NEMA 4X Stainless Steel enclosure for controls. Controls and electrical may not share the same cabinet.
- ☐ Refer to "*Sanitary Sewer Pump Station and Force Main Design Guidelines*" for Pump Station I/O List. *Sanitary Sewer Pump Station and Force Main Design Guidelines*
- ☐ Electrical Grounding & Bonding Riser Diagram for all components as per National Electrical Code, local codes and ordinances.

LIGHTS

- ☐ Lighting plans to include location, type and power distribution.
- ☐ Outside Lighting Control Schematic.
- ☐ Install at least two 120 Volt LED Security Lights on Break Down Poles (quantity to be determined based on site layout.) Pole to be aluminum and light to turn on automatically with motion at night

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN DESIGN REVIEW CHECKLIST	
PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONTRACTOR/DEVELOPER PHONE:	
CONTRACTOR/DEVELOPER EMAIL:	

FORCE MAINS

Plan view shall show to proper scale. Scale shall not be more than:

- ☐ Plan: 1 inch 50 feet

Profile: Horizontal: 1 inch = 50 feet

Vertical: 1 inch = 10 feet

- ☐ Plan view shall show the following:
  - ☐ All streets, alleys and easements. They shall be dimensioned at least once and at breaks. Streets shall be identified by name.
  - ☐ All abutting lots shall be identified by lot number, tract and subdivision.
  - ☐ All topography within and to at least five (5) feet beyond easements and topography affected by construction shall be shown.
  - ☐ Location of all above underground utilities, including storm and sanitary sewers, water lilies, dry wells, buried telephone lines natural gas, power, and cables. Existing utilities shall be shown as dashed lines or faded lines with type, size, and other available information called out.
  - ☐ All structures, paving and other topographic features within the vicinity, such as trees, shall be shown and identified by name, size and type.
  - ☐ Location of proposed force main lines and appurtenances. Items shall be identified by name and number, size, and type, and stations.
  - ☐ Location of all existing and proposed easements.
  - ☐ Location of all existing benchmarks shall be shown and identified by type.
  - ☐ Location of all connections to existing sewer lines.
  - ☐ Show horizontal clearance from buildings, structures, drainage culvert, and water mains.
  - ☐ Show tie in points to FCDPW existing system.
  - ☐ Location of soil boring holes.
  - ☐ All sheets shall have a north arrow orienting the plan view.
- ☐ Profile view shall show the following:
  - ☐ Existing utilities which cross the proposed utility. Identify crossing utility by name, pipe size, pipe material, type of utility (use) location (station), and elevation. Location and elevation are to be obtained from “as-built” plans paying particular attention to any differences in datum.

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN DESIGN REVIEW CHECKLIST		
PROJECT NAME:		DATE
PROJECT NUMBER:		
PROJECT ADDRESS:		REVIEW No.:
LAND LOT:	DISTRICT/SECTION:	
ENGINEER NAME:		
ENGINEER PHONE & EMAIL:		REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:		
CONTRACTOR/DEVELOPER PHONE:		
CONTRACTOR/DEVELOPER EMAIL:		

FORCE MAINS (Continued)

NOTE: Any and all existing underground utilities shown on profile are assumed to be shown in approximate location only.

- ☐ All force mains require a profile.
- ☐ Show existing ground and proposed ground.
- ☐ Show manhole number, station, rim, and invert elevations.
- ☐ All appurtenances such as valves, vaults, fittings and restraints. Identify by name, size, type, station and elevation.

- ☐ All sheets shall show match lines labeled as such with station and sheet number.
- ☐ Proposed force mains shall be shown as solid lines with sizes, slope, material, and pipe classes called out. For example: 8 inch HDPE – DR11.
- ☐ Show any lift stations adjoining the gravity sanitary sewer system.
- ☐ Force main, including the pump discharge through the meter and valve vault, shall be constructed using High Density Polyethylene (HDPE) pipe and fittings.
- ☐ Provide Tracker Tape on force main pipes and gravity sewer lines to facilitate accurate locating in the future.
- ☐ Provide Locator Ball at all fittings along all force mains and gravity sewer lines.
- ☐ Provide valve with Quick Connect for a bypass pump (to be used in case of complete pump station failure).
- ☐ Include calculations to demonstrate that velocity of flow in the force main is a minimum of 3 feet per second and maximum of 6 feet per second.
- ☐ Force mains cannot be installed in lieu of gravity sewers to convey flow downhill to an existing receiving sewer.
- ☐ Provide isolation valve on the force main just beyond and flow meter vault.
- ☐ Cross section of the receiving structure as well as pertinent details such as inverts of all pipes, pipe sizes, pipe material, benching, ground elevation, top elevation, notes, etc.

DETAIL SHEETS

- ☐ Include FCPW "*Sanitary Sewer Pump Station and Force Main Design Guidelines*" to be used on the project.
- ☐ Include any other details specific to the project that are not covered by FCPW "*Sanitary Sewer Pump Station and Force Main Design Guidelines*"
- ☐ Detail sheets shall be located at the end of the plan set and referenced where used.

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN DESIGN REVIEW CHECKLIST		
PROJECT NAME:		DATE
PROJECT NUMBER:		
PROJECT ADDRESS:		REVIEW No.:
LAND LOT:	DISTRICT/SECTION:	
ENGINEER NAME:		
ENGINEER PHONE & EMAIL:		REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:		
CONTRACTOR/DEVELOPER PHONE:		
CONTRACTOR/DEVELOPER EMAIL:		

ODOR CONTROL

- ☐ Odor Control equipment details, specifications, and shop drawings.
- ☐ Wet well 4-inch vent to an Odor Control system, with vent cover on to of system.
- ☐ Odor Control is required for pump stations constructed within 40 feet of the residence.

SITE DESIGN

- ☐ Pump Station shall be installed within a minimum 340 feet square parcel dedicated to Fulton County.
- ☐ Provide a 20-foot easement for force mains.
- ☐ Subgrade for pad, turnaround and access road, side slopes and any other features within the fence line must be compacted to a minimum of 95% Standard Proctor Compaction.
- ☐ Access Road and Turnaround to be constructed of concrete on a six-inch layer of 95% compacted aggregate base course.
- ☐ Provide fences 8 foot high with number 4 chain link wire fabric with top rails, bottom tension wires and 3 strands of barbed wire at the top on angled extension arms.
- ☐ Provide 20 foot wide (minimum) rolling gate on 6-inch diameter posts.
- ☐ Side slopes steeper than 3H:1V to be protected with juniper or FCPW approved equivalent.
- ☐ Minimum access road width to be 20 feet.
- ☐ Minimum turnaround radius to be 45 feet.
- ☐ Pump Station to be at least 2 feet above 25 feet horizontally away from the 100-year flood line as determined by the most recent FEMA Flood Insurance Rate Map, or as established by acceptable modeling techniques.

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN DESIGN REVIEW CHECKLIST	
PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONTRACTOR/DEVELOPER PHONE:	
CONTRACTOR/DEVELOPER EMAIL:	

CONTRACTOR NOTES (TO BE SHOWN ON PLANS)

- ☐ Contractor to ensure that Power Company notifies Technical Services of FCPW about the availability of 3-Phase Power and Voltage to the site. See Section 7 of the "Sanitary Sewer Pump Station and Force Main Design Guidelines".
- ☐ Demonstrate pumps will not cavitate freewheeling (operate at pump run-out), or deadheading (operate at pump shut-off). This type of operation shall not be allowed.
- ☐ Demonstrate minimum time between pump starts is 10 minutes.
- ☐ Provide 3 sets of Operation & Maintenance Manuals, 2 hard copies and 1 searchable electronic copy, to FCPW for the Generator and Automatic Transfer Switch.
- ☐ Demonstrate Generator is load tested at 100% full load on site for a period of four (4) hours.
- ☐ Demonstrate generators are capable of shutting down and activating the audible/visual alarms and telemetry if a damaging operating condition develops.
- ☐ Provide Stand-by Generator (Cummins or Caterpillar) specifications and shop drawings.
- ☐ Provide Automatic Transfer Switch specifications and shop drawings.
- ☐ Provide a 24-month (from date of commissioning) comprehensive warranty.
- ☐ Provide Telemetry equipment details, specifications, and shop drawings.
- ☐ Demonstrate Low-Level Alarm, Pumps-off, Lead Pump-on Lead Pump-off and High-Level Alarm settings are functional.
- ☐ The Contractor shall install and provide all equipment as well as conduct tests in accordance with "Fulton County Sanitary Sewer Pump Station and Force Main Design Guidelines"
- ☐ No underground fuel storage tanks shall be permitted.
- ☐ Contractor to install Safety Placards and warning Signs on all equipment as per OSHA standards.
- ☐ Contractor/Developer is responsible for complete writing and programming of the PLC and RTU.
- ☐ Contractor to obtain 480 Volts, 3 Phase Power at the pump station.

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
PUMP STATION DESIGN CONCEPT REVIEW FORM

PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
DEVELOPMENT NAME:	
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONT./DEV. PHONE & EMAIL:	

PUMP STATION SITE DATA

MUNICIPALITY		
ZONING	OF PROPOSED DEVELOPMENT	
	OF REMAINDER OF SUB-BASIN	
LAND USE	EXISTING	
	PROPOSED	
AUTHORITIES HAVING JURISDICTION	LAND DISTURBANCE PERMIT	
	WATER SUPPLY	
	D. O. T. (access road)	
AREA OF SITE (acres)		
AREA OF DRAINAGE BASIN (acres)		
IS THE SITE ALREADY DEVELOPED?		
IS THE OFFSITE AREA IN THE DRAINAGE BASIN ALREADY DEVELOPED?		
DISTANCE TO THE NEAREST GRAVITY SEWER (feet)		
DIFFERENCE IN ELEVATION BETWEEN THE LOWEST F.F.E. AND NEAREST GRAVITY SEWER (feet)		
LOCATION OF PROPOSED CONNECTION TO EXISTING SANITARY SEWER		

IS THE PROPOSED PUMP STATION SITE WITHIN THE FOLLOWING?	100-YEAR FLOODPLAIN		ELEVATION, ft
	500-YEAR FLOODPLAIN		ELEVATION, ft
	FEMA FLOODWAY		
	WETLANDS		

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS PUMP STATION DESIGN CONCEPT REVIEW FORM	
PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
DEVELOPMENT NAME:	
LAND LOT: DISTRICT/SECTION:	
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ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONT./DEV. PHONE & EMAIL:	

JUSTIFICATION THAT THE PROPOSED DEVELOPMENT REQUIRES A PUMP STATION

FLOW DATA

FLOW SOURCES - (Use additional sheets to show type, quantity, and flow per source)

ESTIMATED WASTEWATER FLOW TO PUMP STATION	ANNUAL AVERAGE DAILY FLOW		gallons / day
	PEAK DAILY FLOW		gallons / day
	PEAKING FACTOR USED		

REQUIRED ATTACHMENTS

- ☐ Proposed site located on a USGS Quadrangle map, with the proposed pump station location shown.
- ☐ The map shall show the limits of the proposed development and of the sub-basin that drains to the pump station.
- ☐ Location of proposed connection to receiving sanitary sewer.
- ☐ Projection of wastewater flows generated by the proposed development.
- ☐ Projection of wastewater flows generated in the remainder of the sub-basin.

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS PUMP STATION DESIGN REVIEW FORM	
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ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONT./DEV. PHONE & EMAIL:	

DESIGN DATA

PUMP DATA

Manufacturer's pump information including referenced curves to be provided.

QUANTITY OF PUMPS: _____

MANUFACTURER: _____

MODEL NUMBER: _____

IMPELLER DIAMETER: _____ CURVE NUMBER: _____

MOTOR HORSEPOWER: _____ SPEED (rpm): _____

SUCTION SIZE (inches): _____ DISCHARGE STZE (inches): _____

DRY-PIT SUBMERSIBLE: ☐ YES ☐ NO

OTHER FEATURES _____

PUMP CAPACITY DATA

Operating points to be identified on pump curves. System curves to be overlaid on pump curves.

A. INITIAL

1. RATED OPERATING CONDITION - PUMP MANUFACTURER GUARANTEED CONDITION

FLOW _____ gpm at HEAD _____ Ft

NPSH 3% _____ gpm at SPEED _____ rpm, at rated condition

LOCATION ON CURVE (AOR / POR) _____ EFFICIENCY (%) _____

2. CONDITION OF MAXIMUM PUMP SPEED AGAINST MINIMUM SYSTEM HEAD

FLOW _____ gpm at HEAD _____ Ft

NPSH 3% _____ gpm at SPEED _____ rpm, at rated condition

PPP LOCATED IN POR? ☐ YES ☐ NO EFFICIENCY (%) _____

LOCATED TO RIGHT OF BEQ? ☐ YES ☐ NO POWER (HP) _____

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS PUMP STATION DESIGN REVIEW FORM	
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ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONT./DEV. PHONE & EMAIL:	

3. CONDITON OF CONTINUOUS DUTY MINIMUM SPEED

FLOW ____ gpm at HEAD ____ Ft

NPSH 3% ____ gpm at SPEED ____ rpm, at rated condition

LOCATED IN POR ☐ YES ☐ NO EFFICIENCY (%) ____

4. CONDITION FOR MOMENTARY STARTUP / SHUTDOWN

HEAD ____ Ft

ANTICIPATED NUMBER OF CYCLES PER DAY ____

5. MAXIMUM EXPECTED SURGE PRUEESUR

____ Ft

B. REQUIRED FUTURE CONDITIONS (IF DIFFERENT THAN INITIAL)

1. RATED OPERATING CONDITION - PUMP MANUFACTURER GUARANTEED CONDITION

FLOW ____ gpm at HEAD ____ Ft

NPSH 3% ____ gpm at SPEED ____ rpm, at rated condition

LOCATION ON CURVE (AOR / POR) ____ EFFICIENCY (%) ____

2. CONDITION OF MAXIMUM PUMP SPEED AGAINST MINIMUM SYSTEM HEAD

FLOW ____ gpm at HEAD ____ Ft

NPSH 3% ____ gpm at SPEED ____ rpm, at rated condition

PPP LOCATED IN POR? ☐ YES ☐ NO EFFICIENCY (%) ____

LOCATED TO RIGHT OF BEQ? ☐ YES ☐ NO POWER (HP) ____

3. CONDITON OF CONTINUOUS DUTY MINIMUM SPEED

FLOW ____ gpm at HEAD ____ Ft

NPSH 3% ____ gpm at SPEED ____ rpm, at rated condition

LOCATED IN POR ☐ YES ☐ NO EFFICIENCY (%) ____

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS PUMP STATION DESIGN REVIEW FORM	
PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONT./DEV. PHONE & EMAIL:	

4. CONDITION FOR MOMENTARY STARTUP / SHUTDOWN

   HEAD _____ Ft

   ANTICIPATED NUMBER OF CYCLES PER DAY _____

5. MAXIMUM EXPECTED SURGE PRUEESUR

   _____ Ft

ELECTRICAL

A. UTILITY

   PROVIDER _____

   VOLTAGE _____ PHASE _____

   POWER FACTOR _____

B. STATION FULL LOAD AMPS _____

C. GENERATOR _____

   MANUFACTURER _____

   FUEL TYPE _____

   RATING _____ kW _____ kVA

   AST MANUFACTURER _____

D. PUMP DRIVES

   MANUFACTURER _____

   MODEL _____ RATED HP _____

   RATED AMPS _____ PULSE RATING _____

FULTON COUNTY PUBLIC WORKS
PUMP STATION DESIGN REVIEW FORM

PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONT./DEV. PHONE & EMAIL:	

CONTROL & TELEMETRY

A. PUMP CONTROLLER

1. PLC MMANUFACTURER

PLC MODEL HMI MODEL

2. TELEMTRY/SCADA MANUFACTURER

ELEMTRY/SCADA MODEL

3. PROPOSED SYSTEM INTEGRATOR

REQUIRED ATTACHMENTS

- ☐ All documents required elsewhere.
- ☐ Pump curve and system head curve. Curve data to be provided in table format in addition to graph.
- ☐ Pump details, specifications, and shop drawings, including wet well elevations.
- ☐ Valve details, specifications, and shop drawings.
- ☐ Magnetic flow meter and other instrumentation details, specifications, and shop drawings.
- ☐ Generator details, specifications, and shop drawings, along with automatic transfer switch specifications and shop drawings.
- ☐ Telemetry equipment details, specifications, and shop drawings.
- ☐ Single line electrical drawing showing power distribution for the proposed pump station.
- ☐ Force main design showing size, material, plan, profile, and valve locations.
- ☐ Depiction of receiving gravity sanitary sewer system and connection to proposed pump station force main.
- ☐ Gravity sanitary sewer feeding the new pump station.

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS PUMP STATION DESIGN CALCULATION FORM	
PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
DEVELOPMENT NAME:	
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONT./DEV. PHONE & EMAIL:	

PUMP STATION SITE DATA				
AVERAGE DAILY FLOW OF PROPOSED DEVELOPMENT			gallons / day	
AVERAGE DAILY FLOW OF REMAINDER OF SUB-BASIN			gallons / day	
TOTAL AVERAGE DAILY FLOW TO PUMP STATION			gallons / day	
PEAKING FACTOR USED				
PEAK FLOW TO PUMP STATION			gallons / day	
SYSTEM HEAD CURVE				
FORCE MAIN DISCHARGE CENTER LINE ELEVATION			feet	
WET WELL MINIMUM WATER ELEVATION			feet	
WET WELL MAXIMUM WATER ELEVATION			feet	
FORCE MAIN DATA	NOMINAL DIAMETER		inches	
	ACTUAL I.D.		inches	
	LENGTH		feet	
	FRICTION FACTOR HAZEN WILLIAMS "C"		NEW PIPE CONDITION	
			AGED PIPE CONDITION	
	CALCULATED VELOCITY		ft/s, Minimum	
			ft/s, Maximum	
ELEVATION OF FORCE MAIN HIGH POINTS (feet)				

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS PUMP STATION DESIGN CALCULATION FORM	
PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
DEVELOPMENT NAME:	
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONT./DEV. PHONE & EMAIL:	

WET WELL

WET WELL SIZE	DIAMETER, ft			
	LENGTH, ft		WIDTH, ft	
	AREA, sq. ft			

WET WELL ELEVATIONS	TOP		feet
	BOTTOM		feet
	GRAVITY SEWER INLET		feet
	FORCE MAIN		feet
	ALL PUMPS OFF ELEVATION		feet
	LEAD PUMP ON		feet
	LAG PUMP ON		feet
	HIGH LEVEL		feet
	GRAVITY SEWER SPILL		feet
WET WELL ACTIVE STORAGE VOLUME		gallons	
DURATION OF EMERGENCY STORAGE		hours	

FULTON COUNTY PUBLIC WORKS PUMP STATION DESIGN CALCULATION FORM		
PROJECT NAME:		**DATE**
PROJECT NUMBER:		
PROJECT ADDRESS:		**REVIEW No.:**
DEVELOPMENT NAME:		
LAND LOT:	DISTRICT/SECTION:	
ENGINEER NAME:		
ENGINEER PHONE & EMAIL:		**REVIEWED BY:**
CONTRACTOR/DEVELOPER NAME:		
CONT./DEV. PHONE & EMAIL:		

BY SIGNING THIS FORM, THE ENGINEER OF RECORD CERTIFIES THAT IT IS COMPLETE AND ACCURATE AND SATISFIES ALL REQUIRMENTS OF THE FULTON COUNTY PUBLIC WORKS "SANITARY SEWER PUMP STATION AND FORCE MAIN DESIGN GUIDELINES"

ENGINEER OF RECORD

NAME (print) _____

SIGNATURE _____

P.E. LICENSE No. _____

DATE _____

FULTON COUNTY

FULTON COUNTY DEPARTMENT OF PUBLIC WORKS
FORCE MAIN DESIGN PLAN CHECKLIST

The engineer is referred to the Fulton County Public Works "Sanitary Sewer Pump Station and Force Main Design Guidelines" for general information on the preparation of force main.

This checklist is intended to be a guide in preparing Force Main Plans. This checklist is not all encompassing. It is left to the Engineer's discretion to decide what additional information may be needed to complete the plans.

ALL SHEETS	
☐	Final plans shall be on 22"x34" paper sheets and in PDF electronic Format.
☐	Each sheet except the cover sheet shall have a title block in the lower right corner containing: ☐ Project name. ☐ Project number (if Fulton County project) ☐ Sheet number ☐ Total number of sheets ☐ Scale ☐ Drawer's, Designer's, and Checker's initials and date. ☐ Date (month/day/year)
☐	All sheets shall be sealed, signed and dated by a Registered Civil Engineer in the State of Georgia
COVER SHEET	
The Engineer shall provide a cover sheet with the following information:	
☐	Project name
☐	Drawing Index which provides sheet number and a description of the corresponding sheet
☐	Table of Quantities such as Pipe, valves, F.H.'s, meters, services etc.
☐	Vicinity map
☐	District and Land Lot number
☐	Engineering firm's name, address and telephone number
☐	Developer's name, address and telephone number
☐	Date (month/day/year)
☐	Signature Approval Blocks
SHEET 2	
The Engineer shall provide a general sheet containing the following information:	

FULTON COUNTY DEPARTMENT OF PUBLIC WORKS FORCE MAIN DESIGN PLAN CHECKLIST	
☐	General notes covering important parameters as outlined in the Fulton County Design Guidelines for Sanitary Sewer Pump Stations and force mains.
☐	Other notes as necessary to cover situations **not** covered by the Design Guidelines or by the FCPWStandard Details.
☐	Legend showing symbols and line types used within the drawings.
☐	Engineering's firm title block containing firm's name, address, and phone number.
☐	Elevation datum and benchmark information in Georgia State Plane Coordinates.
☐	Note to be shown on plan: **Contractor shall notify Fulton County Public Works Inspector forty-eight (48) hours prior to start of construction.**
PLAN & PROFILE SHEETS	
☐	Plan view shall show proper scale. Scale shall not be more than: Plan: 1 inch = 50 feet Profile: Horizontal – 1 inch = 50 feet Vertical – 1 inch = 10 feet
☐	Plan view shall show the following: ☐ All streets, alleys and easements. They shall be dimensioned at least once and at breaks. Streets shall be identified by name. ☐ All abutting lots shall be identified by lot number, tract and subdivision. ☐ All topography within and to at least five (5) feet beyond easements and topography affected by construction shall be shown. ☐ Location of all above and underground utilities, including water mains, storm and sanitary sewers, dry wells, buried telephone lines, natural gas, power and cables. Existing utilities shall be shown as dashed lines or faded lines with type, size and other available information called out. ☐ All structures, paving, and other topographic features within vicinity, such as trees, shall be shown and identified by name, size and type. ☐ Location of all existing and proposed easements. ☐ Location of all existing benchmarks shall be shown and identified by type. ☐ Location of all connections to existing sewer with fittings clearly labeled and method of connection specified. ☐ Show bearings, curve information and stationing. ☐ Location of soil boring holes. ☐ All sheets shall have a north arrow orienting the plan view.

FULTON COUNTY DEPARTMENT OF PUBLIC WORKS FORCE MAIN DESIGN PLAN CHECKLIST	
	Profile view shall show the following: ☐ Profiles are required for all force mains crossing stream bed or Georgia Department of Transportation right-of-way.
	☐ Existing utilities which cross the proposed utility. Identified crossing utility by name, size, type of piping, location (station) and elevation. Location and elevation are to be obtained from 'as-built" plans paying particular attention to any differences in datum. **NOTE:** ***All existing underground utilities shown on profile are assumed to be shown in approximate location only*** ☐ Show proposed and existing grade line. ☐ All appurtenances such as valves, vaults, fittings and restraints. Identify by name, size, type, station and elevation. ☐ All sheets shall show match lines labeled as such with station and sheet number. ☐ Proposed Force Main shall be shown as solid lines with sizes, material, and pipe classes called out. For example: 8 inch DIP (Water Main) – Class 51
DETAIL SHEETS	
☐	Include Fulton County Standards Details to be used on the project.
☐	Include any other details specific to the project that are not covered by Fulton County Standard Details.
☐	Detail sheets shall be located at the end of the plan set and referenced where used.

FULTON COUNTY

FULTON COUNTY DEPARTMENT OF PUBLIC WORKS
ENGINEER'S CERTIFICATE CONSTRUCTION COMPLETION FORM

DATE: _____

PROJECT NAME: _____

LAND LOT: **DISTRICT:**

This is to certify that _____

Have (has) been graded to within three (3) inches of the final grade, to conform to profile grade approved by Fulton County Public Works.

That street(s) is (are) graded to proper width to allow for an eight (8) foot shoulder on each side of the curb. The shoulder is within three (3) inches of final grade.

That the proper catch basins have been erected and the proper drainage facilities installed.

That sewers and sewer services have been installed.

That proof/documentation of 95% compaction has been provided as required.

That if easements are involved, they are within three (3) inches of final grade.

That no force mains will be laid until center line stakes have been installed and materials inspected and approved by Construction Project Manager.

COMMENTS: _____

Signed: _____ **Date Approved:** _____
Developer's/Contractor's Engineer of Record

_____ _____
FCPW Development Engineer **FCPW Chief Construction Manager**

NOTE: Submit completed Engineer's Certificate to the Fulton County Public Works.

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN STARTUP-READINESS CERTIFICATION	
PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
DEVELOPMENT NAME:	
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONT./DEV. PHONE & EMAIL:	

WET WELL

The Engineer and Contractor/Developer shall certify that the following is completed to the satisfaction of FCP

- ☐ All sewer, pump station, and force main designs were completed and reviewed and approved by FCPW
- ☐ The Engineer and Contractor/Developer shall have received all approvals from EPD, if required.
- ☐ The Engineer and Contractor/Developer shall have provided accurate and stamped as-builts.
- ☐ A Force Main Test must be completed and accepted.
- ☐ A pump draw down test must be completed and accepted.
- ☐ A certified of compaction from a licensed Geotechnical Engineer must be completed and accepted.
- ☐ The General Contractor/Developer, Electrical Contractor, and Pump Manufacturer personnel must be scheduled to be on site at Start-up.
- ☐ All utilities (i.e. – electric, water, communications, and gas, if applicable) must be installed and working at Start-up.
- ☐ Telemetry/remote monitoring system shall be functional.
- ☐ Submersible pumps will need to be pulled out of the wet well at Start-up. (The General Contractor is responsible for this.)
- ☐ Pumps must be able to run off of the main power source, as well as off of the generator.
- ☐ All spare parts, O&M Manuals, and applicable paperwork should be brought to Start-up unless provided in advance.

THE ABOVE ITEMS MUST BE COMPLETE PRIOR TO SCHEDULING A START-UP.

When this check off list is complete, it will need to be provided to FCPW.

The desired Start-up date should be listed along with a contact name and phone number. If all the items are complete, you will be contacted with a Start-up date and time. It is understood that some items may require onsite review and approval prior to the "Startup." These will be coordinated through the designated FCPW PM.

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS PUMP STATION AND FORCE MAIN STARTUP-READINESS CERTIFICATION	
PROJECT NAME:	DATE
PROJECT NUMBER:	
PROJECT ADDRESS:	REVIEW No.:
DEVELOPMENT NAME:	
LAND LOT: DISTRICT/SECTION:	
ENGINEER NAME:	
ENGINEER PHONE & EMAIL:	REVIEWED BY:
CONTRACTOR/DEVELOPER NAME:	
CONT./DEV. PHONE & EMAIL:	

SIGNATURES BELOW CONFIRMING THE ABOVE IS COMPLETED

ENGINEER OF RECORD

NAME (print) _____

SIGNATURE _____

P.E. LICENSE No. _____

DATE _____

DEVELOPER / CONTRACTOR

NAME (print) _____

SIGNATURE _____

DATE _____

FULTON COUNTY PUBLC WORKS WASTEWATER AS-BUILT CHECKLIST		
Project Name:		
Project Address:		
Reviewed by:		**Date:**

General Information

General

☐	Show name, address and phone number of engineering/surveying firm.
☐	Show name, address and phone number of force main contractor.
☐	Show name, address and phone number of owner/developer.
☐	Submit 2 sets of **22" x 34"** as-built drawings, AutoCAD file and electronic signed sealed PDF on a flash drive.
☐	Plans must bear an original handwritten signature and date across the seal of a Registered LandSurveyor licensed in the State of Georgia.
☐	Show the following on all plans: • North arrow • Location map • Graphic scale • Benchmark information in State Plane Coordinates
☐	Specify project title, project number (if Fulton County Project), land lot, district, and parcel number in thetitle block.
☐	Show name of development with all name changes.
☐	Show, label and station fire hydrants, valves and fittings.
☐	Label pipe size and type for each section of line.
☐	Show, label and number all manholes including station numbers.
☐	Show stub locations for each lot with station numbers from manholes, lengths and depths.
☐	Label all abutting lots by lot number, tract, subdivision an address.
☐	Show and label roads, right-of-way and pavement widths.
☐	Submit a copy of the site plan or final plat.
☐	Show and label all property boundaries, roads, right of ways with dimensions, all utility easements, phase lines, buffers and adjoining property owners.
☐	Provide State Plane Coordinates for all valve locations.
☐	Provide a material list shown on as-built drawing indicating the number of valves and size/length/type of pipes.

FULTON COUNTY PUBLC WORKS WASTEWATER AS-BUILT CHECKLIST		
Project Name:		
Project Address:		
Reviewed by:		**Date:**
☐	Show and label all permanent easement with Book and Page Number. Provide easement documents for all easement and provide a letter signed and sealed by a Registered Land Surveyor licensed in the State of Georgia, stating they have all been addressed or that there are none.	
☐	**Include a copy of the checklist with re-submittal.**	

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS CONSTRUCTION MANAGEMENT			
RELEASE FOR FORCE MAIN CONSTRUCTION			
DATE:			
PROJECT NAME:			
WR#:			
LAND LOT:		**DISTRICT:**	
DEVELOPER:			
CONTRACTOR:			

☐	Copy of Contractor's Insurance		
☐	**Compaction Test**	**DATE:**	
☐	Engineer's Certificate	**DATE:**	
☐	Invoice / Packing Slip		
☐	Copy of Labor Agreement		
☐	D.O.T. / R&D permit if required		
☐	Inspector's Certification of Materials		
DATE:		**INSPECTOR:**	

When the above items are approved and/or on file. Force Main construction is thereby authorized to begin.

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
REQUEST FOR EXCEPTION/CHANGE TO PUMP STATION FORM

Date: _____

Requested By: _____

Company Name: _____

Contact Phone Number: _____ **Fax Number:** _____

The following exception/change is requested at _____
Pump Station.

Station is: _____ **New** _____ **Upgrade**

Description: _____

Purpose for change: _____

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
REQUEST FOR EXCEPTION/CHANGE TO PUMP STATION FORM

Detail Attached:___Yes_____No

Date of Stamped Plans:_____Station:_____Force Main: _____

Page #_____Page #_____Page #_____Page # _____

Engineer has been consulted:_____Yes
_____No

Engineer's name:_____Contact phone number: _____

Date of consult: _____

Engineer agrees to show any and all changes on as-builts.

Engineer's Signature: _____

Pump Station Trade Manager Initial to request: _____

Accepted by:_____Date:_____

Must be signed by the Distribution/Collection Division Director or authorized designee

GEORGIA DEPARTMENT OF TRANSPORTATION CHECKLIST	
To obtain a Georgia Department of Transportation Utility Encroachment Permit, please contact the FultonCounty Public Works Technical Service Division with the following information:	
☐	Right-of-Way Width
☐	Pavement Centerline and Width
☐	Distance to Curb
☐	North Arrow
☐	Location of proposed installation showing distances to nearest intersecting street
☐	Length, size and type of utility
☐	Bore and Jack Pits (if required)
☐	Show posted speed limit
☐	Include an 8 ½ x11 map of location

FULTON COUNTY

GEORGIA DEPARTMENT OF TRANSPORTATION MINIMUM INFORMATION REQUIRED FOR GUPS UTILITY PERMIT APPLICATION	
I.	**GENERAL PERMIT INFORMATION**
☐	1. State Route number or County Route/City Street number when permitting/adding facilities within a GDOT programmed project. (Note: Project permits will be submitted by the project identification (PI) number and this information will automatically populate)
☐	2. County. (GUPS interactive map allows search by county to confirm boundaries)
☐	3. Verify access control. (Additional restrictions apply on limited access routes)
☐	4. Location. (GUPS will populate the milepost via the interactive map, need to field verify)
☐	5. Assure Traffic Control (TC) is in accordance with current Manual on Uniform Traffic Control Devices **(MUTCD)**. Confirm a typical application shown in part 6 of the MUTCD will work with field conditions,if not, select and upload detailed TC plan. Any work done on the interstate or Limited Access Highway requires a detailed TC plan.
☐	6. Description of proposed utility work. (Provide details – Size, type, and length including method of installation, and note if it is replacement, maintenance, reconducting, etc. type work, when applicable)
☐	7. For aerial proposals, field verifies that there are no facilities that require transfer or removal of existing facilities on the entire route covered by this permit within that County. If transfers and/or removal are determined, they will be required to be performed under this permit. Pole transfer data information will need to be filled out and proposed plan submitted.
☐	8. If blasting is required with permit, a supplemental form (DOT 8413X-Blasting Permit & Procedures Form) will need to be submitted with the general permit.
☐	9. Provide legend, if applicable or required.
☐	10. If project list that is populated by GUPS reflects project is UC (under construction) or close to letting, a coordination letter from prime contractor and utility adjustment schedule (UAS) when permit request is inside GDOT project under construction is required.
II.	**DETAILS REQUIRED IN SUPPORTING DOCUMENTS** Confirm supporting documents are legible when printed at 8 ½" X 11" or 11" X 17". NO DWG FILES ACCEPTED.
	A. EXISTING FIELD CONDITIONS
☐	1. Dimensions of the roadbed – Must be English units. a. Pavement width. (Indicate centerline, curb & gutter or edge of pavement (EOP)) b. Distance to shoulder point, ditch and/or toe of slope. c. Show grass/concrete median and sidewalk, if applicable.
☐	2. Right of way width. (Note: If r/w varies you will need to indicate these changes and not use the word "varies")
☐	3. North Arrow.
☐	4. Show location of traffic signals, if exists.
☐	5. Location of all above and below ground structures to be navigated. (I.e. storm drain, culverts, bridges, existing utilities, walls, parking lots, buildings, driveways, side streets, signal, etc.)
☐	6. Test holes are required when boring under or over existing facilities/structures. Show test hole locations and size with details on existing facility/structure.

GEORGIA DEPARTMENT OF TRANSPORTATION MINIMUM INFORMATION REQUIRED FOR GUPS UTILITY PERMIT APPLICATION	
☐	7. Posted speed limit.
☐	8. Local Street names for state route and side streets shown.
☐	9. Note unpaved roads and if driveways are paved or dirt.
☐	10. Clearly identified and differentiate existing and proposed facilities in legend.
	B. DETAILS ON PROPOSAL
☐	1. Distance to proposed facility from right of way, edge of pavement and face of curb where curb exist.
☐	2. Depth of cover of proposed facility noted at back-slope, ditches, shoulders and pavement.
☐	3. Location of proposed installation showing distances to nearest intersecting street or milepost.
☐	4. Length, size, type of proposed utility, and distance between proposed structures.
☐	5. Detailed distances for offset portions of installation from right of way.
☐	6. **Boring (Detailed profile)** a. Type and length of bore. b. Length, size and type of casing, if applicable. (see #11) c. Bore pits – location dimensioned from edge of pavement, size and vertical difference from bottom of pit to EOP. Bore pits are to be minimum 1' to 1' ratio from EOP (for every 1' in depth 1' from EOP) or minimum of 10' from EOP, whichever is greater. d. Outside diameter of bore and outside diameter of facility being proposed. e. Shoring details if applicable. f. Plot existing facility/structure to be navigated. g. Depict right of way, ditches, pavement, etc. h. Special Provision for directional bore on limited access routes (Directional Boring under Interstate and Limited Access Highways).
☐	7. Pavement cuts – note jurisdiction, dimension, location from EOP and known travel lanes, size and method of repair. Note limits of mill and inlay if applicable. (Depends on age of existing pavement, please contact District Utilities Office for information).
☐	8. Method of installation. **(To choose multiple methods in GUPS, hold CTRL +click the additional methods.)**
☐	9. Detailed explanation for any installation other than in back five feet of the right of the right of way. **(Note on drawing why facilities cannot be located in the back five feet r/w or include exception letter if under pavement.)**
☐	10. Location of proposed fire hydrant, manholes, etc., including distance from pavement and right of way.
☐	11. Casing required when facility has "wash" factor (i.e., water, sewer, petroleum) or in the area of existing structures (bridges, culverts).
☐	12. Profile for all road crossings.
☐	13. Length and width of clearing.

GEORGIA DEPARTMENT OF TRANSPORTATION MINIMUM INFORMATION REQUIRED FOR GUPS UTILITY PERMIT APPLICATION	
☐	14. Interstate crossing shown on GDOT construction plans.
☐	15. Note whether company forces or sub-contractor will be used. (Special assurance form required for sub-contractor)
☐	16. Permit work required because access permit will be shown on GDOT approved permitted driveway drawings.
	C. ADDITIONAL INFORMATION FOR ABOVE GROUND FACILITIES
☐	1. Distance from edge of travel lane/face of curb for existing and proposed above ground facilities.
☐	2. Overhead clearance noted on profile for crossings at low point.
☐	3. Location of temporary poles or guy poles if applicable.
☐	4. Average daily traffic (ADT) volumes noted when clear zone must be evaluated.
☐	5. Indicate poles as new, replaced, or existing to remain.
☐	6. Cross-sections of the current terrain at the proposed above ground facility if above ground structures are inside clear zone. Cross-section to include slope ratios.
III.	**DETAILS REQUIRED FOR BRIDGE ATTACHMENTS** Bridge attachments will not be considered when, in the Department's judgment, practical alternative methods, including joint use of existing facilities, are available. (See sections 5.7 of UAM)
☐	1. Description. (e.g. 10" water main, four 6-inch diameter telephone conduits)
☐	2. The weight of the utility per foot including contents.
☐	3. The opening size required through end walls, back walls, and diaphragms.
☐	4. For water and sewer mains, the maximum diameter of the pipe bell or flanges.
☐	5. The hanger spacing with hanger details.
☐	6. Location on the bridge.
☐	7. Proposal shown on Department bridge plans.
☐	8. Anchor type and specifications.
IV.	**DETAILS REQUIRED FOR TUNNELS** See GDOT standard specifications section 555.
☐	1. Designed in compliance with AASHTO specifications for tunneling.
☐	2. Subsoil surveys, including the elevation of the water table and the classification and relative density of the soils from the ground line to 3 feet below the tunnel liner.
☐	3. Rock coring data, including rock type and core recovery, when applicable.
☐	4. Sequence of operation for dewatering where applicable.
☐	5. Shoring details if applicable.
☐	6. Survey of existing field conditions.
☐	7. Steel liner plates hot-dipped galvanized and bituminous-coated.

FULTON COUNTY

SYFULTON COUNTY PUBLIC WORKS PRESSURE TEST FORM					
Project Name:		**Sewer Main:**	☐	**ADDITIONAL COMPONENTS**	
Constructed by:		**Force Main:**	☐	**Number of Fire Hydrants =**	
		Water Main:	☐	**Total Feet of Copper ¾" and 1" =**	
Tap Address:				**Total Feet of Copper 1-1/2" and Larger =**	

PIPE LINE TEST RESULTS

Test Date	Pipe		Station		Length	Start		End		Pressure Loss	Pass/Fail STATUS
	Size	Type	From	To		Time	PSI	Time	PSI		

TAPPING SLEEVE AND VALVE TEST RESULTS

County Inspector:	**Signature:**	Date:

FULTON COUNTY DEPARTMENT OF PUBLIC WORKS PRESSURE TEST FORM	
COMMENTS:	
(Allowable Loss for Force Mains = Max 0 PSI over 2 hours.) *(Allowable Loss for Water Mains = Max 5 PSI over 2 hours.)* *(Allowable Loss for Taps = Max 0 PSI over 30 minutes.)* *(Allowable Loss for Sewer Mains = 1 PSI over 15 min.)*	

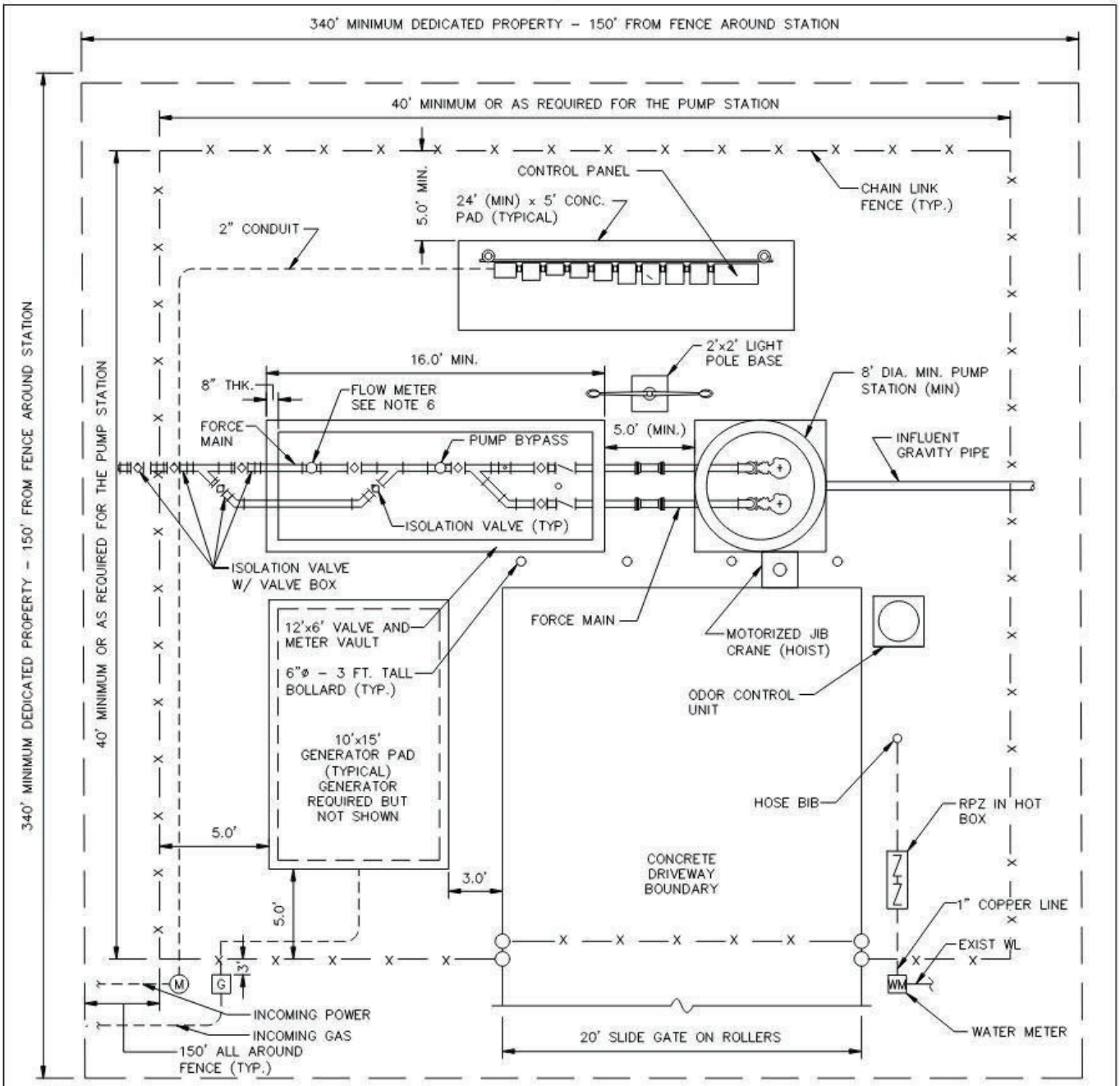
FULTON COUNTY

APPENDIX B

STANDARD DETAILS

FULTON COUNTY

STANDARD DETAILS LIST SANITARY SEWER PUMP STATION AND FORCE MAIN	
DETAIL NUMBER	**TITLE**
P-001	PUMP STATION SITE PLAN (TYPICAL/EXAMPLE)
P-002	PUMP STATION UNDERGROUND POWER DETAIL
P-003	PUMP STATION OVERHEAD POWER DETAIL
P-004	PUMP STATION HOSE BIB SERVICE CONNECTION DETAIL
P-005	PUMP STATION JIB CRANE (HOIST) BASE
P-006	PUMP STATION LIGHT POLE DETAIL
P-007	NOT USED
P-008	PUMP STATION SLAB AND CURB DETAIL
P-009	PUMP STATION GENERATOR PAD DETAIL
P-010	PUMP STATION FENCE AND GATE DETAIL
P-011	PUMP STATION NOISE WALL
P-012	PUMP STATION EXAMPLE ACCESS DRIVEWAY & TURN AROUND AREA
P-013	PUMP STATION TYPICAL DRIVE CROSS SECTION
P-014	PUMP STATION TYPICAL DETAIL MAXIMUM 50 HP PUMPS & 1 MGD FLOW
P-015	PUMP STATION COATING DETAIL
P-016	PUMP STATION CABLE DETAIL
P-017	PUMP STATION EXAMPLE OVERFLOW TANK
P-018	PUMP STATION COMBINATION AIR-VACUUM VALVE INSTALLATION DETAIL
P-019	PUMP STATION ELECTRICAL LEGEND
P-020	PUMP STATION RTU CONNECTIONS
P-021	PUMP STATION BASIC CONTROL PANEL DETAIL RTU ALARM INPUTS
P-022	PUMP STATION GENERATOR TRANSFER SWITCH GENERATOR RUN ALARM
P-023	PUMP STATION TYPICAL POWER & CONTROL PANELS RACK (240V, 480V)
P-024	PUMP STATION EXAMPLE DUPLEX PUMP CONTROL BLOCK DIAGRAM (240V, 480V)
P-025	NOT USED
P-026	ROOT BARRIER SYSTEM
P-027	PUMP STATION EXAMPLE DUPLEX CONTROL PANEL ENCLOSURE DEAD FRONT LAYOUT
P-028	PUMP STATION EXAMPLE PROCESS & INSTRUMENTATION DIAGRAM
P-029	PUMP STATION EXAMPLE SITE GROUNDING PLAN



NOTES:

1. DETAIL IS EXAMPLE SITE PLAN. SIZES ARE RELATIVE AND BASED ON MINIMUM CRITERIA. LARGER WET WELLS, VALVE VAULTS, ETC. MAY BE REQUIRED BASED ON SITE CONDITIONS.
2. PUMP STATION PAD AND DRIVEWAY SHALL INCLUDE EXPANSION JOINTS AS NEEDED.
3. PUMP STATION PAD, OVERFLOW VAULT TOP SLAB, AND DRIVEWAY REINFORCEMENT SHALL BE DESIGNED TO WITHSTAND 80,000 LB LOAD.
4. THE STATION NAME, UTILITIES I.D. NUMBER AND ADDRESS SHALL BE AFFIXED TO THE FRONT OF THE METER CABINET.
5. ELECTRICAL AND CONTROL PANELS SHALL BE PROVIDED WITH A CANOPY WITH LED LIGHTING. SIZE OF THE CANOPY SHALL BE 5 FT WIDE AND 8 FT HIGH WITH THE LENGTH TO BE DETERMINED BY THE TOTAL COMBINED LENGTH OF ELECTRICAL AND CONTROL PANELS.
6. FOLLOW FLOW METER MANUFACTURER'S RECOMMENDATION FOR MINIMUM UPSTREAM AND DOWNSTREAM STRAIGHT PIPE DISTANCE FROM FLOW METER.
7. 20 FEET EASEMENT ALONG THE FORCE MAIN TO BE DEDICATED TO FULTON COUNTY.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

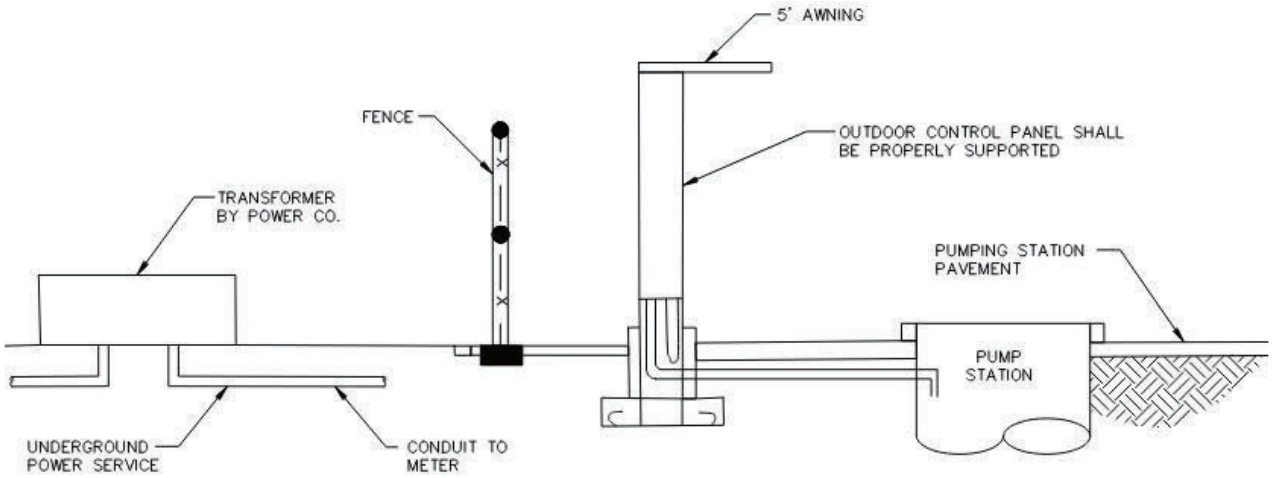
PUMP STATION SITE PLAN (TYPICAL / EXAMPLE)

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-001



NOTES:

1. METER AND DISCONNECT SHALL BE PLACED NEAR THE FRONT ENTRANCE AS SHOWN ON P-001.
2. ALL ELECTRICAL CONDUIT TO BE ENCASED IN CONCRETE. ADD RED DYE OR SPRINKLE RED DYE THROUGHOUT CONCRETE THAT IS ACCEPTABLE TO INSPECTOR.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

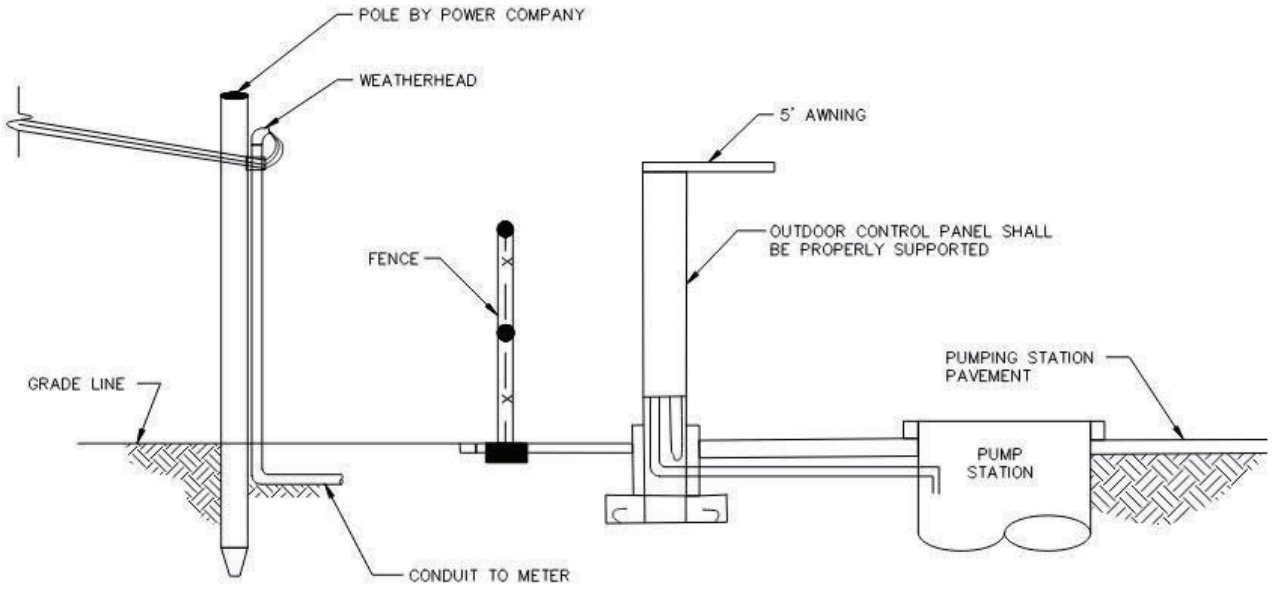
PUMP STATION UNDERGROUND POWER DETAIL

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-002



NOTES:

1. DISCONNECT SHALL BE PLACED ON ELECTRICAL/CONTROL PANEL SUPPORT (MAIN BREAKER IS SHOWN ON P-023 AND P-025).
2. DISCONNECT SWITCH MUST BE LOCKABLE IN EACH POSITION.
3. OVERHEAD POWER ONLY ALLOWED IF NOT PHYSICALLY POSSIBLE TO RUN SERVICE UNDERGROUND.
4. ALL ELECTRICAL CONDUIT TO BE ENCASED IN CONCRETE. ADD RED DYE OR SPRINKLE RED DYE THROUGHOUT CONCRETE THAT IS ACCEPTABLE TO INSPECTOR.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

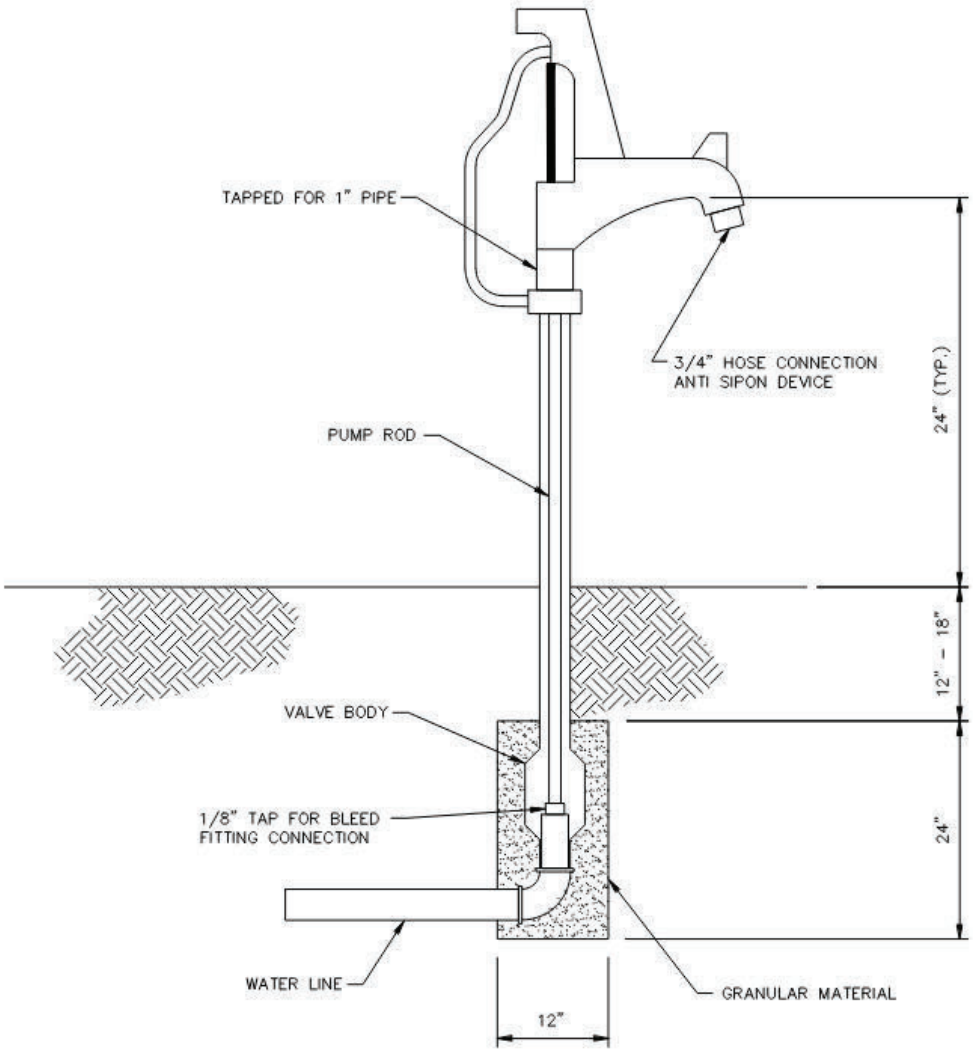
PUMP STATION OVERHEAD POWER DETAIL

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-003



NOTE:

1. YARD HYDRANT TO BE SIMMONS 800 SERIES FREEZE PROOF OR APPROVED EQUAL.
2. PROVIDE FREEZE PROOF INSULATION FOR EXPOSED PIPE.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

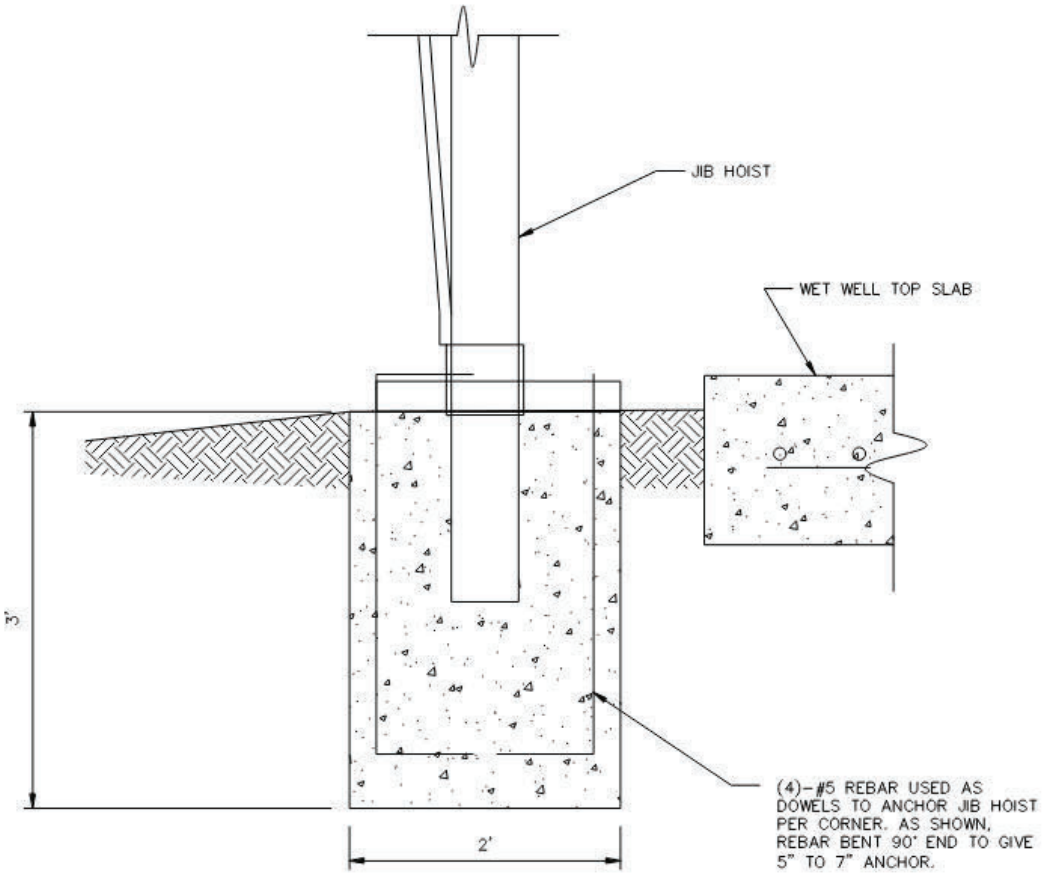
PUMP STATION
HOSE BIB
SERVICE CONNECTION DETAIL

NOT TO SCALE

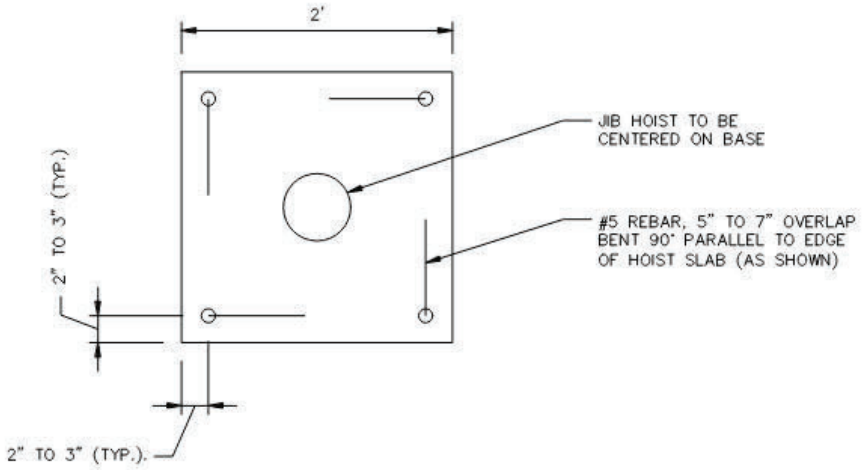
DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-004



PROFILE



PLAN

NOTES:

1. HOIST SIZE TO INCREASE AS NECESSARY FOR PUMP SIZE OR PER HOIST MANUFACTURER.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

PUMP STATION
JIB CRANE (HOIST) BASE

NOT TO SCALE

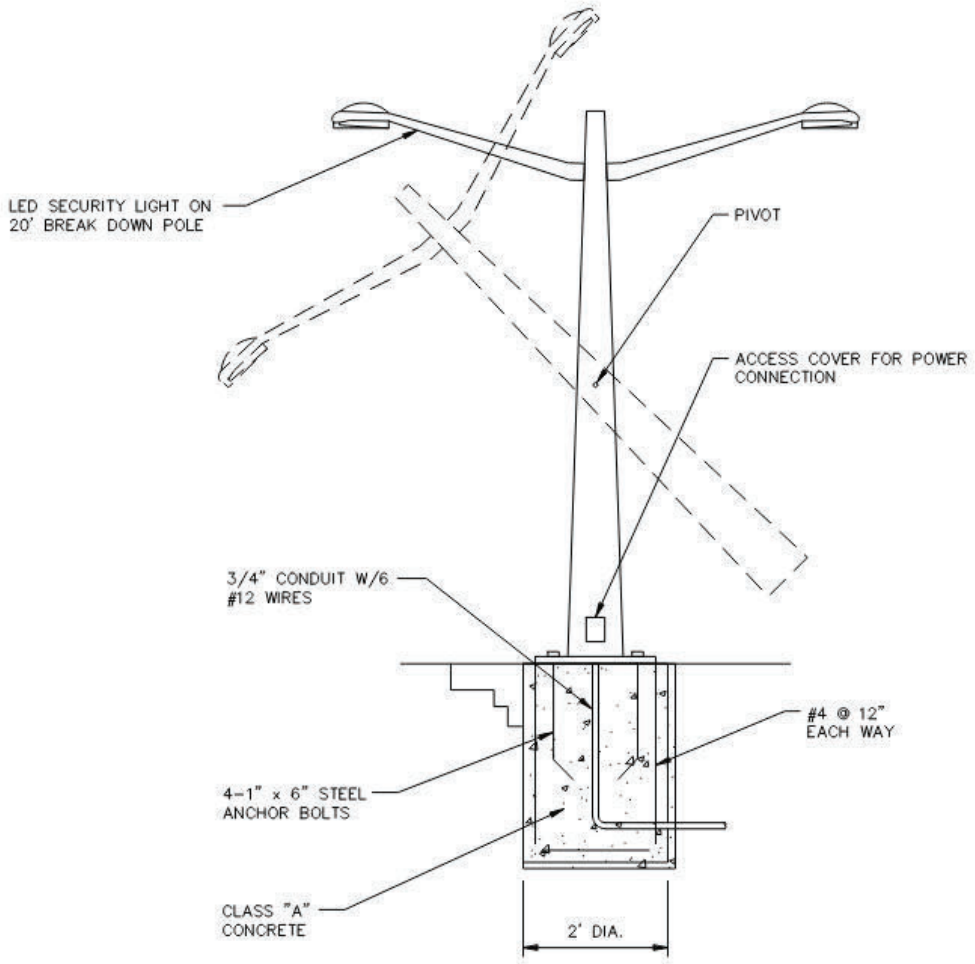
DATE: 08-06-2025

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404-612-7400
FAX: 404-224-0498

DETAIL NO. P-005

NOTES:

1. EXTERIOR HINGED LIGHT POLE WITH 4900 LUMENS LED FIXTURE 120 VOLT PHOTOELECTRIC CONTROL, WITH HEAT AND IMPACT RESISTANT LENS. POLE IS TO BE ARCHITECTURAL BROWN AND IS TO BE SUPPLIED WITH LOWERING WENCH.
   FIXTURE – GE PART # ERL1005C530EDKBZR
   ER1 SHEILDS – GE PART # 93118695
   BRACKET – GE PART # RBSU216PP
   POLE – GE PART # ASHS202T–4.0–7PP
   WINCH – GE PART # M180A
2. SECURITY LIGHT TO HAVE MOTION SENSOR TO ACTIVE, LIGHTS TO CUT OFF 30–MINUTES AFTER ACTIVATION; LIGHT TO HAVE FULL CUTOFF SHIELD.
3. ALL ELECTRICAL CONDUIT TO BE ENCASED IN CONCRETE. ADD RED DYE OR SPRINKLE RED DYE THROUGHOUT CONCRETE THAT IS ACCEPTABLE TO INSPECTOR.



FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

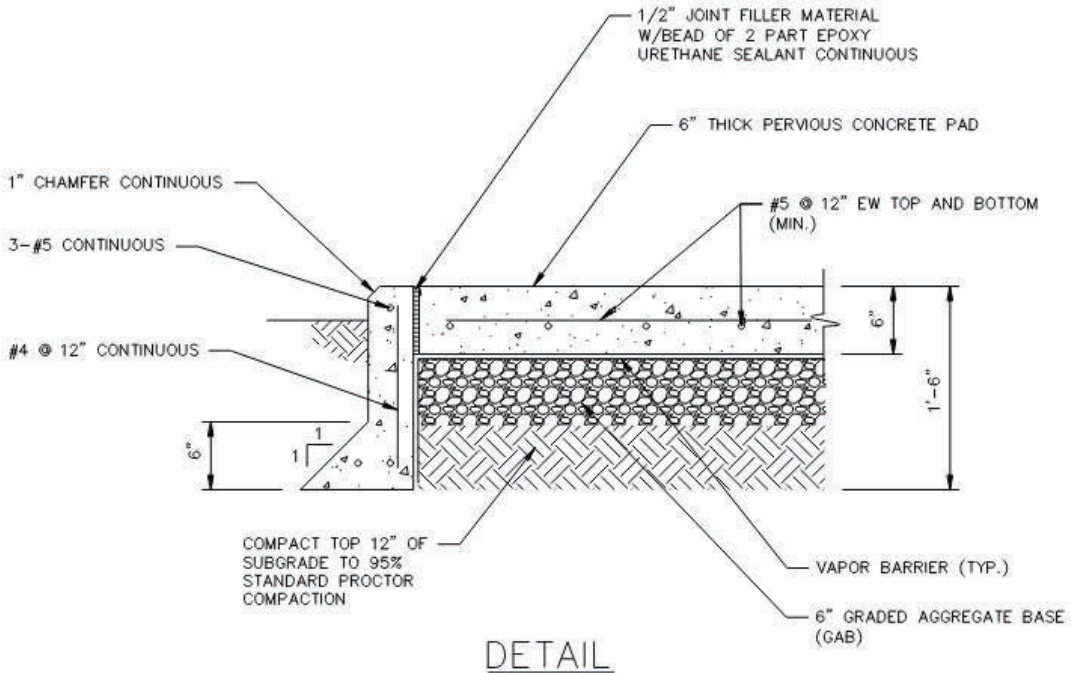
PUMP STATION
LIGHT POLE DETAIL

NOT TO SCALE

DATE: 08–06–2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404–612–7400
FAX: 404–224–0498

DETAIL NO. P–006



DETAIL

N.T.S.

NOTES:

1. PUMPING STATION CONCRETE PAD TO BE A MINIMUM OF 6 INCHES THICK ON A COMPACTED SUB-GRADE AND A MINIMUM 6 INCH AGGREGATE BASE COURSE COMPACTED TO 95% STANDARD PROCTOR COMPACTION.
2. PROVIDE CURBING, AS SHOWN, AROUND THE PAD TO PREVENT RUNOFF FROM FROM ERODING THE UNDERSIDE OF THE PAD.
3. PUMPING STATION PAD AND DRIVEWAY SHALL INCLUDE EXPANSION JOINTS AS NEEDED.
4. PUMPING STATION PAD AND DRIVEWAY REINFORCEMEINT SHALL BE DESIGNED TO WITHSATAND 80,000 LB LOAD.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

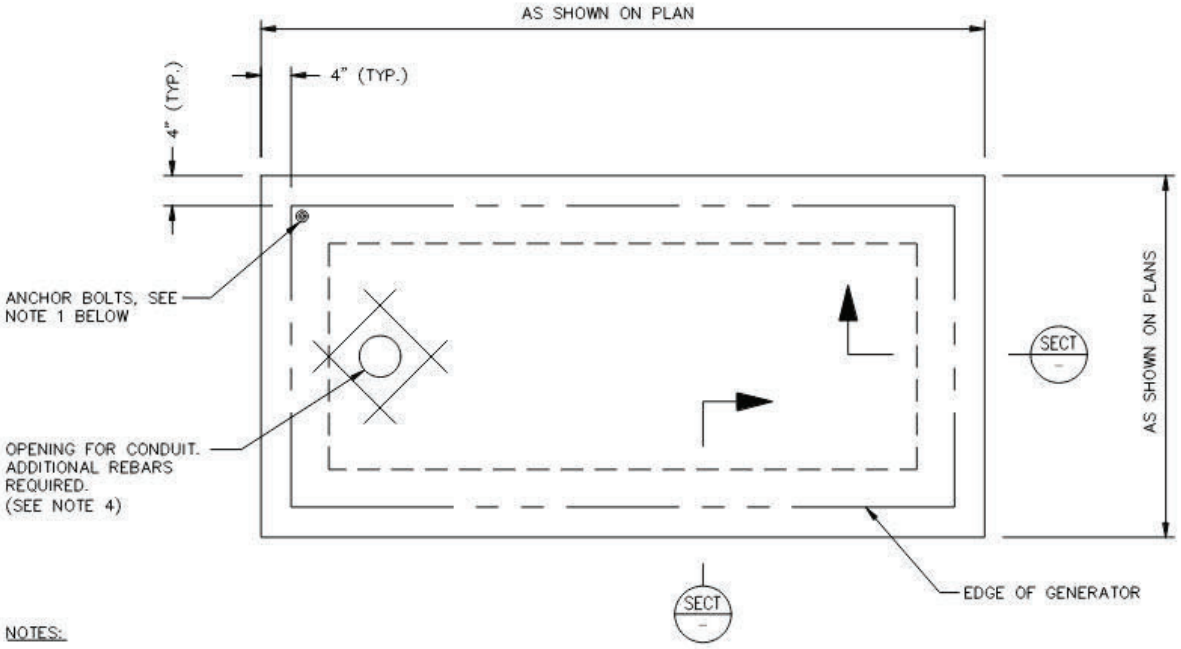
PUMP STATION
SLAB AND CURB DETAIL

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
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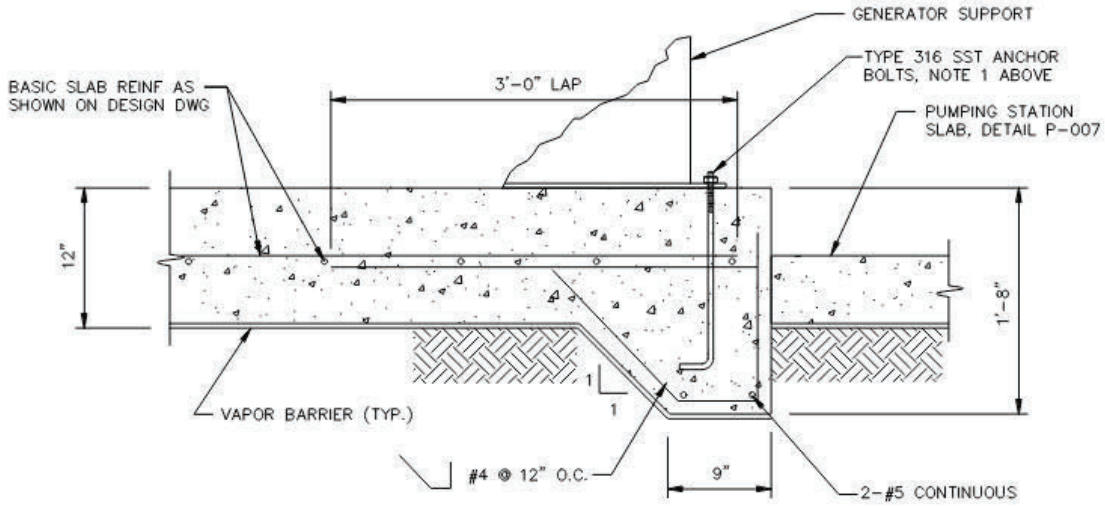
DETAIL NO. P-008



NOTES:

1. VERIFY QUANTITY, TYPE, DIAMETER AND LENGTH OF ANCHOR BOLTS REQUIRED BY MANUFACTURER PRIOR TO ORDERING AND/OR EMBEDDING FASTENERS IN CONCRETE SLAB.
2. PAD SIZE SHALL BE INCREASED AS NECESSARY.
3. CONTRACTOR TO COORDINATE SIZE AND LOCATION OF OPENING IN PAD FOR CONDUITS.
4. SIZE AND LENGTH OF REBARS TO BE DETERMINED BY DIAMETER OF CONDUIT OPENING.

PLAN
N.T.S.



SECTION (TYP.)
N.T.S.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

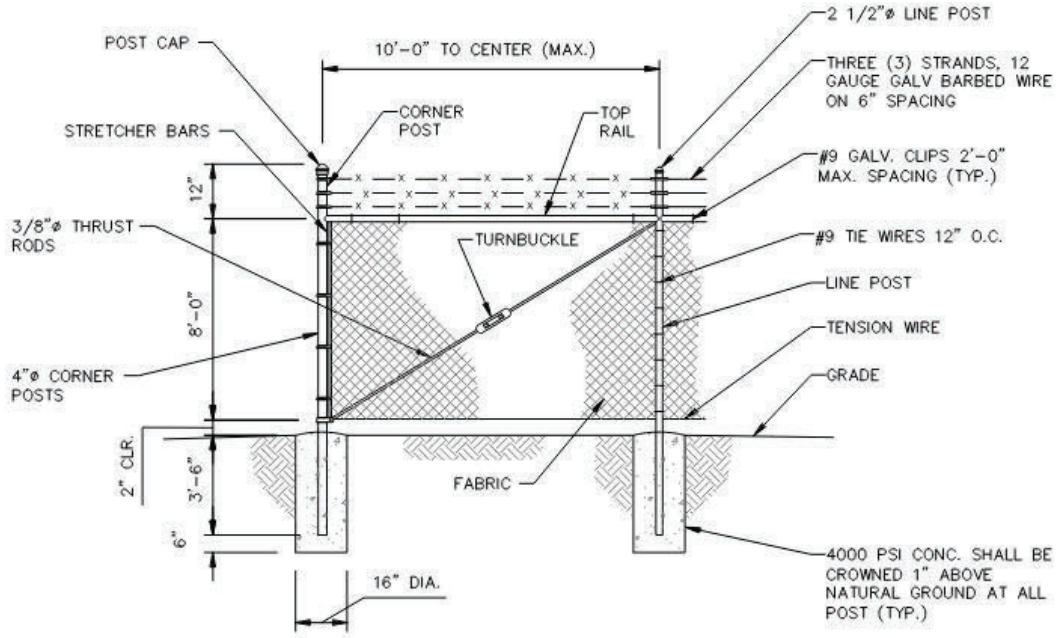
PUMP STATION GENERATOR PAD DETAIL

NOT TO SCALE

DATE: 08-06-2025

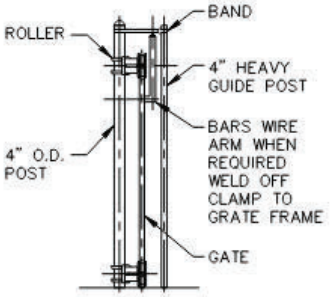
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
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404-612-7400
FAX: 404-224-0498

DETAIL NO. P-009



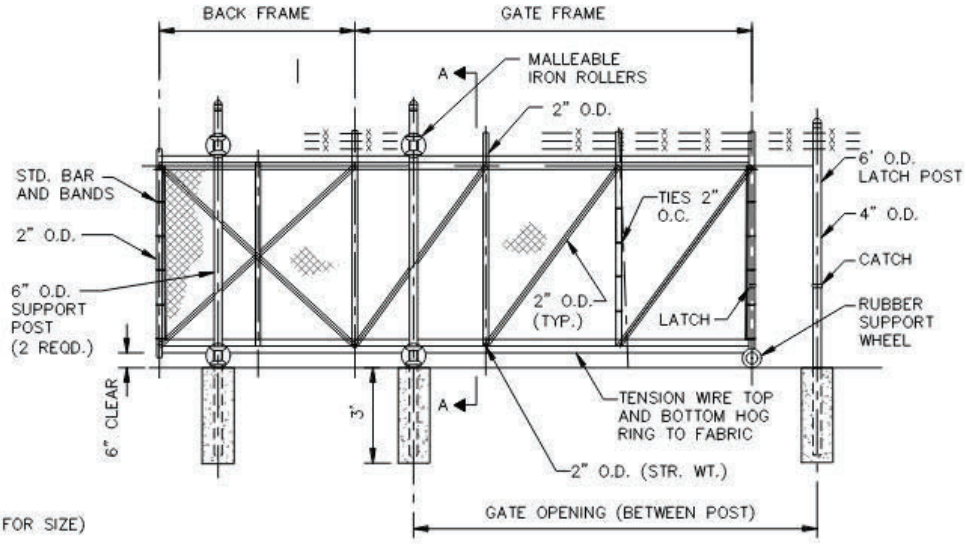
FENCING – CORNER DETAIL

N.T.S.



SECTION A–A

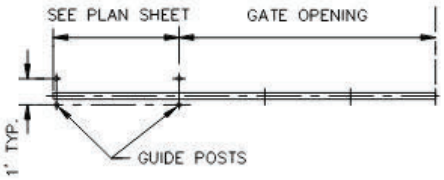
N.T.S.



ROLLING GATE DETAIL

N.T.S.

(SEE PLAN SHEET FOR SIZE)



PLAN VIEW

N.T.S.

NOTES:

1. THRUST RODS ARE REQUIRED FOR EACH GATE SECTION AND THE FIRST SPAN ON EACH SIDE OF A CORNER POST.
2. TOP LOCK HDPE FENCE SLATS ARE REQUIRED FOR ALL PUMPING STATION FENCES.
3. NUMBER 4 CHAINLINK WIRE FABRIC W/TOP RAILS.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

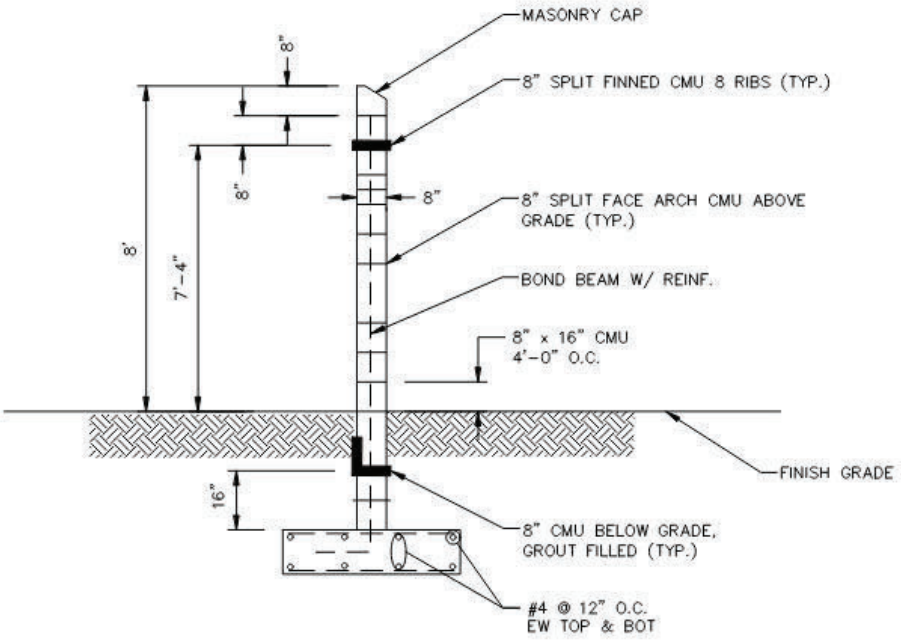
PUMP STATION
FENCE AND GATE DETAIL

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
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FAX: 404-224-0498

DETAIL NO. P-010



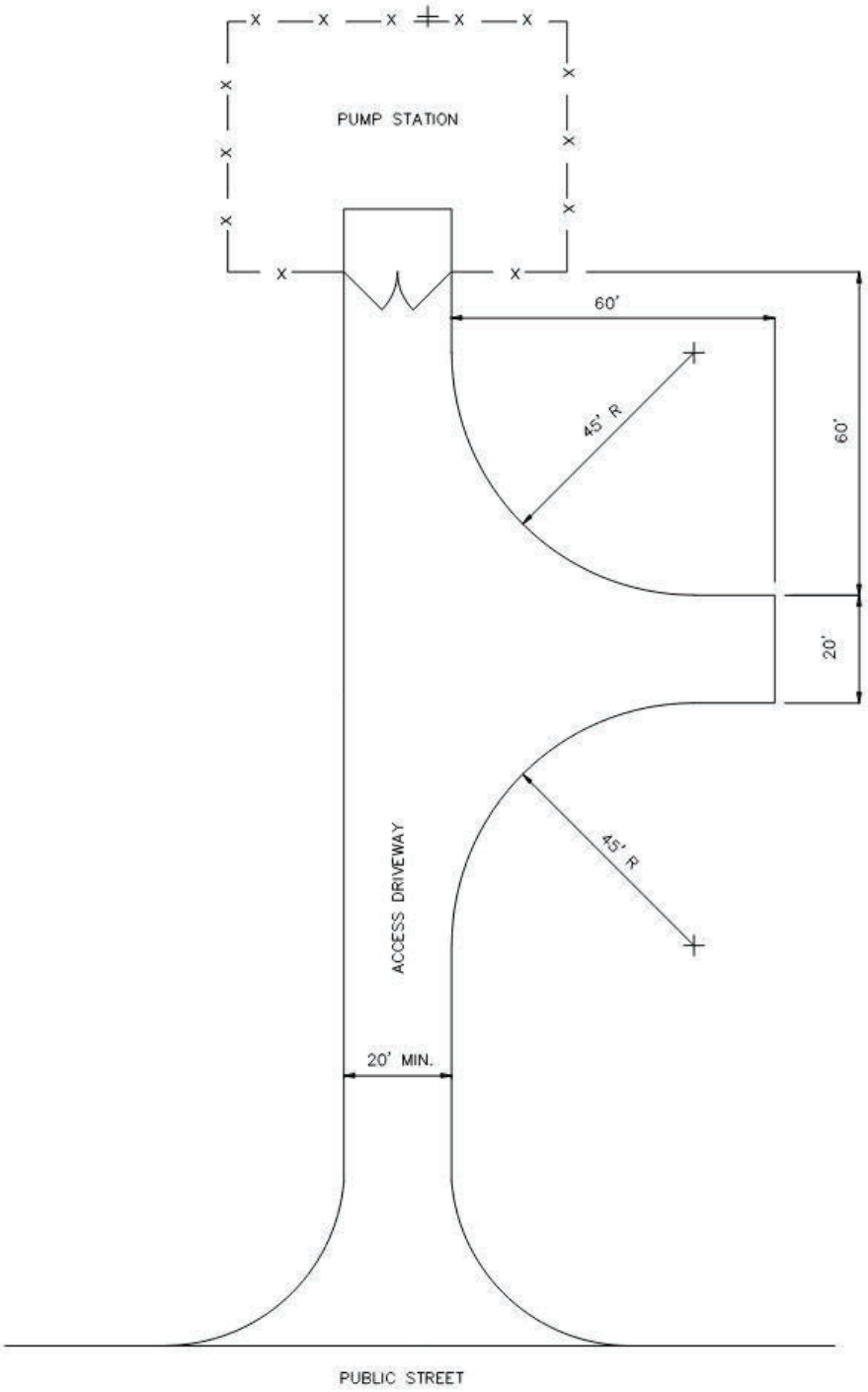
SECTION VIEW

N.T.S.

NOTES:

1. DEVELOPER TO PROVIDE WALL DESIGN DRAWINGS SIGNED AND SEALED BY A PROFESSIONAL ENGINEER.

FULTON COUNTY	FULTON COUNTY STANDARD DETAILS	DATE: 08-06-2025
	PUMP STATION NOISE WALL	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498
	NOT TO SCALE	DETAIL NO. P-011



NOTES:

1. ENSURE THAT HAZMAT TRUCK MAY ENTER, BACK OUT, TURN AROUND AND EXIT PUMP STATION IN A SAFE MANNER.
2. ACCESS DRIVEWAY SHALL INCLUDE EXPANSION JOINTS AS NEEDED.
3. ACCESS DRIVEWAY REINFORCEMENT SHALL BE DESIGNED TO WITHSTAND 80,000 LB LOAD.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

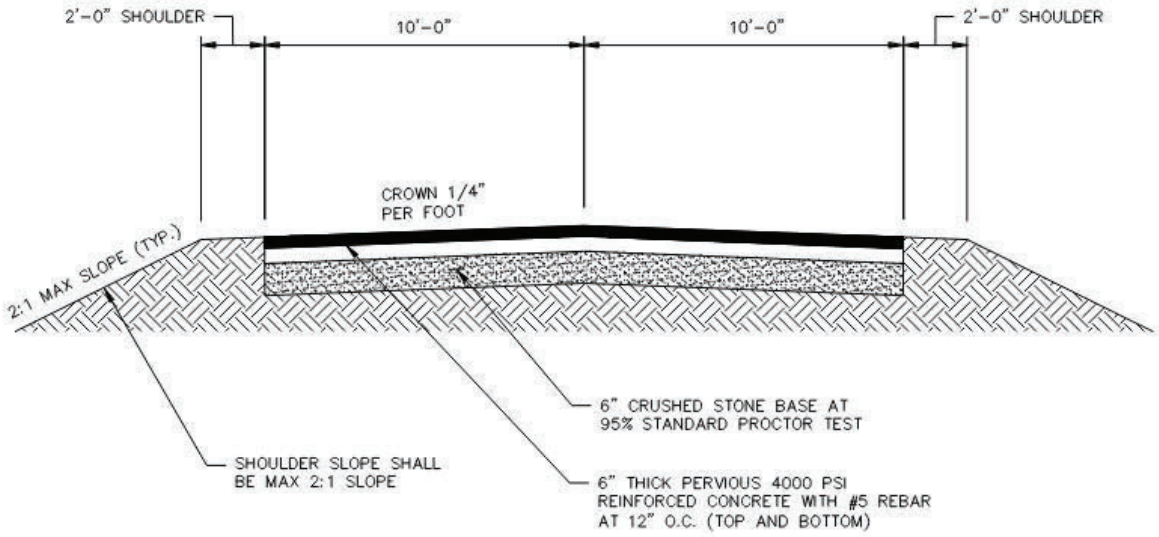
PUMP STATION EXAMPLE ACCESS DRIVEWAY AND TURN AROUND AREA

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-012



NOTES:

1. CONTRACTOR SHALL SUBMIT COPY OF PLAN AND PROFILES OF ACCESS ROAD FROM PUMP STATION TO EXISTING ROAD OR STREET. SLOPE OF ACCESS ROAD SHALL COMPLY WITH FULTON COUNTY REGULATIONS.
2. ACCESS DRIVEWAY SHALL INCLUDE EXPANSION JOINTS AS NEEDED.
3. ACCESS DRIVEWAY REINFORCEMENT SHALL BE DESIGNED TO WITHSTAND 80,000 LB LOAD.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

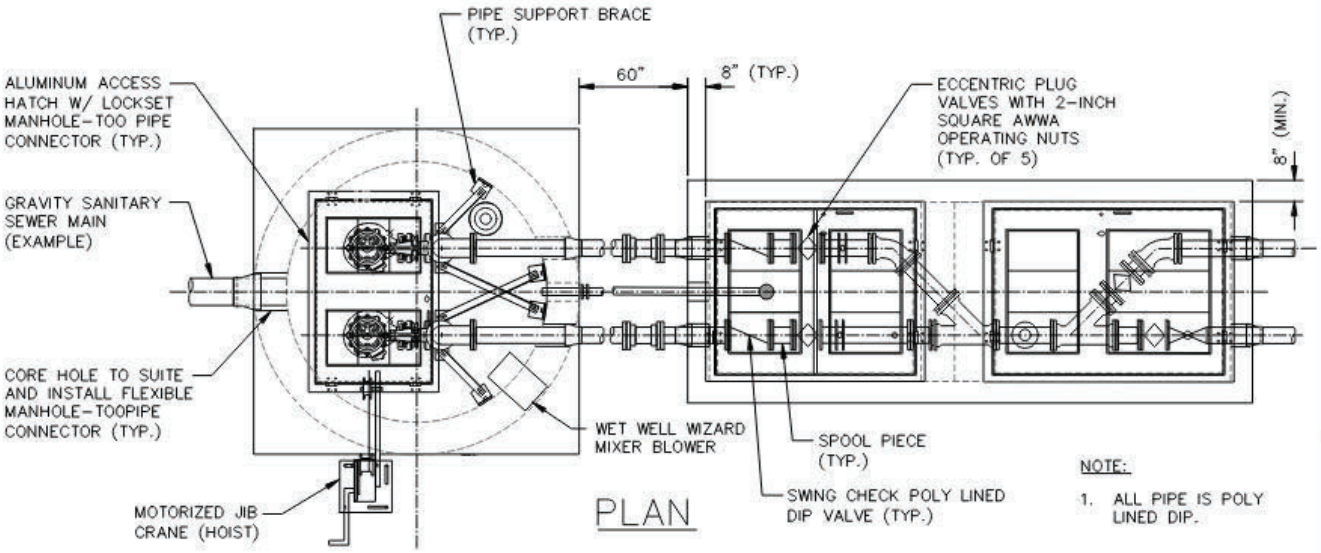
PUMP STATION
TYPICAL DRIVE CROSS SECTION

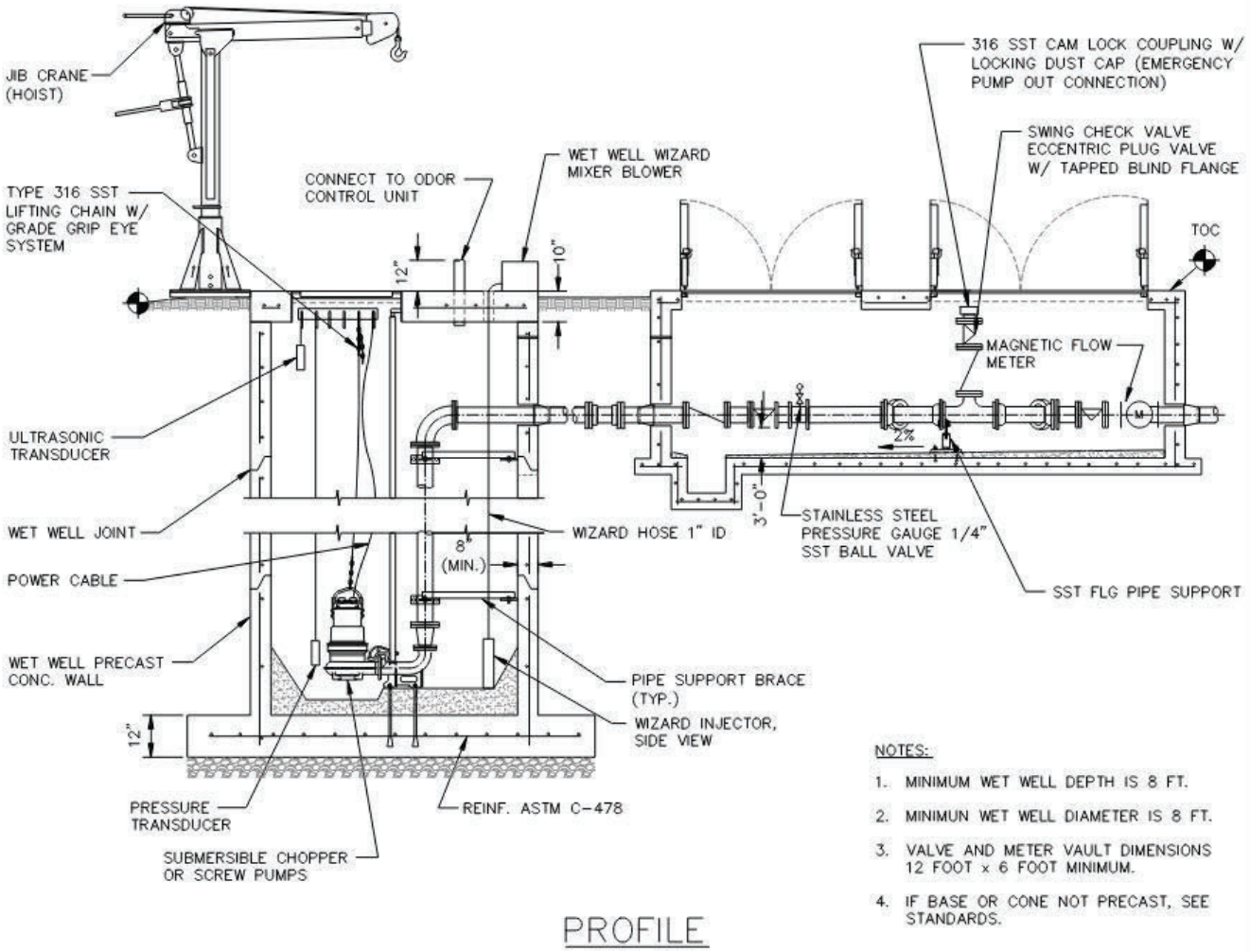
NOT TO SCALE

DATE: 08-06-2025

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DETAIL NO. P-013





FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

PUMP STATION
TYPICAL DETAIL
MAXIMUM 50 HP PUMPS AND 1 MGD FLOW

NOT TO SCALE

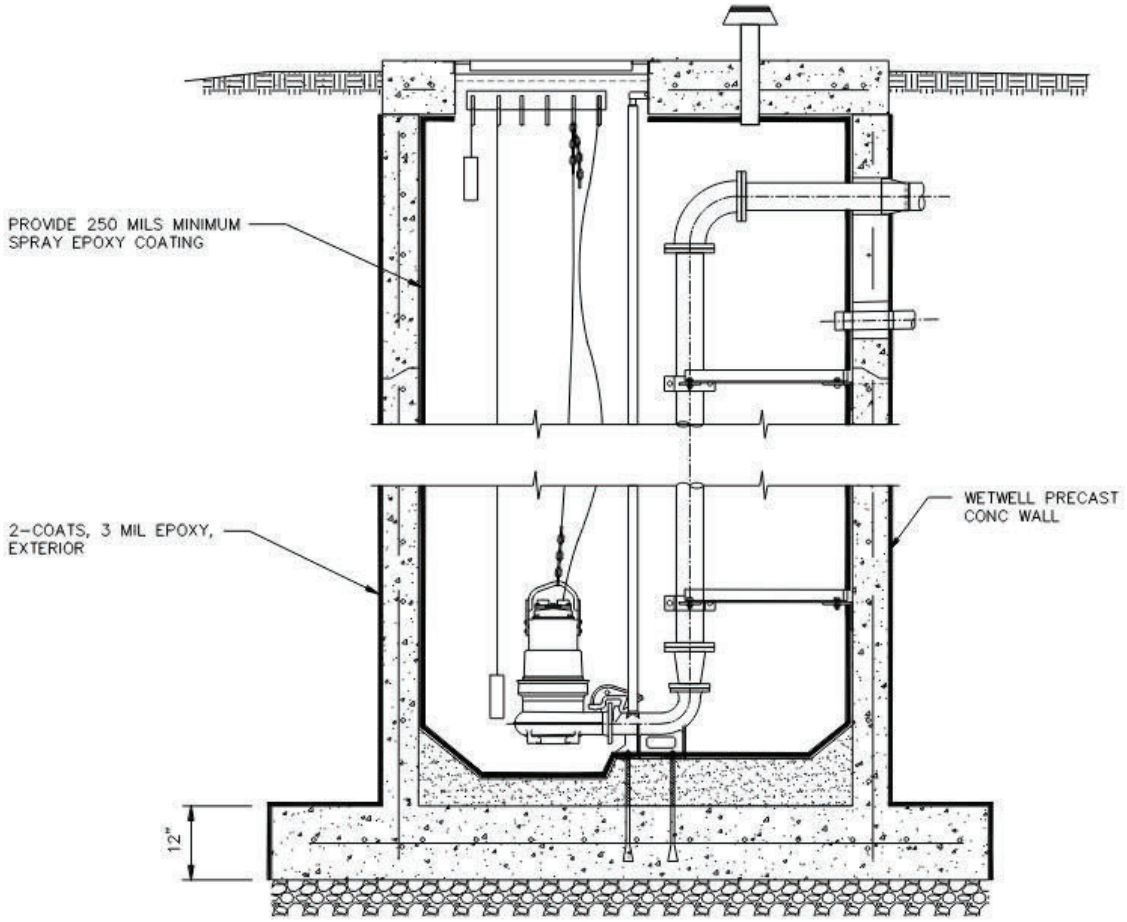
DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
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FAX: 404-224-0498

DETAIL NO. P-014

NOTES:

1. INTERIOR AND EXTERIOR OF WETWELL VALVE VAULT SHALL HAVE SPRAY EPOXY APPLIED PER THE MANUFACTURER'S RECOMMENDATION.
2. ACCEPTABLE PRODUCTS SHALL BE CPP SPRAYLINER BY EPOXY TEC OR APPROVED EQUAL.
3. REFER TO SECTION 33 01 32 OF FULTON COUNTY SEWER STANDARD SPECIFICATIONS.



FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

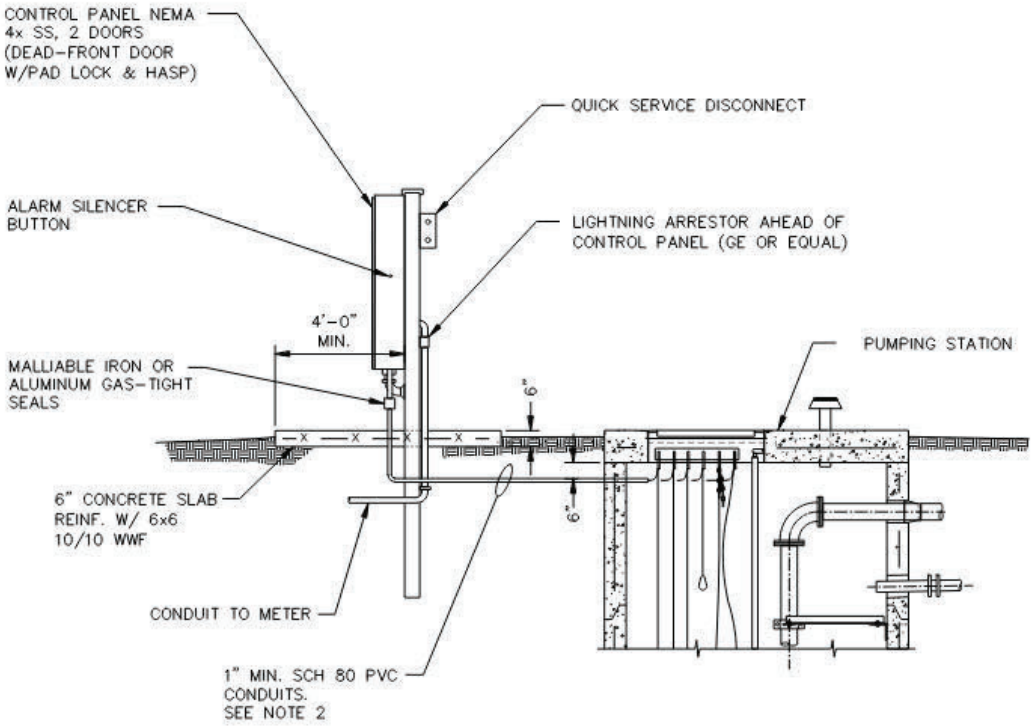
PUMP STATION COATING DETAIL

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-015



NOTES:

1. AWNING NOT SHOWN FOR CLARITY. SEE NOTE 5 ON P-001 FOR AWNING REQUIREMENTS.
2. NUMBER OF CONDUIT AND SIZES SHALL BE INCREASED AS NECESSARY TO ACCOMMODATE POWER AND CONTROL CABLES.
3. ALL ELECTRICAL CONDUIT TO BE ENCASED IN CONCRETE. ADD RED DYE OR SPRINKLE RED DYE THROUGHOUT CONCRETE THAT IS ACCEPTABLE TO INSPECTOR.

SECTION

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

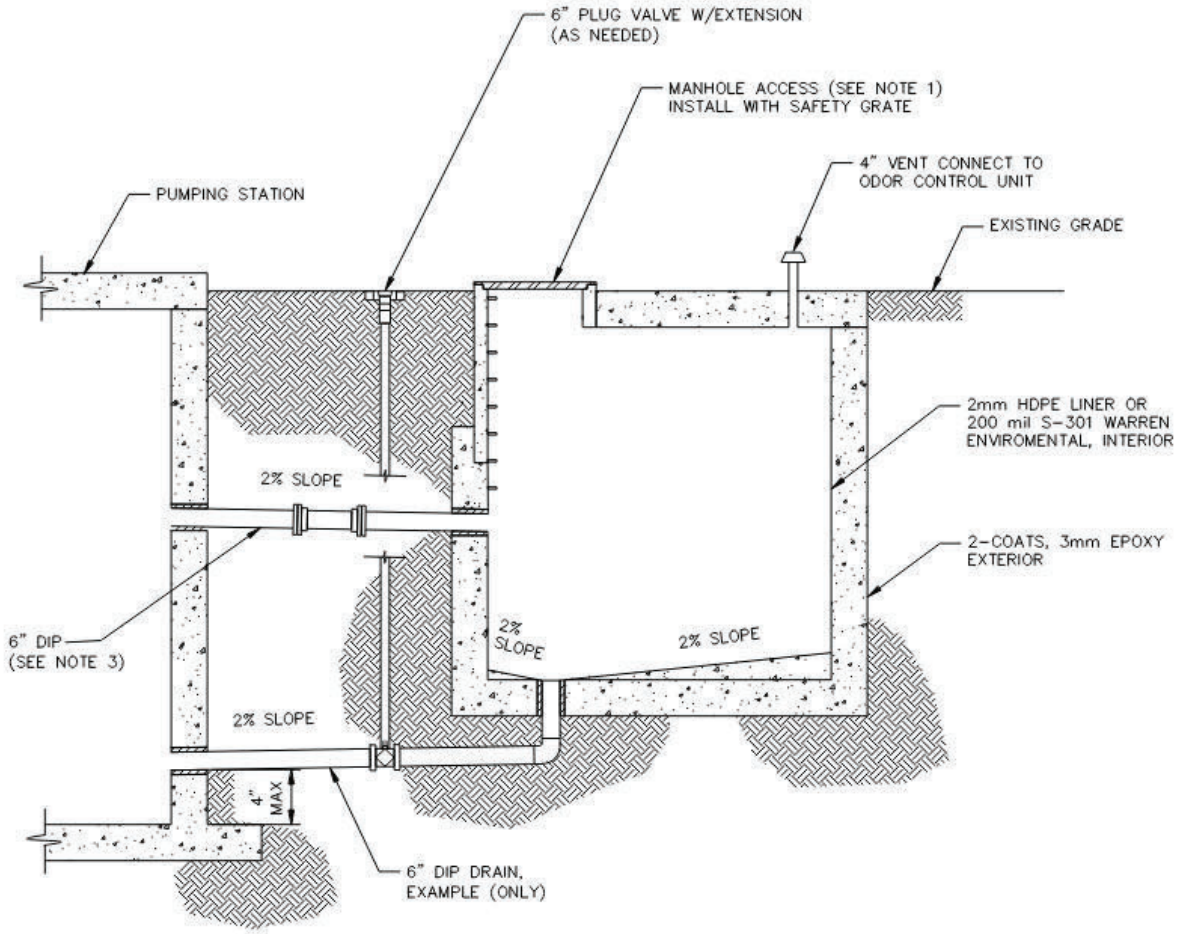
PUMP STATION CABLE DETAIL

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-016



NOTES:

1. USE OF OVERFLOW TANK IS NOT ALLOWED EXCEPT WHEN SPECIFICALLY DIRECTED BY FCDPW.
2. FOLLOW REQUIREMENTS FOUND IN PART III GRAVITY STANDARDS FOR STEPS AND MANHOLE COVER REQUIREMENTS.
3. PIPES ARE ROTATED TO BE SHOWN IN THE SAME VIEW.
4. OVERFLOW PIPE INVERT SHALL BE EQUAL TO HIGH LEVEL ALARM.
5. VOLUME OF OVERFLOW SHALL BE EQUAL TO THREE HOURS OF STORAGE AT PEAK FLOW, MINIMUM 32,000 GALLONS.
6. OVERFLOW TANK MUST BE ENTIRELY WITHIN 150 FT BY 150 FT BUFFER AREA. MANHOLE ACCESS AND VENT TO BE LOCATED WITHIN FENCE AREA.
7. OVERFLOW VAULT TOP SLAB REINFORCEMENT SHALL BE DESIGNED TO WITHSTAND 80,000 LB LOAD.
8. ODOR CONTROL UNIT TO BE INCREASED FOR OVERFLOW TANK.
9. INSTALLATION OF OVERFLOW TANK DOES NOT REMOVE REQUIREMENT FOR BACKUP POWER GENERATOR.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

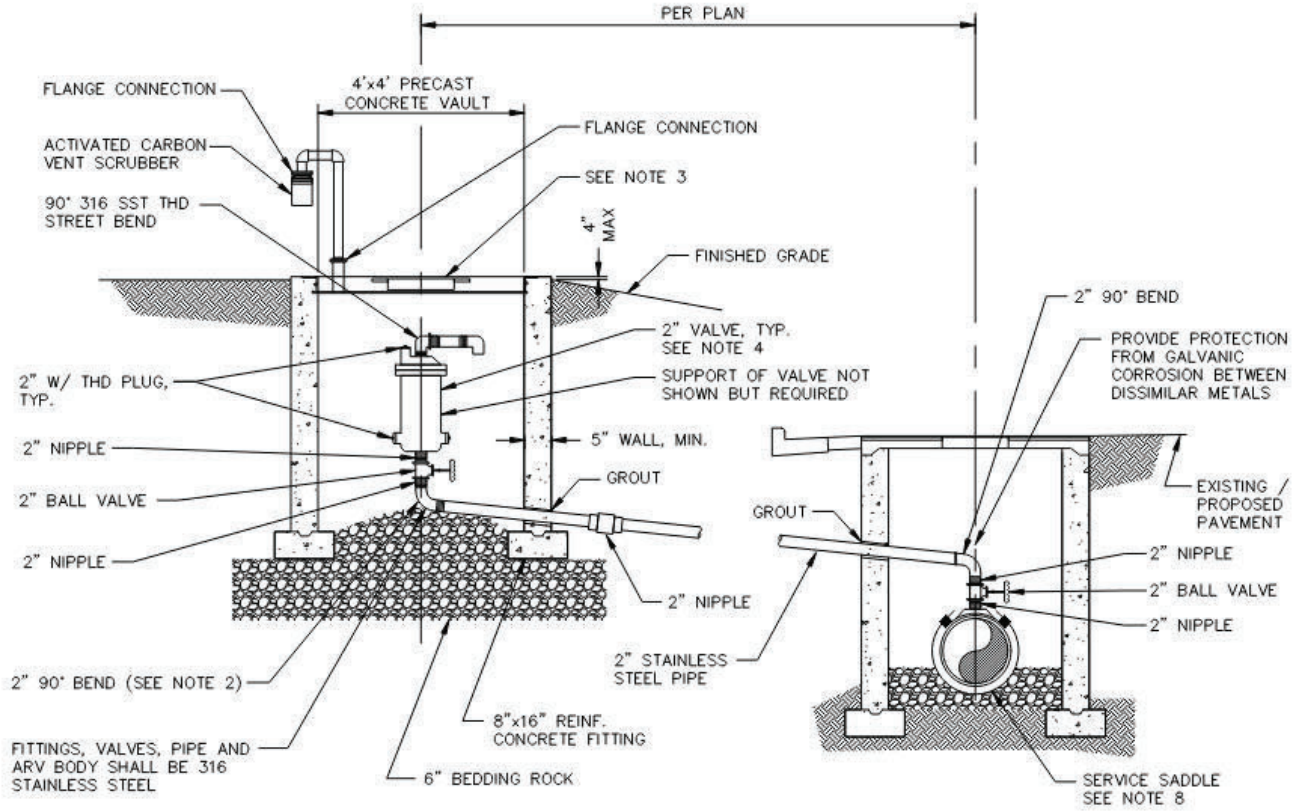
PUMP STATION
EXAMPLE OVERFLOW TANK

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-017



NOTES:

1. ABOVE DETAIL IS BASED ON A 2" WASTEWATER AIR/VACUUM RELEASE VALVE. VALVE SIZES SHALL BE DETERMINED BY THE DEVELOPER'S ENGINEER AND APPROVED BY FULTON COUNTY PUBLIC WORKS PRIOR TO INSTALLATION. SPECIFIC COMPONENTS WILL BE DIFFERENT BASED ON DIFFERENT SIZES.
2. THE MINIMUM DIMENSION FROM INVERT TO FINISHED GRADE SHALL BE 4.0 FEET.
3. FRAME AND COVER SHALL BE EQUIVALENT TO U.S. FOUNDARY USF 170-E-ORS.
4. VALVE SHALL BE VENT TECH OR VENT-O-MAT OR EQUAL. SIZE SHALL BE BASED ON FORCE MAIN SIZE.
5. THE WASTEWATER AIR/VACUUM RELEASE VALVE VAULT IS NOT DETAILED FOR VEHICULAR TRAFFIC LOADS AND IS NOT INTENDED FOR PLACEMENT WITHIN THE TRAVELED WAY.
6. VAULT VENT SHALL BE PROVIDED WITH ACTIVATED CARBON ODOR CONTROL CANISTER.
7. AIR-VACUUM VALVE SHALL BE PROVIDED WITH SUPPORTS.
8. PROVIDE SERVICE SADDLE WITH NTP THREADED OUTLETS:
   - DESIGNED FOR USE WITH DIP, PVC AND HDPE PIPES WITH A WORKING PRESSURE OF 300 PSI.
   - BODIES: DUCTILE IRON PER ASTM A536.
   - STRAPS: TYPE 304 STAINLESS STEEL. DOUBLE STRAP 1.50" WIDE.
   - NUTS: TYPE 304 STAINLESS STEEL FLUOROPOLYMER COATED.
   - WASHERS: TYPE 304 STAINLESS STEEL
   - STUDS: TYPE 304 STAINLESS STEEL
   - GASKET: NITRILE (BUNA N) NSF 61® COMPOUNDED TO RESIST OIL, ACIDS, ALKALIES, MOST (ALIPHATIC) HYDROCARBON FLUIDS, WATER AND OTHER CHEMICALS.
   - FINISH: FLEXI-COAT® FUSION-BONDED EPOXY FINISH PER AWWA C213.
   - AS MANUFACTURED BY SMITH BLAIR OR FCPW APPROVED EQUAL.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

PUMP STATION COMBINATION AIR-VACUUM VALVE INSTALLATION DETAIL

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-018

LEGEND

AH – ALARM HORN

AIT – ANALYSIS INDICATING TRANSMITTER

AL – ALARM LIGHT

ASB – ALARM SILENCE BUTTON

ATS – AUTOMATIC TRANSFER SWITCH

CCB – CONTROL CIRCUIT BREAKER

DRB – DUPLEX RECEPTACLE BREAKER

ECB – EMERGENCY CIRCUIT BREAKER

ETM – ELAPSE TIME METER

F – FUSE

FIT – FLOW INDICATING TRANSMITTER

FL – FLASHER

GFDR – GROUND FAULT DUPLEX RECEPTACLE

HOA – HANDS-OFF-AUTO SELECTOR SWITCH

LIT – LEVEL INDICATING TRANSMITTER

LSH – LEVEL SWITCH HIGH

MB – MOTOR BREAKER

MCB – MAIN CIRCUIT BREAKER

MSH – MOISTER SENSOR HIGH

MS – MOTOR STARTER

PL – PILOT LIGHT

PLC – PROGRAMABLE LOGIC CONTROLLER

PM – PHASE MONITOR

RCB – RTU CIRCUIT BREAKER

RL – RUNNING LIGHT

RTU – REMOTE TRANSMITTING UNIT

TB – TERMINAL BLOCK

TS – TEST SWITCH

TSH – TEMPERATURE SWITCH HIGH

TVSS – TRANSIENT VOLTAGE SURGE SUPPRESSER

XFMR – TRANSFORMER

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

PUMP STATION
ELECTRICAL LEGEND

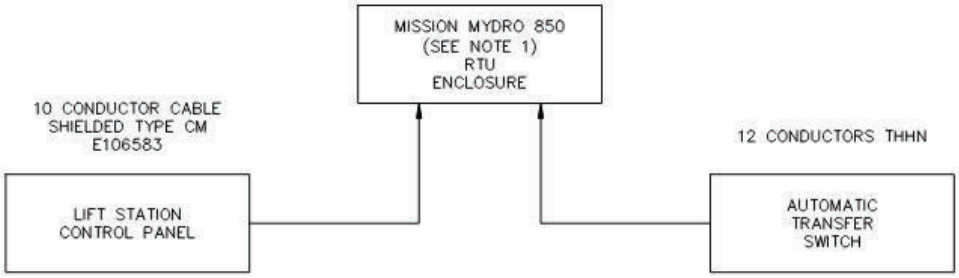
NOT TO SCALE

DATE: 08-06-2025

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DETAIL NO. P-019

PUMPING STATION RTU CONNECTIONS



RTU ENCLOSURE MIXED I/O MODULE

FROM RTU ENCLOSURE DOOR LIMIT

1	O—	SPARE
2	O—	SPARE
3	O—	SPARE
4	O—	SPARE
5	O—	SPARE
6	O—	SITE SECURITY
7	O—	SPARE
8	O—	GEN INTRUSION

#14 AWG FROM GEN TRANS

9	O—	GENERATOR RUNNING
10	O—	PUMP 1 FAILURE
11	O—	PUMP 2 FAILURE
12	O—	HIGH WET WELL
13	O—	CONTROL VOLTAGE FAILURE/STATION FLOODED
14	O—	COMMON
15	O—	GEN FAULT
16	O—	GEN WARNING

17	O—	LOW FUEL LEVEL
18	O—	LOW GAS PRESSURE
19	O—	OVER RUN CONDITION
20	O—	HIGH ENGINE TEMP
21	O—	LOW ENGINE TEMP
22	O—	LOW COOLANT
23	O—	LOW OIL PRESSURE
24	O—	FUEL TANK RUPTURE BASIN ALARM

25	O—	NOT IN AUTO
26	O—	SOURCE 1 AVAILABLE
27	O—	SOURCE 1 CONNECTED
28	O—	SOURCE 2 AVAILABLE
29	O—	SOURCE 2 CONNECTED
30	O—	TRANSFER SWITCH NORMAL POSITION
31	O—	TRANSFER SWITCH EMERGENCY POSITION
32	O—	AC LINE FAILURE

33	O—	HIGH BATTERY VOLTAGE
34	O—	LOW BATTERY VOLTAGE
35	O—	SPARE
36	O—	LIT-1
37	O—	LIT-2
38	O—	FIT-1
39	O—	XIT-1
40	O—	AIT-1

NOTE:

1. OR CURRENT MODEL AS DIRECTED BY FCPW.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

PUMP STATION RTU CONNECTIONS

NOT TO SCALE

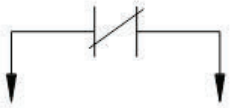
DATE: 08-06-2025

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FAX: 404-224-0498

DETAIL NO. P-020

BASIC LIFT STATION CONTROL PANEL – RTU ALARM INPUTS

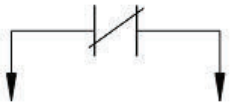
PUMP 1 FAILURE



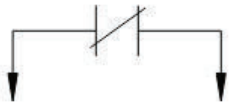
PUMP 2 FAILURE



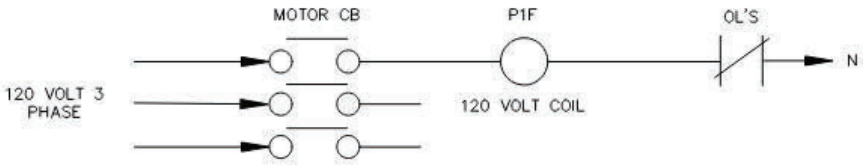
HIGH WET WELL



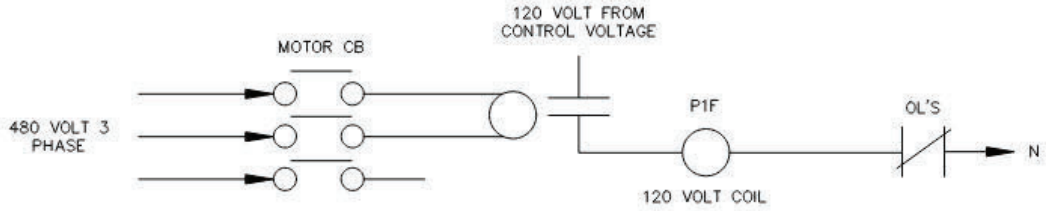
CONTROL VOLTAGE FAILURE
STATION FLOODED (IF NEEDED)



TYPICAL FOR 240V
3 PHASE POWER



TYPICAL FOR 480V
3 PHASE POWER
(PREFERED)



RELAY TYPE:
480 VOLT AC COIL, PORTER & BRUMFIELD PRD-11AYO-480 OF EQUAL.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

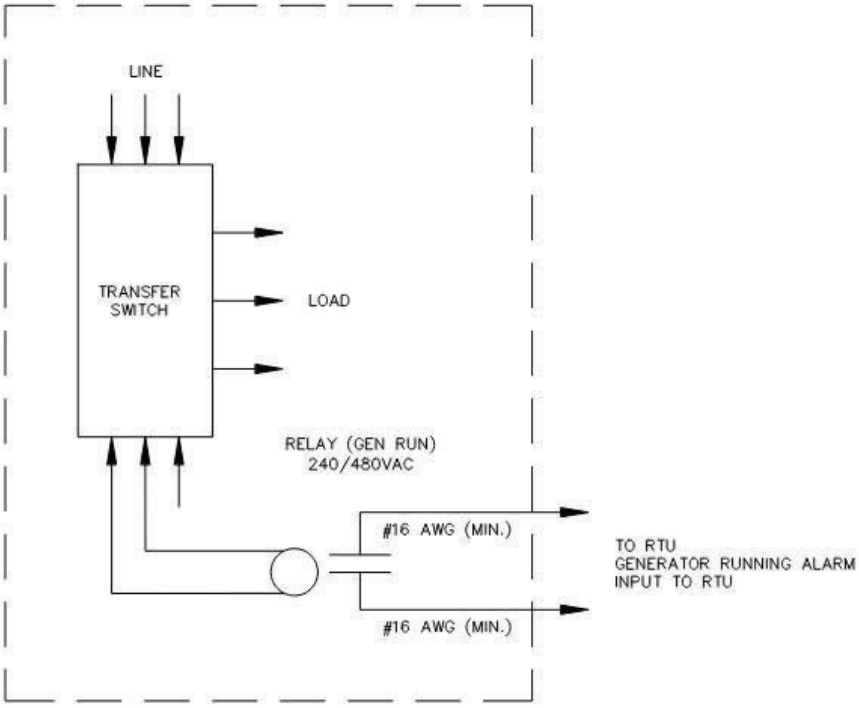
PUMP STATION
BASIC CONTROL PANEL DETAIL
RTU ALARM INPUTS

NOT TO SCALE

DATE: 08-06-2025

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DETAIL NO. P-021



RELAY TYPES:
240VAC COIL, 8 PIN CUBE TYPE; 480VAC COIL PORTER & BRUMFIELD PRD-11AYO-480 OR EQUAL.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

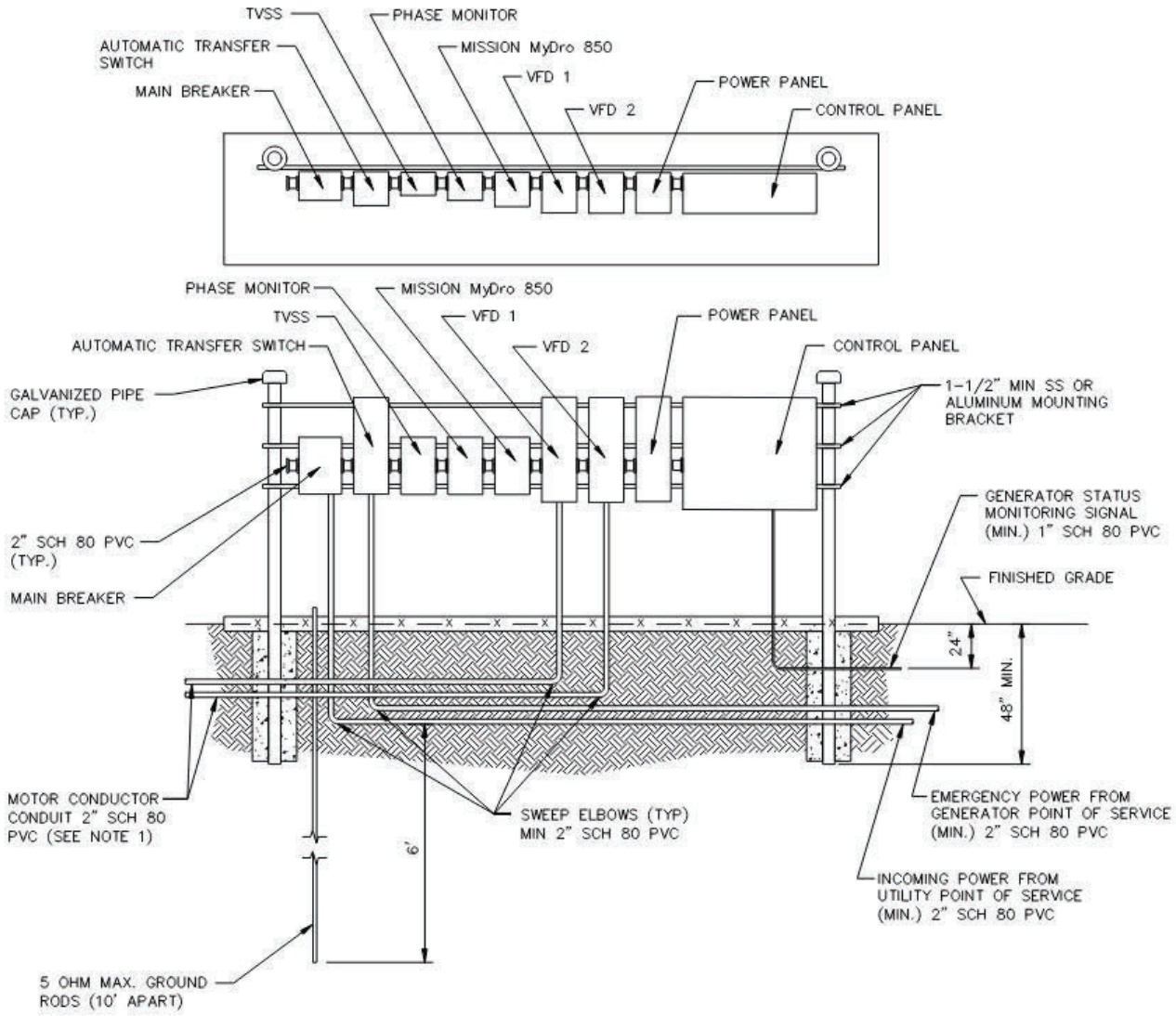
PUMP STATION
GENERATOR TRANSFER SWITCH
GENERATOR RUN ALARM

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
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DETAIL NO. P-022



PANEL INSTALLATION NOTES:

1. PUMP MOTOR CONDUIT SHALL BE SIZED TO BE ONLY 40% FILLED. MINIMUM CONDUIT SIZE TO BE 2" SCH 80 PVC.
2. POWER SUPPLY SHALL BE UNDERGROUND ON THE LIFT STATION SITE AND SHALL BE 3-PHASE, FROM A 3-PHASE SOURCE ONLY.
3. AN ELECTRICAL GROUNDING SYSTEM SHALL BE INSTALLED AS PER THE NATIONAL ELECTRICAL CODE, LOCAL CODES AND ORDINANCES. AN UNDERGROUND PERIMETER CABLE GROUNDING SYSTEM SHALL BE INSTALLED WITH CONNECTIONS TO AT LEAST WET WELL COVER, VALVE VAULT COVER, CONTROL PANELS, GENERATOR, UTILITY COMPANY TRANSFORMER, MANUAL DISCONNECT SWITCH AND METAL FENCE.
4. ALL MOUNTING HARDWARE & BRACKETS SHALL BE 316 STAINLESS STEEL.
5. ON A 4-WIRE, DELTA SYSTEM, THE HIGH-LEG SHALL BE IDENTIFIED WITH ORANGE COLOR TAPE AT ALL CONNECTION POINTS AND SHALL BE LOCATED ON THE "B" PHASE AT THE LINE SIDE OF THE MAIN DISCONNECT.
6. PANELS AND ELECRICAL CXABINETS SHALL BE COVERED WITH A 4 FEET WIDE BY 8 FEET HIGH AWNING (NOT SHOWN).
7. ALL ELECTRICAL CONDUIT TO BE ENCASED IN CONCRETE. ADD RED DYE OR SPRINKLE RED DYE THROUGHOUT CONCRETE THAT IS ACCEPTABLE TO INSPECTOR.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

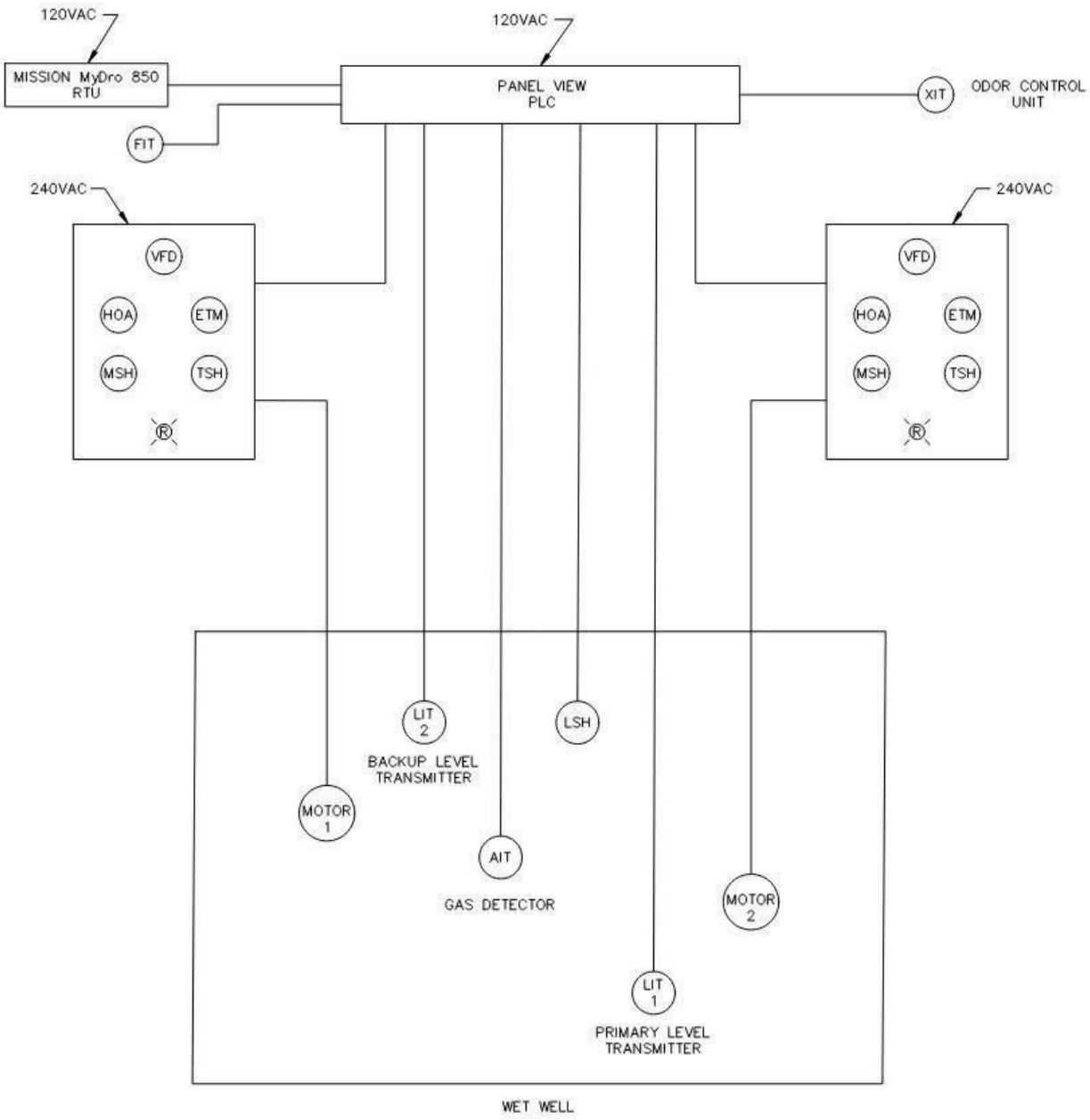
PUMP STATION
TYPICAL POWER AND CONTROL PANEL RACK (240V, 480V)

NOT TO SCALE

DATE: 08-06-2025

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DETAIL NO. P-023



NOTES:

1. PUMP'S MOISTURE/TEMPERATURE RELAYS TO BE MOUNTED AT RESPECTIVE VFDs.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

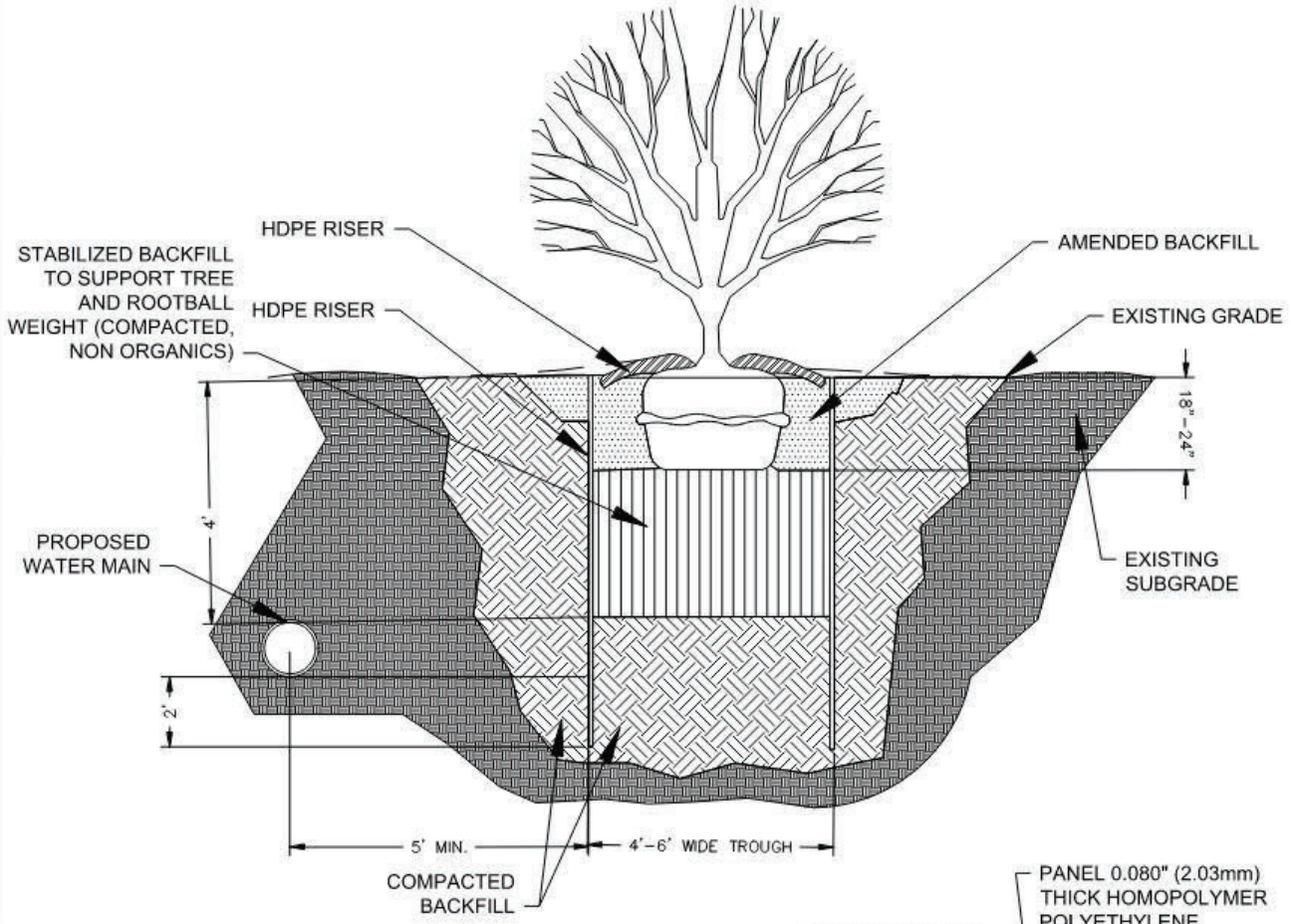
PUMP STATION
EXAMPLE DUPLEX PUMP CONTROL
BLOCK DIAGRAM (240V, 480V)

NOT TO SCALE

DATE: 08-06-2025

FULTON COUNTY PUBLIC WORKS
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DETAIL NO. P-024

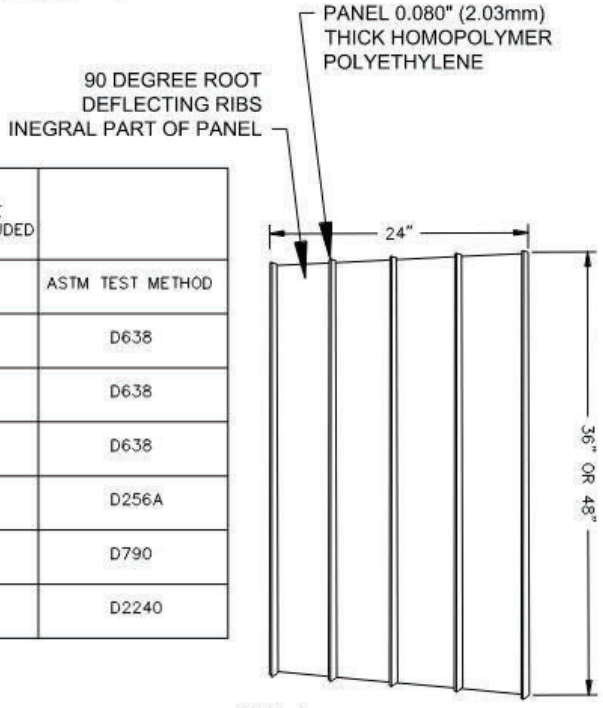


UB 36-2/UB 48-2 SPECIFICATIONS 36" AND 48" DEEPROOT TREE ROOT BARRIER

A. MATERIALS

1. THE CONTRACTOR SHALL FURNISH AND INSTALL TREE ROOT BARRIER AS SPECIFIED. THE ROOT BARRIER SHALL BE EITHER PRODUCT #UB 36-2 OR UB 48-2 AS MANUFACTURED BY DEEPROOT GREEN INFRASTRUCTURE, LLC. 530 WASHINGTON STREET, SAN FRANCISCO, CA, WWW.DEEPROOT.COM (800).458.7668).
2. ROOT BARRIER SHALL BE RECYCLABLE, BLACK, EXTRUDED PANELS WITH 0.80" (2.03MM) WALL THICKNESS IN MODULES 24" (609MM) LONG AND EITHER 36" (910MM) OR 48" (1220MM) DEEP.
3. ROOT BARRIER SHALL BE MANUFACTURED WITH 100% REPROCESSED HOMOPOLYMER POLYETHYLENE WITH ADDED ULTRAVIOLET INHIBITORS.
4. ROOT BARRIER SHALL BE COMPRISED OF 24" (609mm) MODULES. EACH PANEL SHALL HAVE NO LLESS THAN FOUR (4) MOLDED INTEGRAL VERTICAL ROOT DIRECTING RIBS OF A MINIMUM 0.080" (2.03mm) THICKNESS, PROTRUDING 1/2" (12.7mm) AT 90 DEGREES FROM INTERIOR OF THE BARRIER PANEL, SPACED 6" (152.4mm) APART. (SEE DETAIL A)
5. ROOT BARRIER SHALL HAVE AN INTEGRATED JOINING SYSTEM FOR ASSEMBLY BY SLIDING ONE PANEL INTO ANOTHER.

MATERIAL AND THICKNESS	HOMOPOLYMER POLYETHYLENE 0.080 INCH EXTRUDED	
PROPERTIES	TYPICAL VALUE	ASTM TEST METHOD
TENSILE STRESS @ YIELD	3800 PSI	D638
ELONGATION @ BREAK %	10%	D638
TENSILE MODULUS	155,000 PSI	D638
NOTCHED IZOD IMPACT	0.4 - 4.0	D256A
FLEXUAL MODULUS 73 PSI	145,000	D790
HARDNESS SHORE	P66	D2240



DETAIL A
TREE ROOT BARRIER FENCE

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

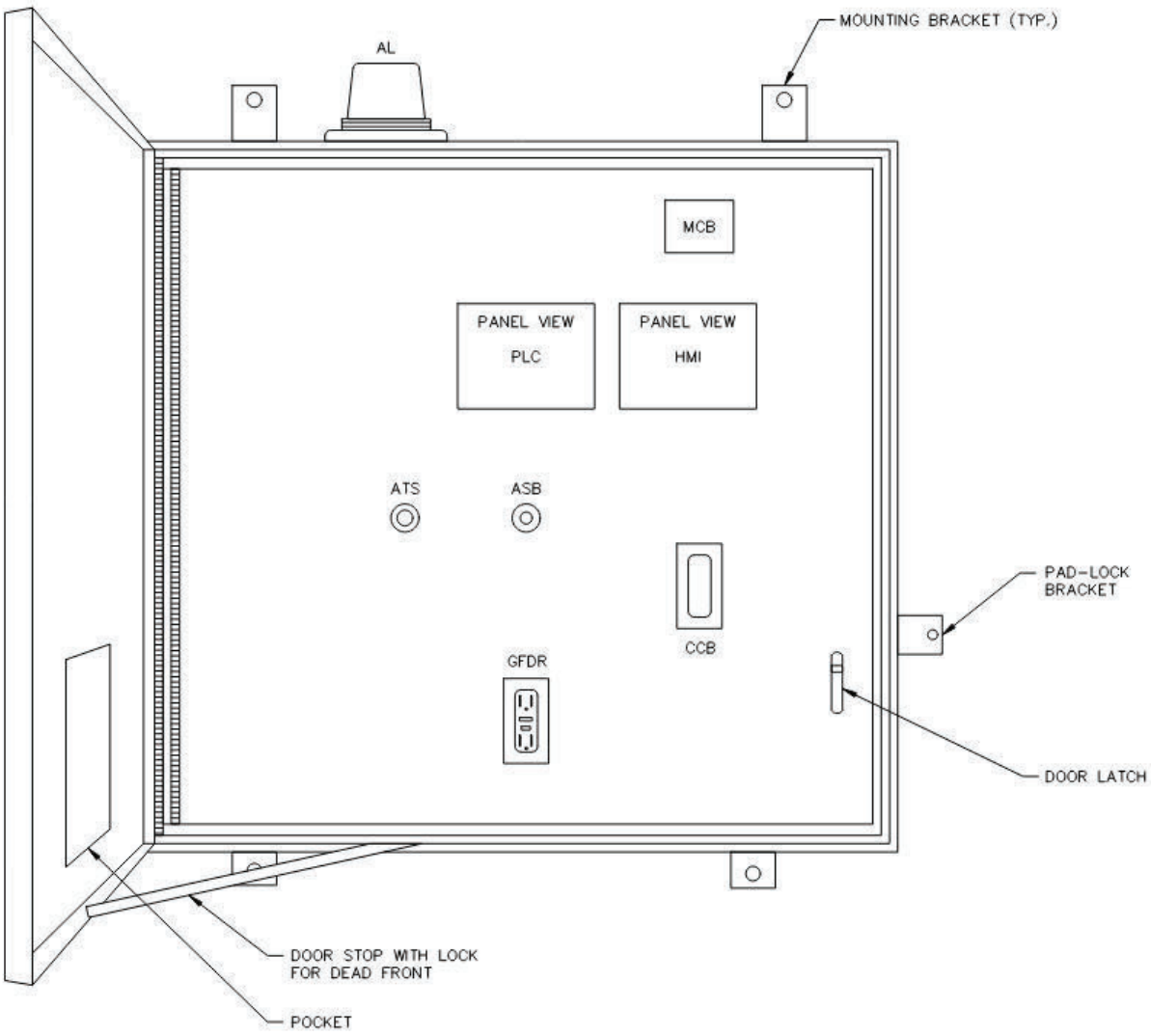
ROOT BARRIER SYSTEM

NOT TO SCALE

DATE: 08-06-2025

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DETAIL NO. P-026



NOTES:

1. DEADFRONT LAYOUT NEMA TYPE 3R SS ENCLOSURE W/CONTINUOUS HINGE. ALL HARDWARE TYPE 316 SS TYPICAL, ACTUAL MAY VARY WITH HORSEPOWER AND NUMBER OF PUMPS.
2. ALL CONTROL WIRE TO BE #16 AWG, MINIMUM.
3. CONTROL PANEL SHALL BE UL LISTED AND LABELED.
4. PANEL VIEW PLC (HMI) SHALL BE 10-INCH MINIMUM.
5. EXTERIOR OF PANEL SHALL BE POWDER COATED WHITE.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

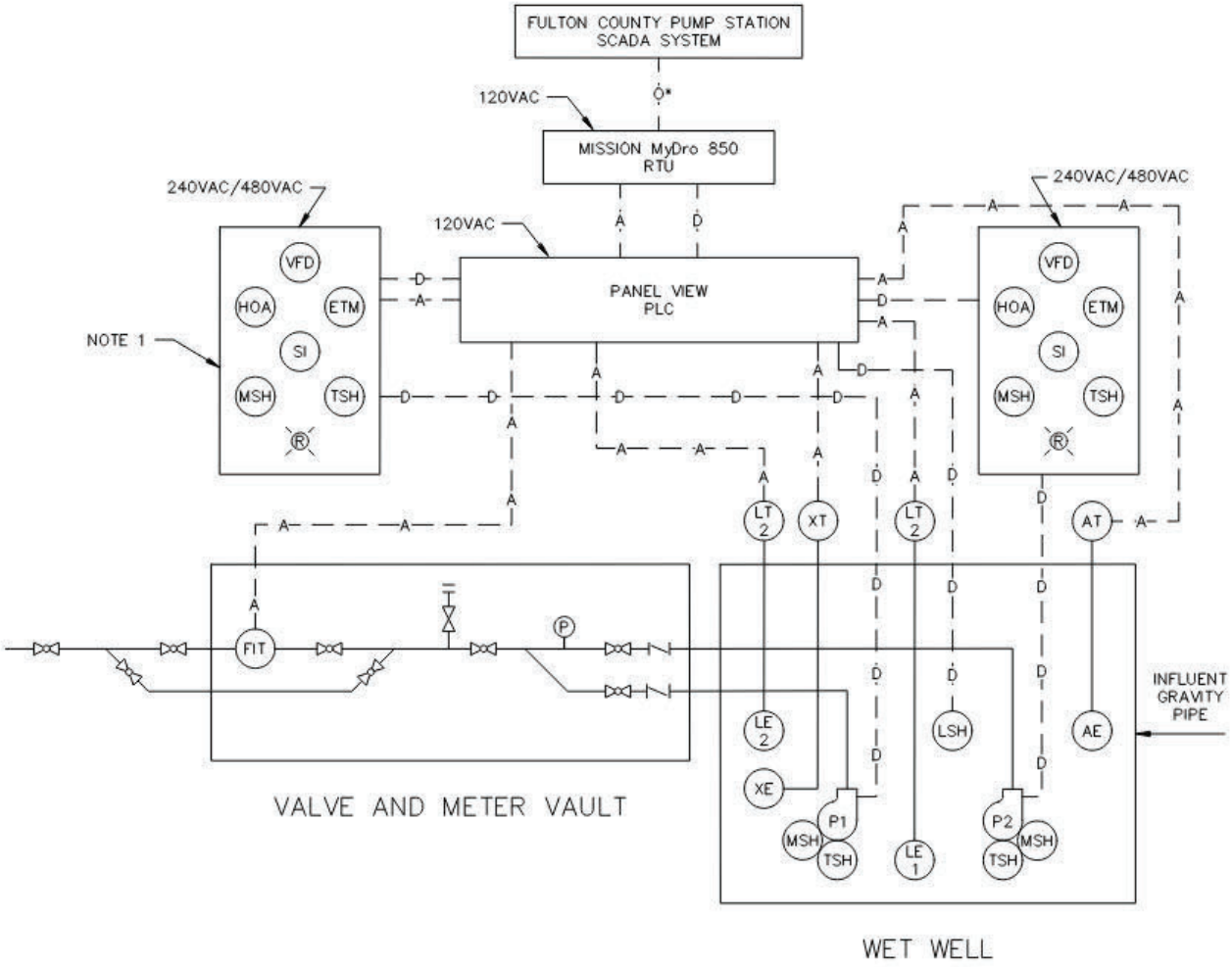
PUMP STATION
EXAMPLE DUPLEX CONTROL PANEL
ENCLOSURE DEAD FRONT LAYOUT

NOT TO SCALE

DATE: 08-06-2025

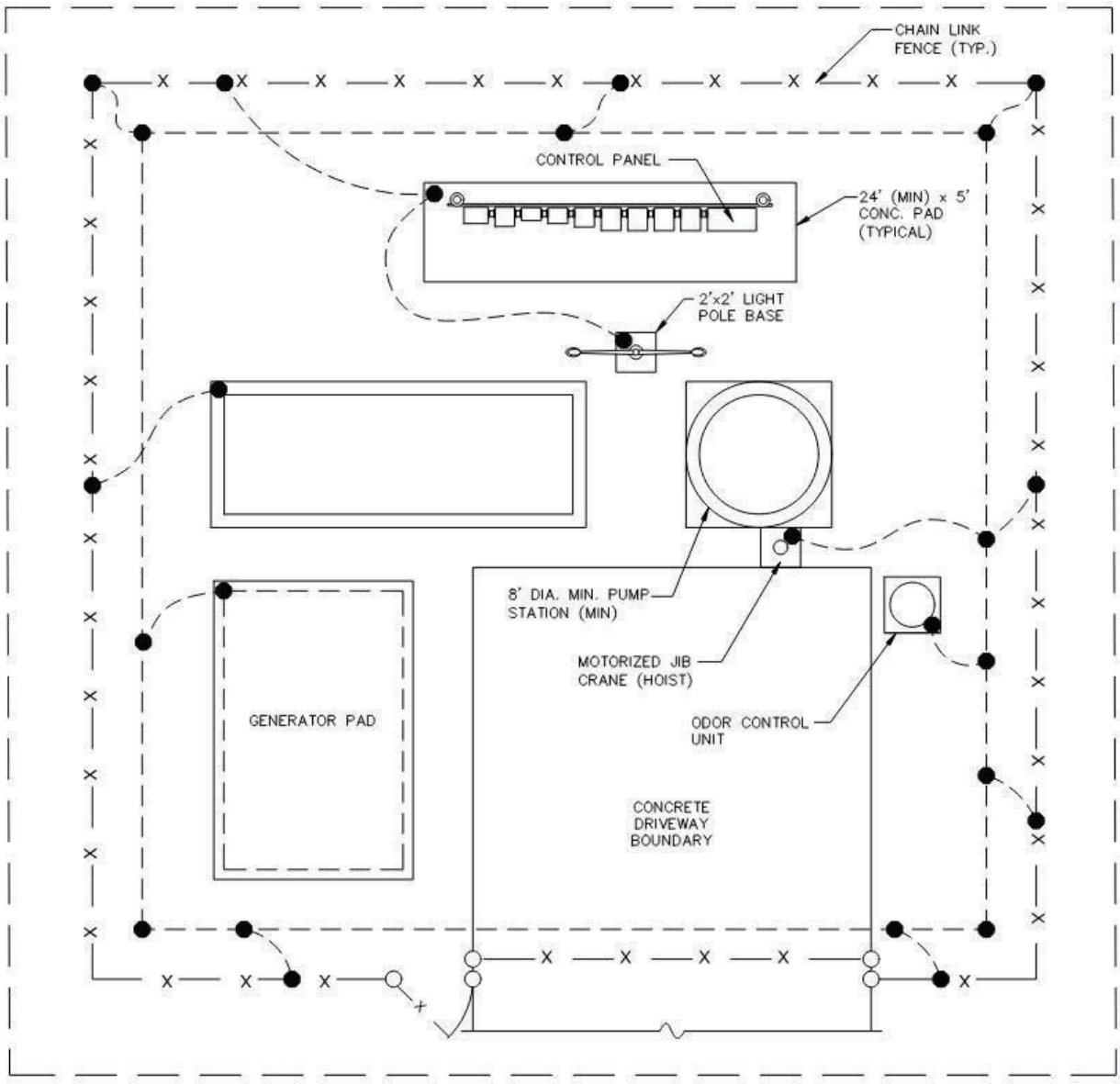
FULTON COUNTY PUBLIC WORKS
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DETAIL NO. P-027



*DATA

FULTON COUNTY	FULTON COUNTY STANDARD DETAILS	DATE: 08-06-2025
	PUMP STATION EXAMPLE PROCESS AND INSTRUMENTATION DIAGRAM NOT TO SCALE	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498
		DETAIL NO. P-028



NOTES:

GROUNDING ELECTRODE SYSTEM

1. A GROUNDING SYSTEM SHALL BE INSTALLED PER EOR THE NATIONAL ELECTRICAL CODE, LOCAL CODES AND ORDINANCES.
2. AN UNDERGROUND PERIMETER CABLE GROUNDING SYSTEM SHALL BE INSTALLED WITH CONNECTIONS TO AT EAST THE FOLLOWING EQUIPMENT.
   a. WET WALL COVER.
   b. VAULT COVER.
   c. CONTROL PANEL MOUNTING RACK.
   d. MAIN DISCONNECT SWITCH.
   e. PUMP STATION FENCE.
3. BARE COPPER WIRE (#4) IS TO BE CONNECTED TO THE WET WELL COVER AND THE VALVE AND METER VAULT COVER BY WAY OF AN APPROVED MECHANICAL CONNECTION.
4. WIRE (#4) SHALL ALSO BE POURED INTO TOP SLAB OF WET WELL AND THE VALVE AND METER VAULT AT THE FOUNDRY WITH A TWELVE (12) INCH STUB-OUT FOR FIELD CONNECTION.
5. UNDER NO CIRCUMSTANCES SHALL WIRE BE ALLOWED TO RUN ACROSS THE OUTSIDE TOP SLABS.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

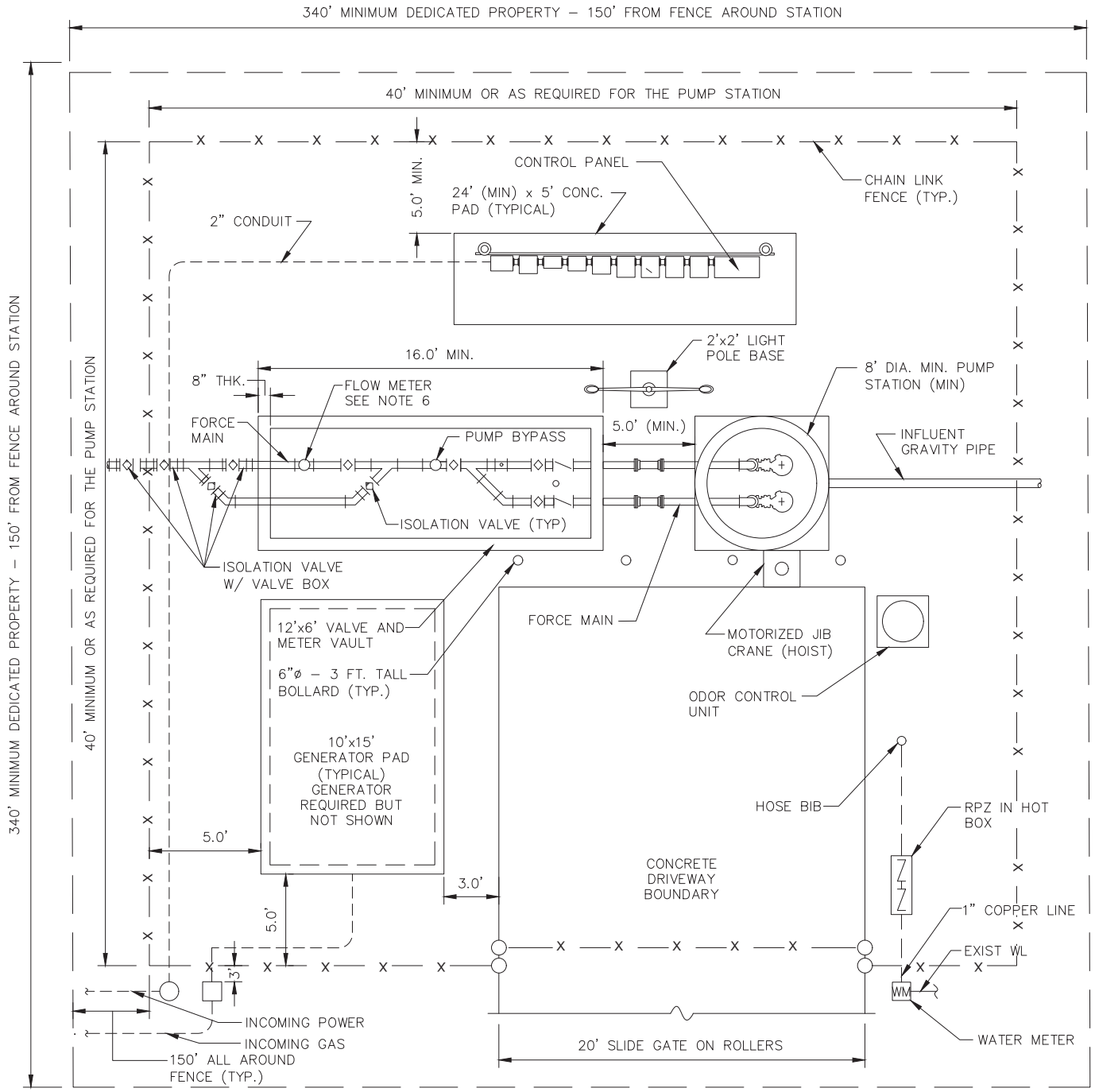
PUMP STATION
EXAMPLE SITE GROUNDING PLAN

NOT TO SCALE

DATE: 08-06-2025

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DETAIL NO. P-029



NOTES:

1. DETAIL IS EXAMPLE SITE PLAN. SIZES ARE RELATIVE AND BASED ON MINIMUM CRITERIA. LARGER WET WELLS, VALVE VAULTS, ETC. MAY BE REQUIRED BASED ON SITE CONDITIONS.
2. PUMP STATION PAD AND DRIVEWAY SHALL INCLUDE EXPANSION JOINTS AS NEEDED.
3. PUMP STATION PAD, OVERFLOW VAULT TOP SLAB, AND DRIVEWAY REINFORCEMENT SHALL BE DESIGNED TO WITHSTAND 80,000 LB LOAD.
4. THE STATION NAME, UTILITIES I.D. NUMBER AND ADDRESS SHALL BE AFFIXED TO THE FRONT OF THE METER CABINET.
5. ELECTRICAL AND CONTROL PANELS SHALL BE PROVIDED WITH A CANOPY WITH LED LIGHTING. SIZE OF THE CANOPY SHALL BE 5 FT WIDE AND 8 FT HIGH WITH THE LENGTH TO BE DETERMINED BY THE TOTAL COMBINED LENGTH OF ELECTRICAL AND CONTROL PANELS.
6. FOLLOW FLOW METER MANUFACTURER'S RECOMMENDATION FOR MINIMUM UPSTREAM AND DOWNSTREAM STRAIGHT PIPE DISTANCE FROM FLOW METER.
7. 20 FEET EASEMENT ALONG THE FORCE MAIN TO BE DEDICATED TO FULTON COUNTY.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

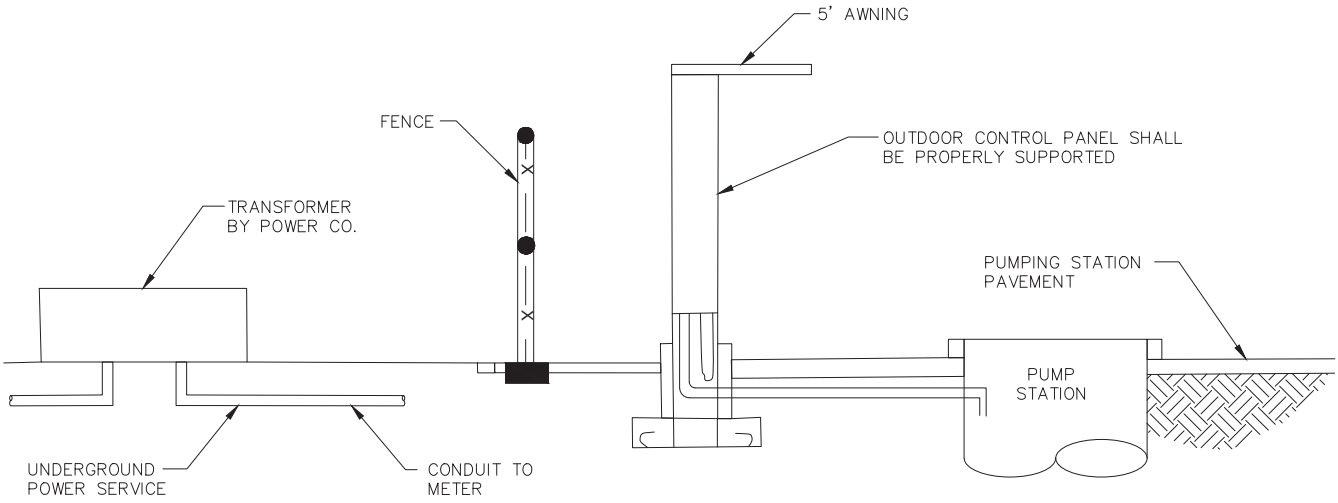
PUMP STATION SITE PLAN (TYPICAL / EXAMPLE)

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
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404-612-7400
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DETAIL NO. P-001



NOTES:

1. METER AND DISCONNECT SHALL BE PLACED NEAR THE FRONT ENTRANCE AS SHOWN ON P-001.
2. ALL ELECTRICAL CONDUIT TO BE ENCASED IN CONCRETE. ADD RED DYE OR SPRINKLE RED DYE THROUGHOUT CONCRETE THAT IS ACCEPTABLE TO INSPECTOR.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

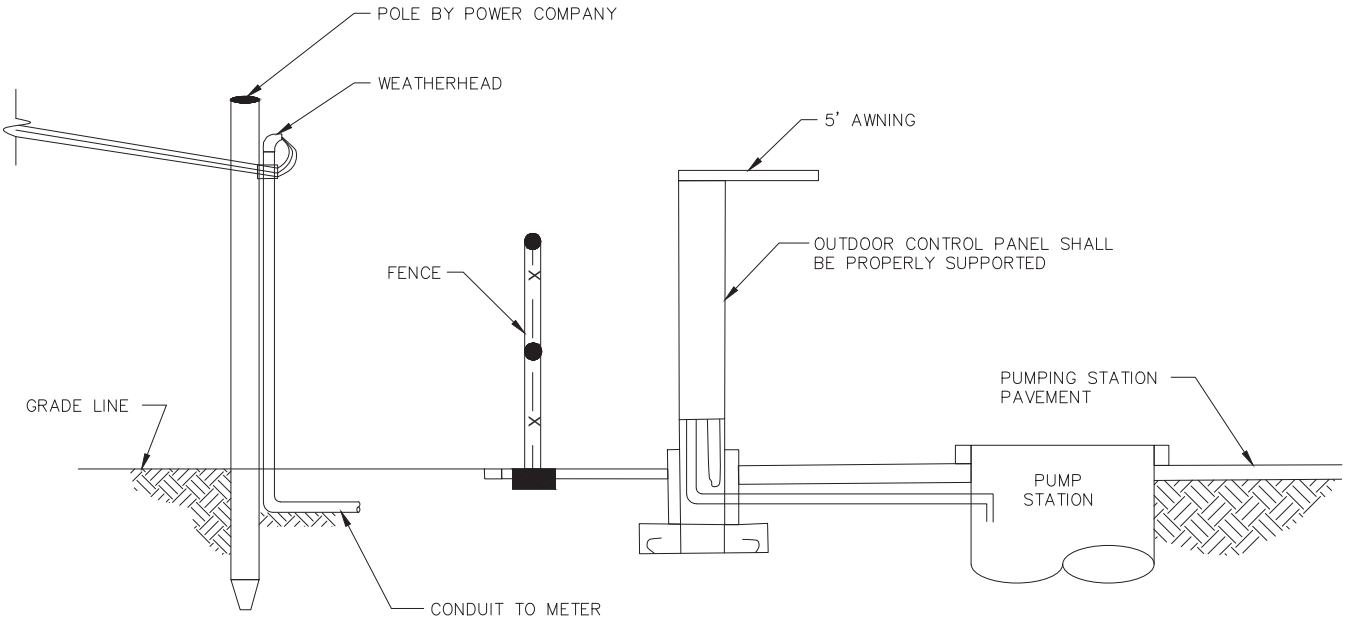
PUMP STATION UNDERGROUND POWER DETAIL

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
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DETAIL NO. P-002



NOTES:

1. DISCONNECT SHALL BE PLACED ON ELECTRICAL/CONTROL PANEL SUPPORT (MAIN BREAKER IS SHOWN ON P-023 AND P-025).
2. DISCONNECT SWITCH MUST BE LOCKABLE IN EACH POSITION.
3. OVERHEAD POWER ONLY ALLOWED IF NOT PHYSICALLY POSSIBLE TO RUN SERVICE UNDERGROUND.
4. ALL ELECTRICAL CONDUIT TO BE ENCASED IN CONCRETE. ADD RED DYE OR SPRINKLE RED DYE THROUGHOUT CONCRETE THAT IS ACCEPTABLE TO INSPECTOR.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

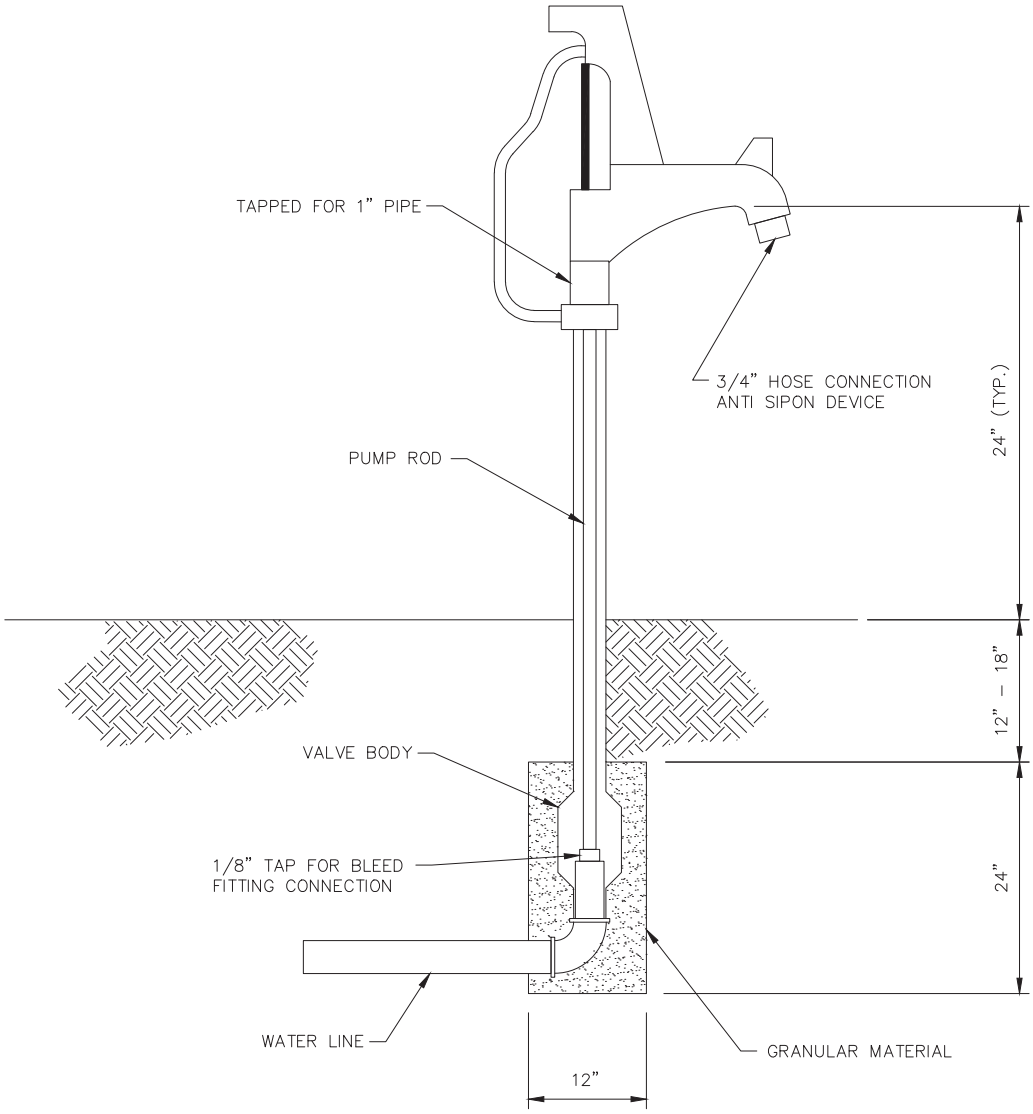
PUMP STATION OVERHEAD POWER DETAIL

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
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DETAIL NO. P-003



NOTE:

1. YARD HYDRANT TO BE SIMMONS 800 SERIES FREEZE PROOF OR APPROVED EQUAL.
2. PROVIDE FREEZE PROOF INSULATION FOR EXPOSED PIPE.
3. INCLUDE HOSE STAND AND 50-FEET OF 3/4-INCH HEAVY DUTY HOSE WITH BRASS NOZZLE.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

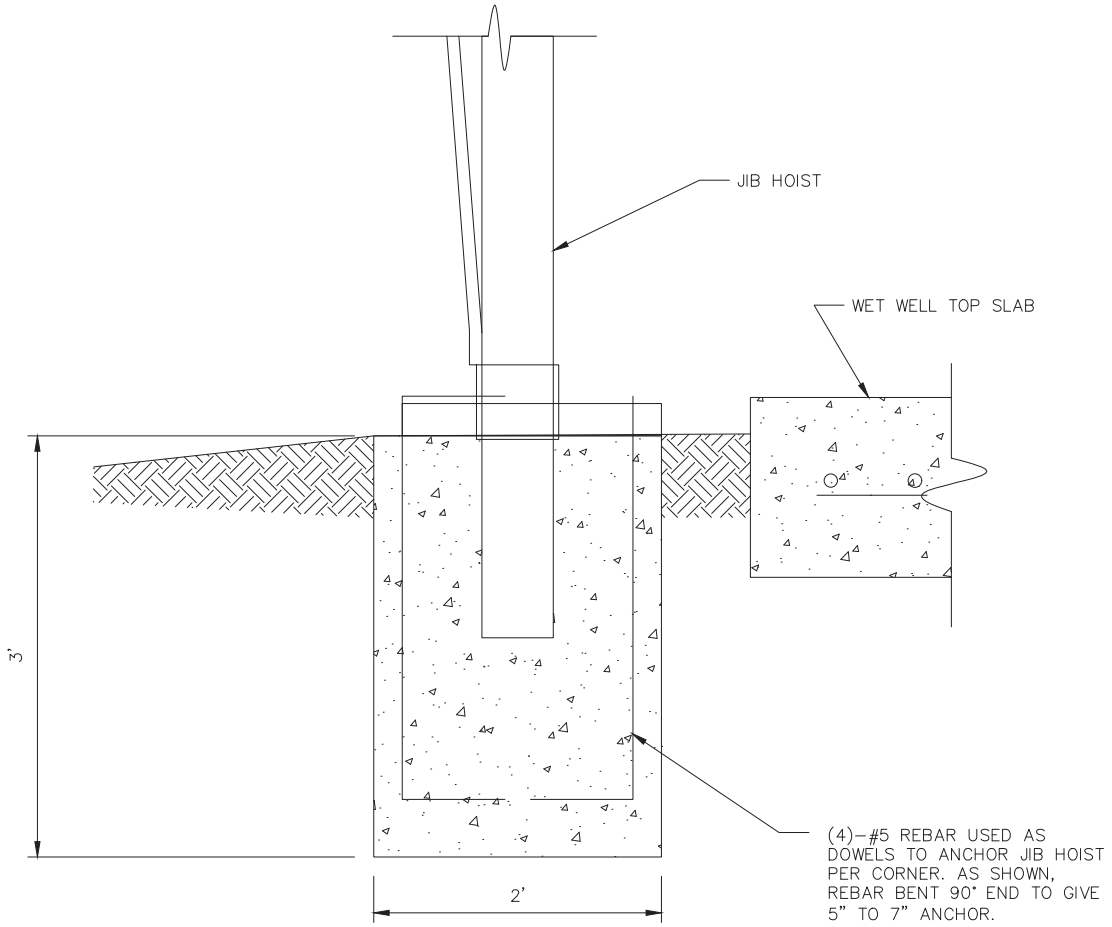
PUMP STATION
HOSE BIB
SERVICE CONNECTION DETAIL

NOT TO SCALE

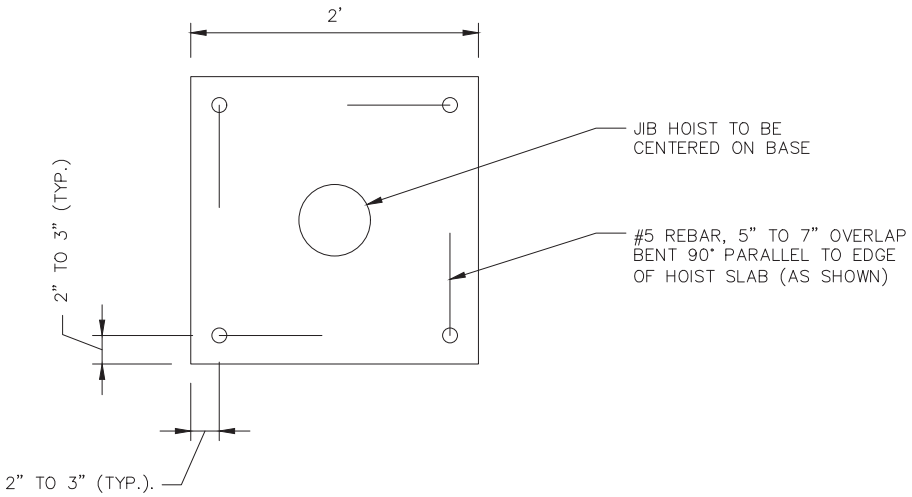
DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
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DETAIL NO. P-004



PROFILE



PLAN

NOTES:

1. HOIST SIZE TO INCREASE AS NECESSARY FOR PUMP SIZE OR PER HOIST MANUFACTURER.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

PUMP STATION
JIB CRANE (HOIST) BASE

NOT TO SCALE

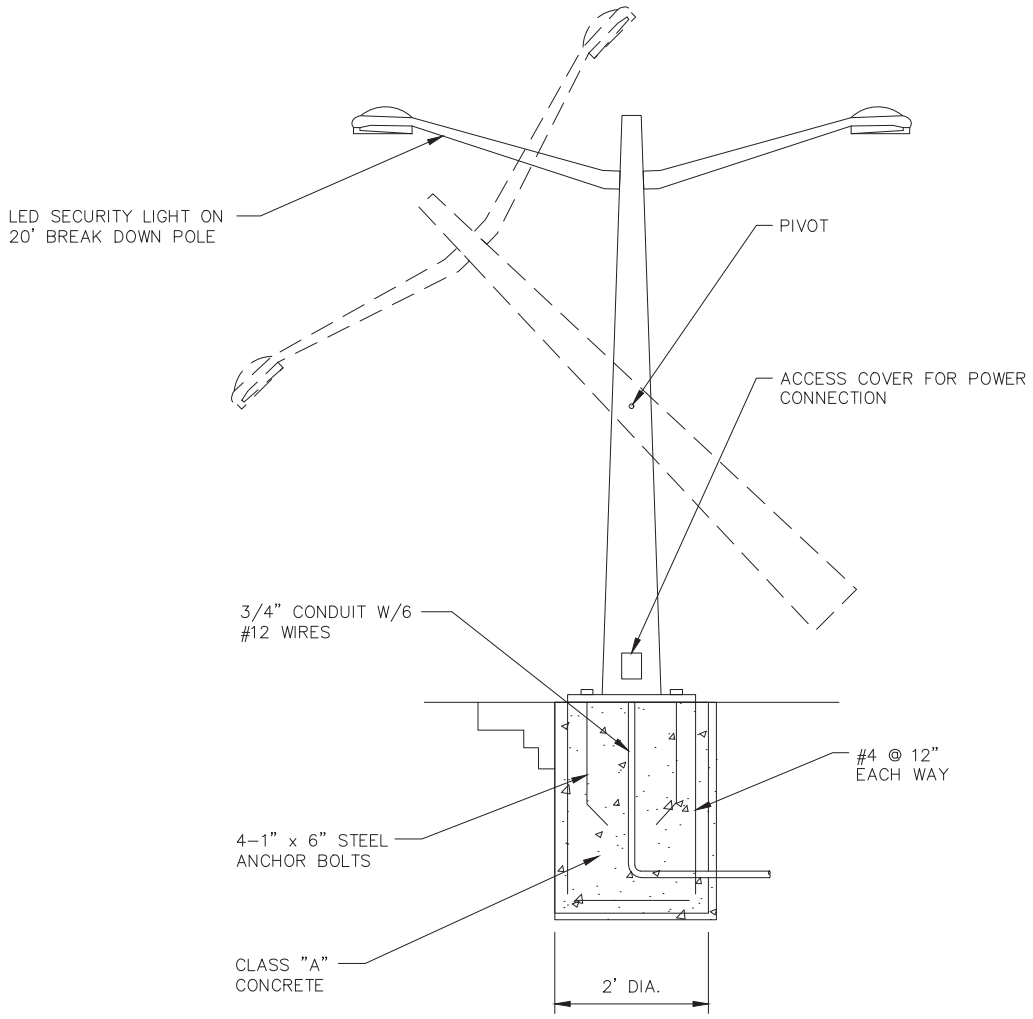
DATE: 01–21–2026

FULTON COUNTY PUBLIC WORKS
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FAX: 404–224–0498

DETAIL NO. P–005

NOTES:

1. EXTERIOR HINGED LIGHT POLE WITH 4900 LUMENS LED FIXTURE 120 VOLT PHOTOELECTRIC CONTROL, WITH HEAT AND IMPACT RESISTANT LENS. POLE IS TO BE ARCHITECTURAL BROWN AND IS TO BE SUPPLIED WITH LOWERING WENCH.
   FIXTURE – GE PART # ERL1005C530EDKBZR
   ER1 SHEILDS – GE PART # 93118695
   BRACKET – GE PART # RBSU216PP
   POLE – GE PART # ASHS202T–4.0–7PP
   WINCH – GE PART # M180A
2. SECURITY LIGHT TO HAVE MOTION SENSOR TO ACTIVE, LIGHTS TO CUT OFF 30–MINUTES AFTER ACTIVATION; LIGHT TO HAVE FULL CUTOFF SHIELD.
3. ALL ELECTRICAL CONDUIT TO BE ENCASED IN CONCRETE. ADD RED DYE OR SPRINKLE RED DYE THROUGHOUT CONCRETE THAT IS ACCEPTABLE TO INSPECTOR.



FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

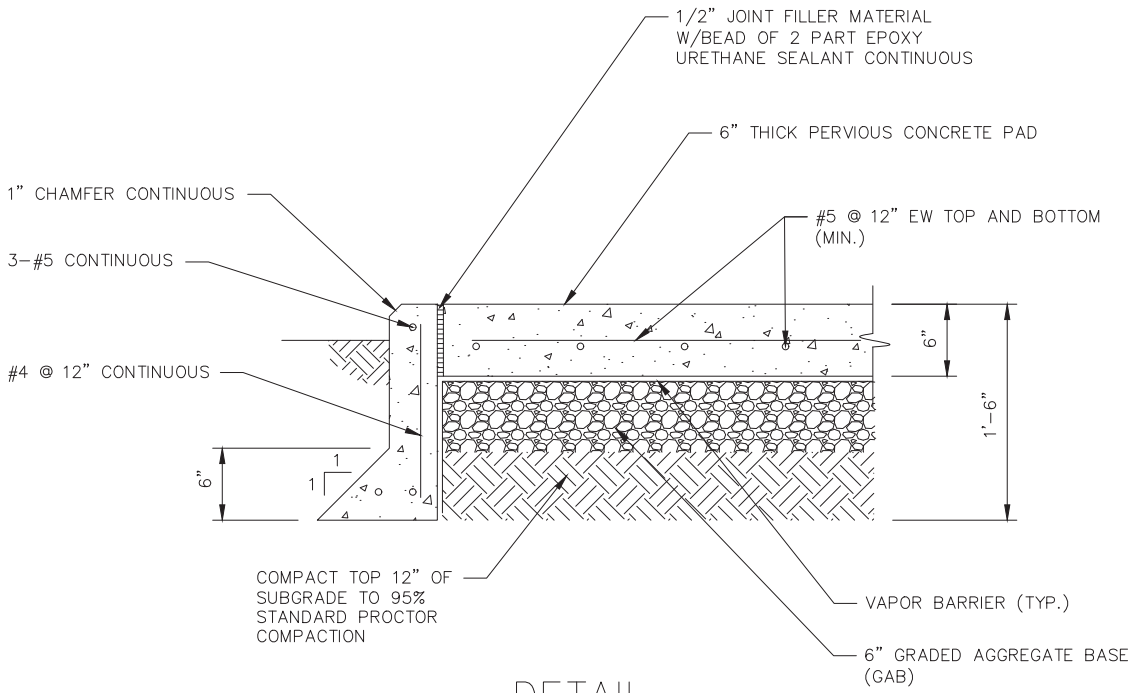
PUMP STATION
LIGHT POLE DETAIL

NOT TO SCALE

DATE: 01–21–2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404–612–7400
FAX: 404–224–0498

DETAIL NO. P–006



DETAIL

N.T.S.

NOTES:

1. PUMPING STATION CONCRETE PAD TO BE A MINIMUM OF 6 INCHES THICK ON A COMPACTED SUB-GRADE AND A MINIMUM 6 INCH AGGREGATE BASE COURSE COMPACTED TO 95% STANDARD PROCTOR COMPACTION.
2. PROVIDE CURBING, AS SHOWN, AROUND THE PAD TO PREVENT RUNOFF FROM FROM ERODING THE UNDERSIDE OF THE PAD.
3. PUMPING STATION PAD AND DRIVEWAY SHALL INCLUDE EXPANSION JOINTS AS NEEDED.
4. PUMPING STATION PAD AND DRIVEWAY REINFORCEMEINT SHALL BE DESIGNED TO WITHSATAND 80,000 LB LOAD.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

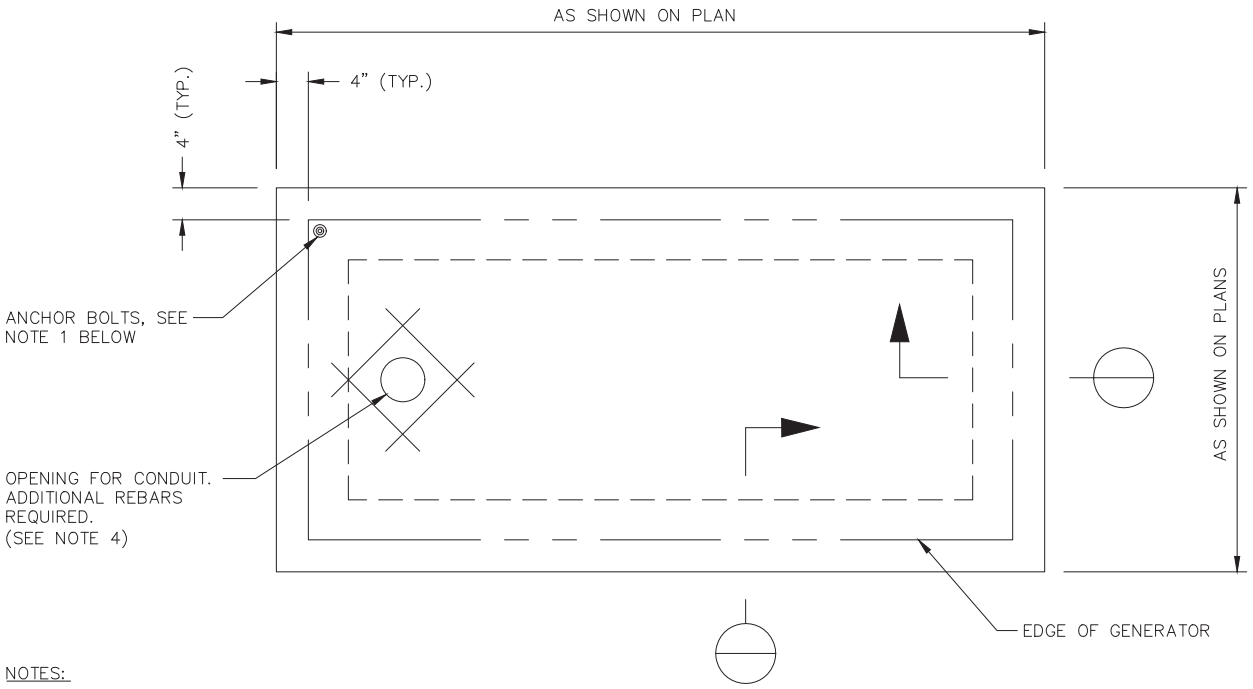
PUMP STATION
SLAB AND CURB DETAIL

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-008

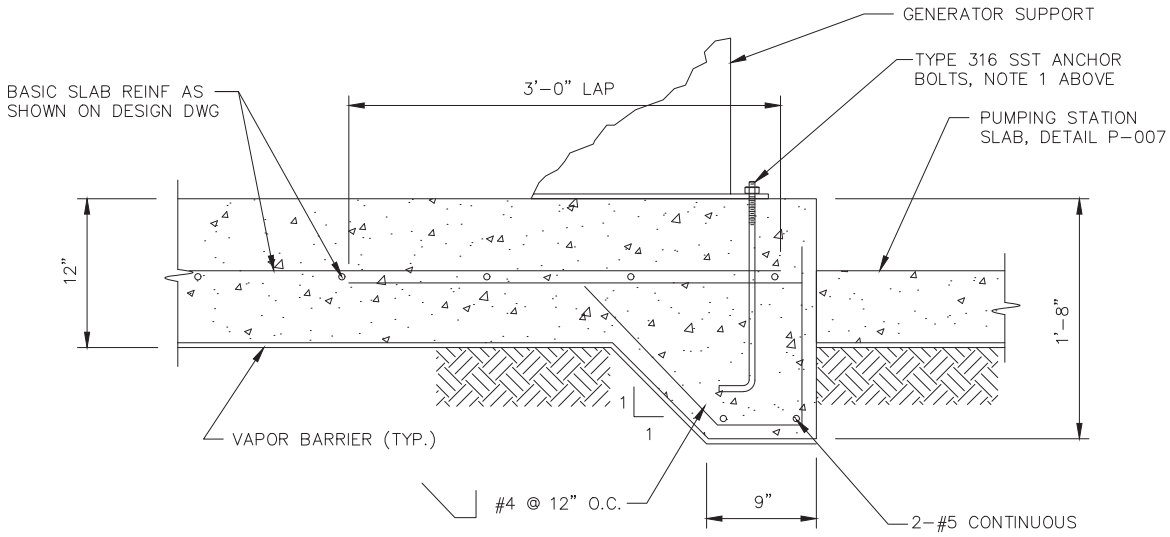


NOTES:

1. VERIFY QUANTITY, TYPE, DIAMETER AND LENGTH OF ANCHOR BOLTS REQUIRED BY MANUFACTURER PRIOR TO ORDERING AND/OR EMBEDDING FASTENERS IN CONCRETE SLAB.
2. PAD SIZE SHALL BE INCREASED AS NECESSARY.
3. CONTRACTOR TO COORDINATE SIZE AND LOCATION OF OPENING IN PAD FOR CONDUITS.
4. SIZE AND LENGTH OF REBARS TO BE DETERMINED BY DIAMETER OF CONDUIT OPENING.

PLAN

N.T.S.



SECTION (TYP.)

N.T.S.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

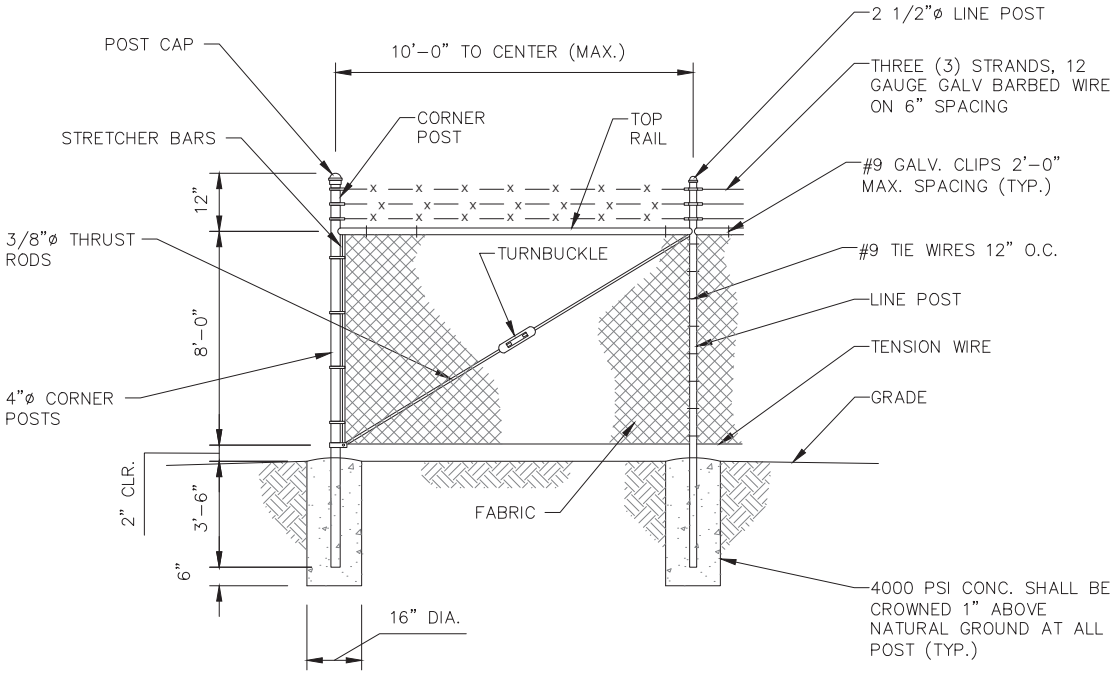
PUMP STATION
GENERATOR PAD DETAIL

NOT TO SCALE

DATE: 01-21-2026

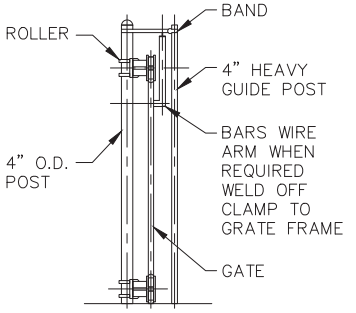
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-009



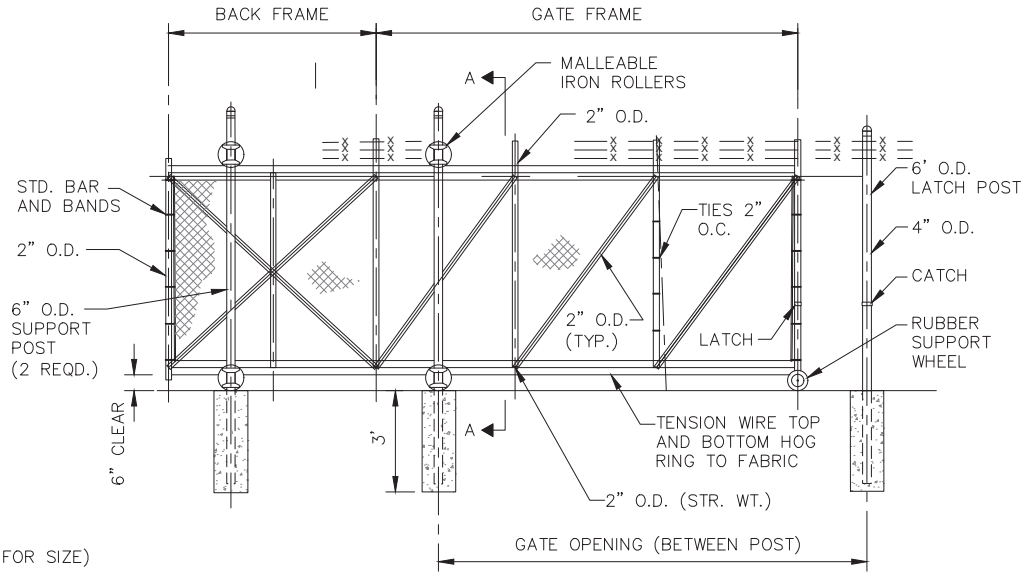
FENCING – CORNER DETAIL

N.T.S.

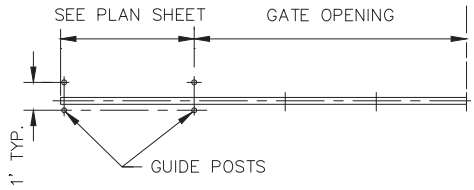


SECTION A–A

N.T.S.



(SEE PLAN SHEET FOR SIZE)



PLAN VIEW

N.T.S.

ROLLING GATE DETAIL

N.T.S.

NOTES:

1. THRUST RODS ARE REQUIRED FOR EACH GATE SECTION AND THE FIRST SPAN ON EACH SIDE OF A CORNER POST.
2. TOP LOCK HDPE FENCE SLATS ARE REQUIRED FOR ALL PUMPING STATION FENCES.
3. NUMBER 4 CHAINLINK WIRE FABRIC W/TOP RAILS.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

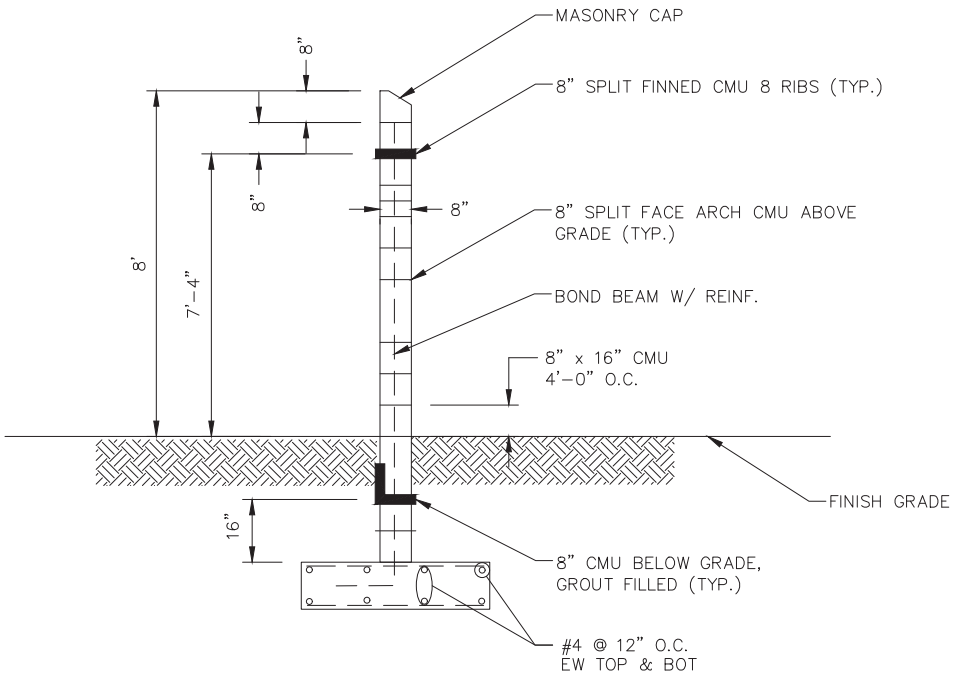
PUMP STATION
FENCE AND GATE DETAIL

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-010



SECTION VIEW

N.T.S.

NOTES:

1. DEVELOPER TO PROVIDE WALL DESIGN DRAWINGS SIGNED AND SEALED BY A PROFESSIONAL ENGINEER.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

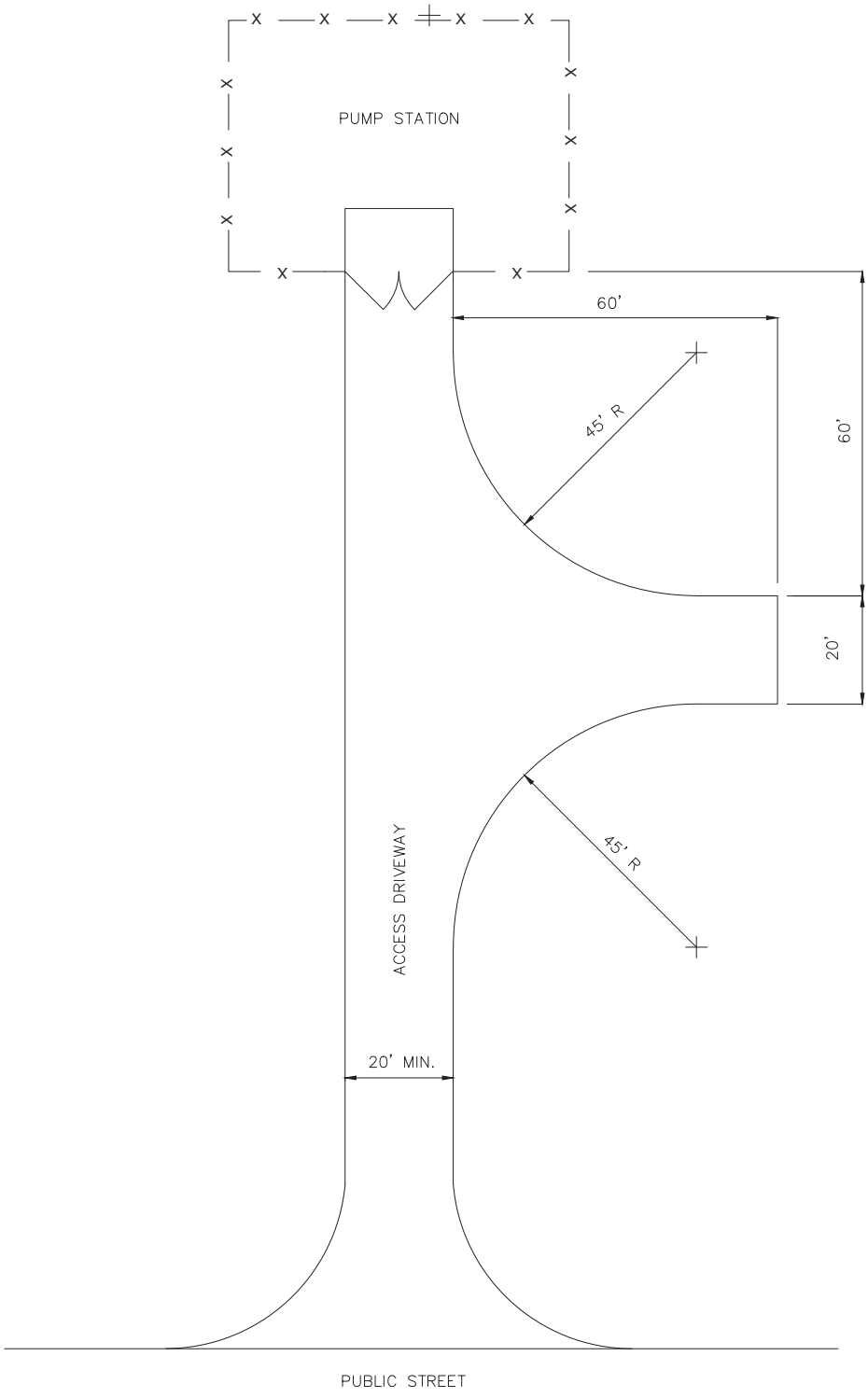
PUMP STATION
NOISE WALL

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-011



NOTES:

1. ENSURE THAT HAZMAT TRUCK MAY ENTER, BACK OUT, TURN AROUND AND EXIT PUMP STATION IN A SAFE MANNER.
2. ACCESS DRIVEWAY SHALL INCLUDE EXPANSION JOINTS AS NEEDED.
3. ACCESS DRIVEWAY REINFORCEMENT SHALL BE DESIGNED TO WITHSTAND 80,000 LB LOAD.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

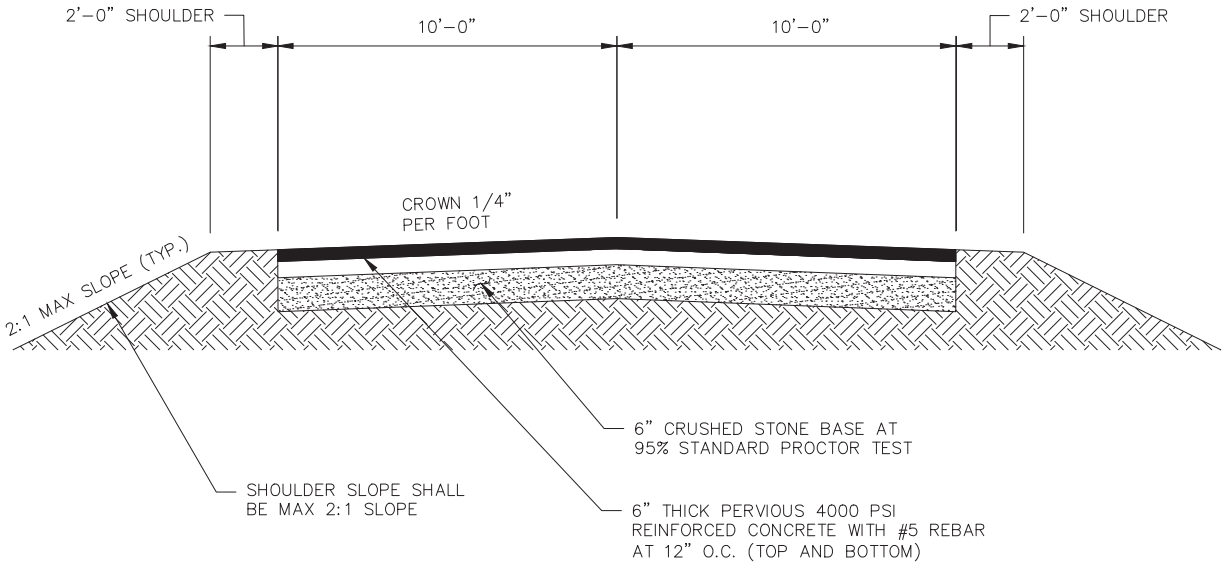
PUMP STATION
EXAMPLE ACCESS DRIVEWAY
AND TURN AROUND AREA

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-012



NOTES:

1. CONTRACTOR SHALL SUBMIT COPY OF PLAN AND PROFILES OF ACCESS ROAD FROM PUMP STATION TO EXISTING ROAD OR STREET. SLOPE OF ACCESS ROAD SHALL COMPLY WITH FULTON COUNTY REGULATIONS.
2. ACCESS DRIVEWAY SHALL INCLUDE EXPANSION JOINTS AS NEEDED.
3. ACCESS DRIVEWAY REINFORCEMENT SHALL BE DESIGNED TO WITHSTAND 80,000 LB LOAD.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

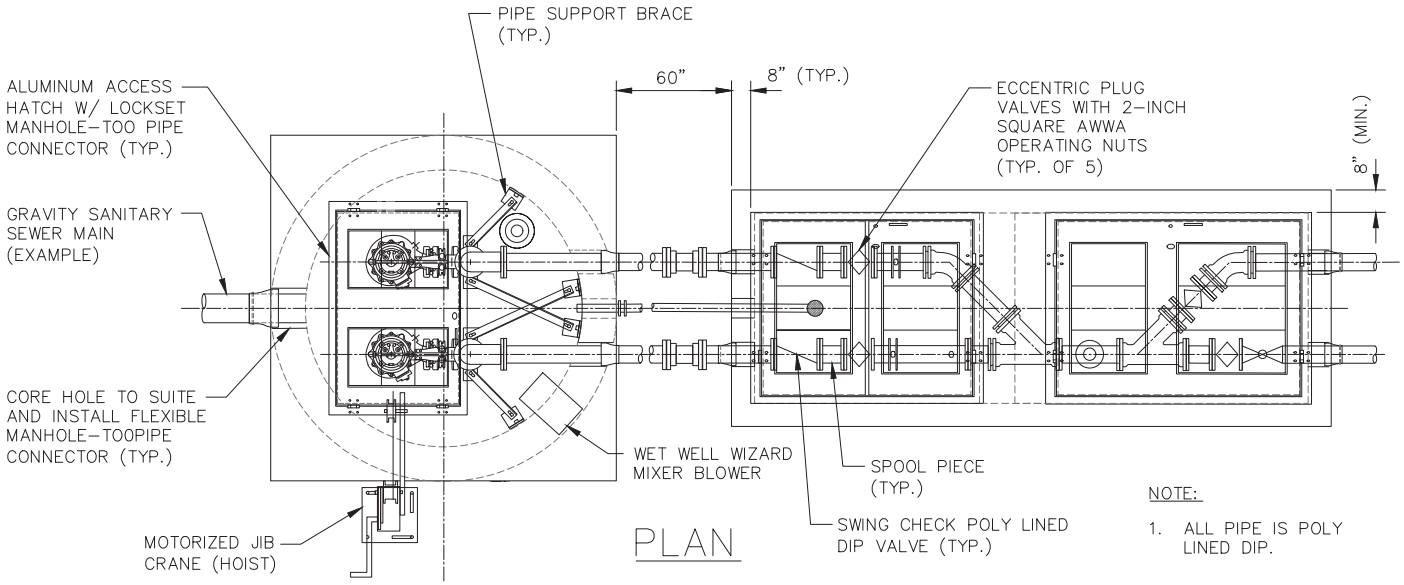
PUMP STATION TYPICAL DRIVE CROSS SECTION

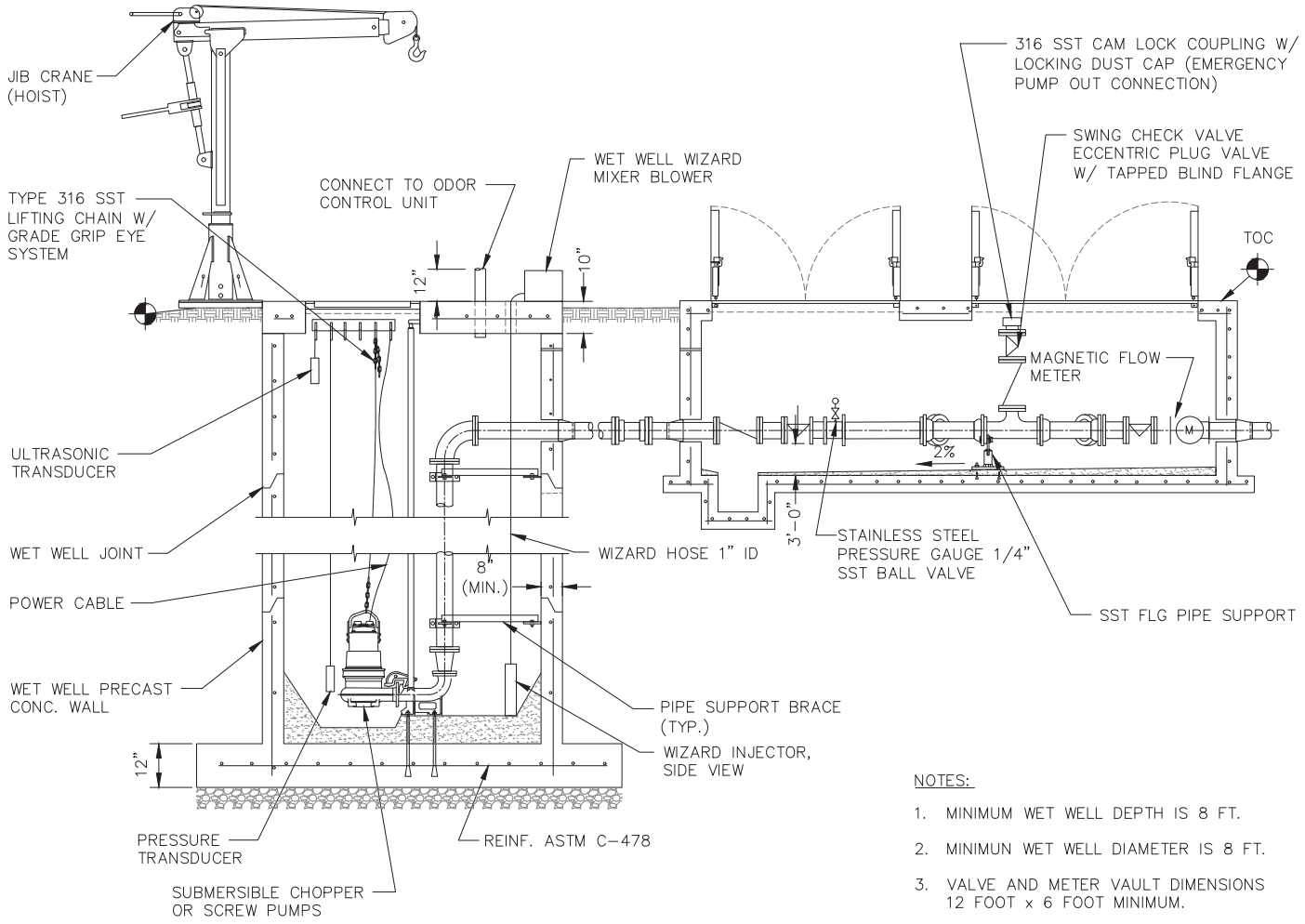
NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
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DETAIL NO. P-013





FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

PUMP STATION TYPICAL DETAIL MAXIMUM 50 HP PUMPS AND 1 MGD FLOW

NOT TO SCALE

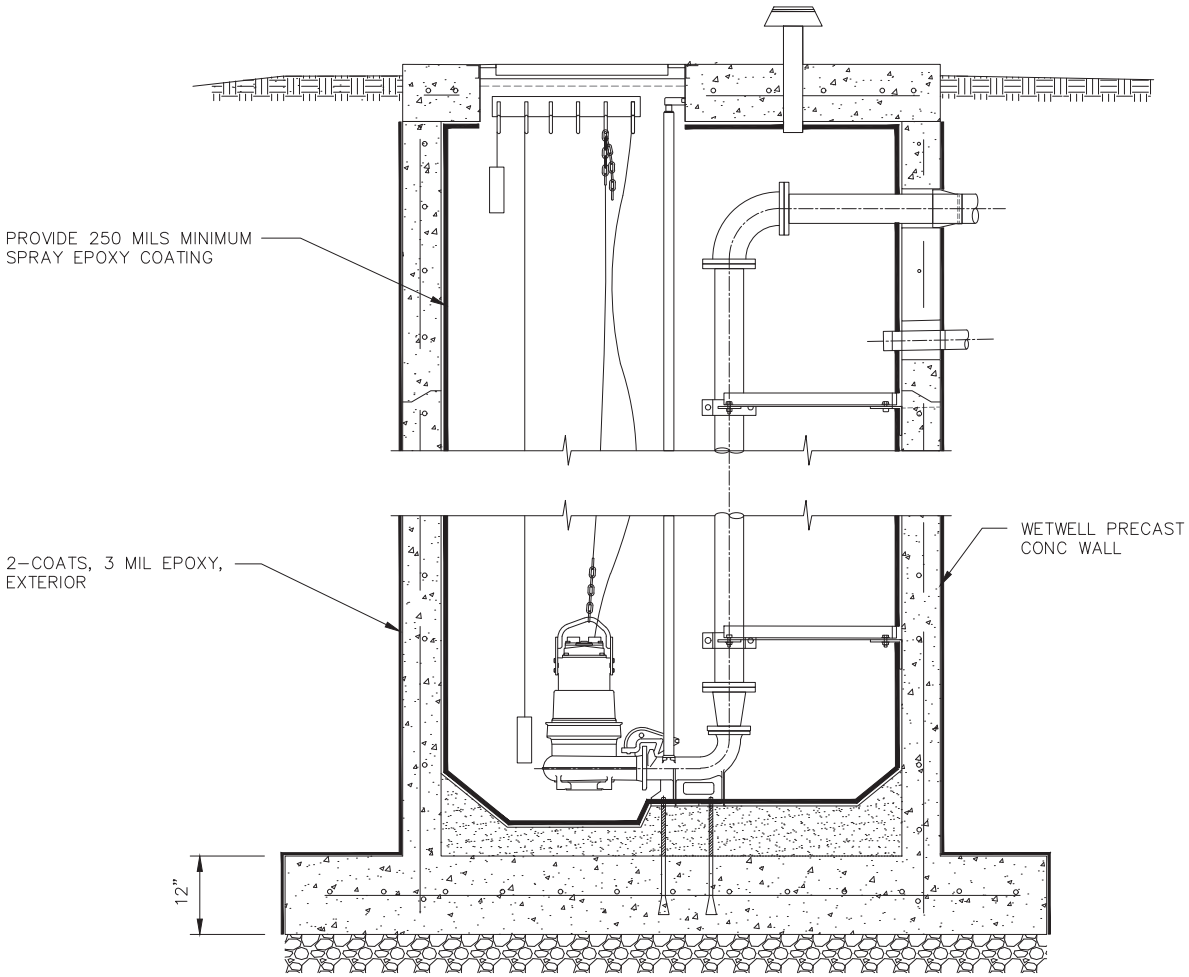
DATE: 01–21–2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404–612–7400
FAX: 404–224–0498

DETAIL NO. P–014

NOTES:

1. INTERIOR AND EXTERIOR OF WETWELL VALVE VAULT SHALL HAVE SPRAY EPOXY APPLIED PER THE MANUFACTURER'S RECOMMENDATION.
2. ACCEPTABLE PRODUCTS SHALL BE CPP SPRAYLINER BY EPOXY TEC OR APPROVED EQUAL.
3. REFER TO SECTION 33 01 32 OF FULTON COUNTY SEWER STANDARD SPECIFICATIONS.



FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

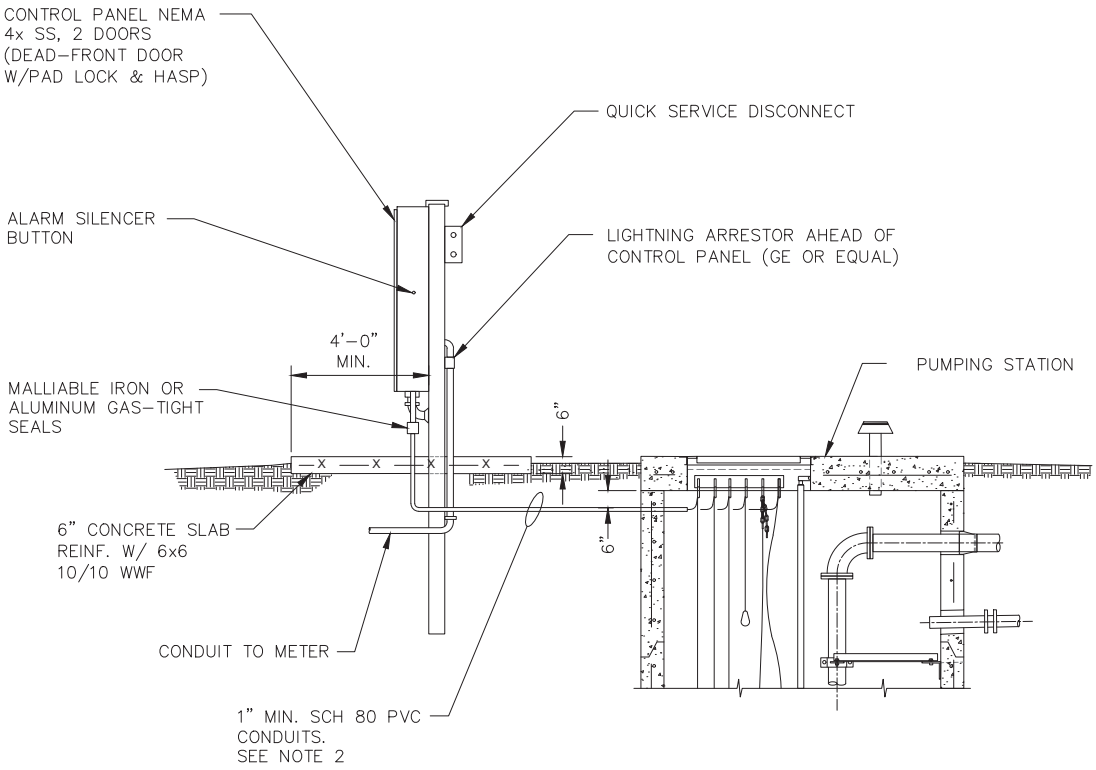
PUMP STATION COATING DETAIL

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-015



NOTES:

1. AWNING NOT SHOWN FOR CLARITY. SEE NOTE 5 ON P-001 FOR AWNING REQUIREMENTS.
2. NUMBER OF CONDUIT AND SIZES SHALL BE INCREASED AS NECESSARY TO ACCOMMODATE POWER AND CONTROL CABLES.
3. ALL ELECTRICAL CONDUIT TO BE ENCASED IN CONCRETE. ADD RED DYE OR SPRINKLE RED DYE THROUGHOUT CONCRETE THAT IS ACCEPTABLE TO INSPECTOR.

SECTION

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

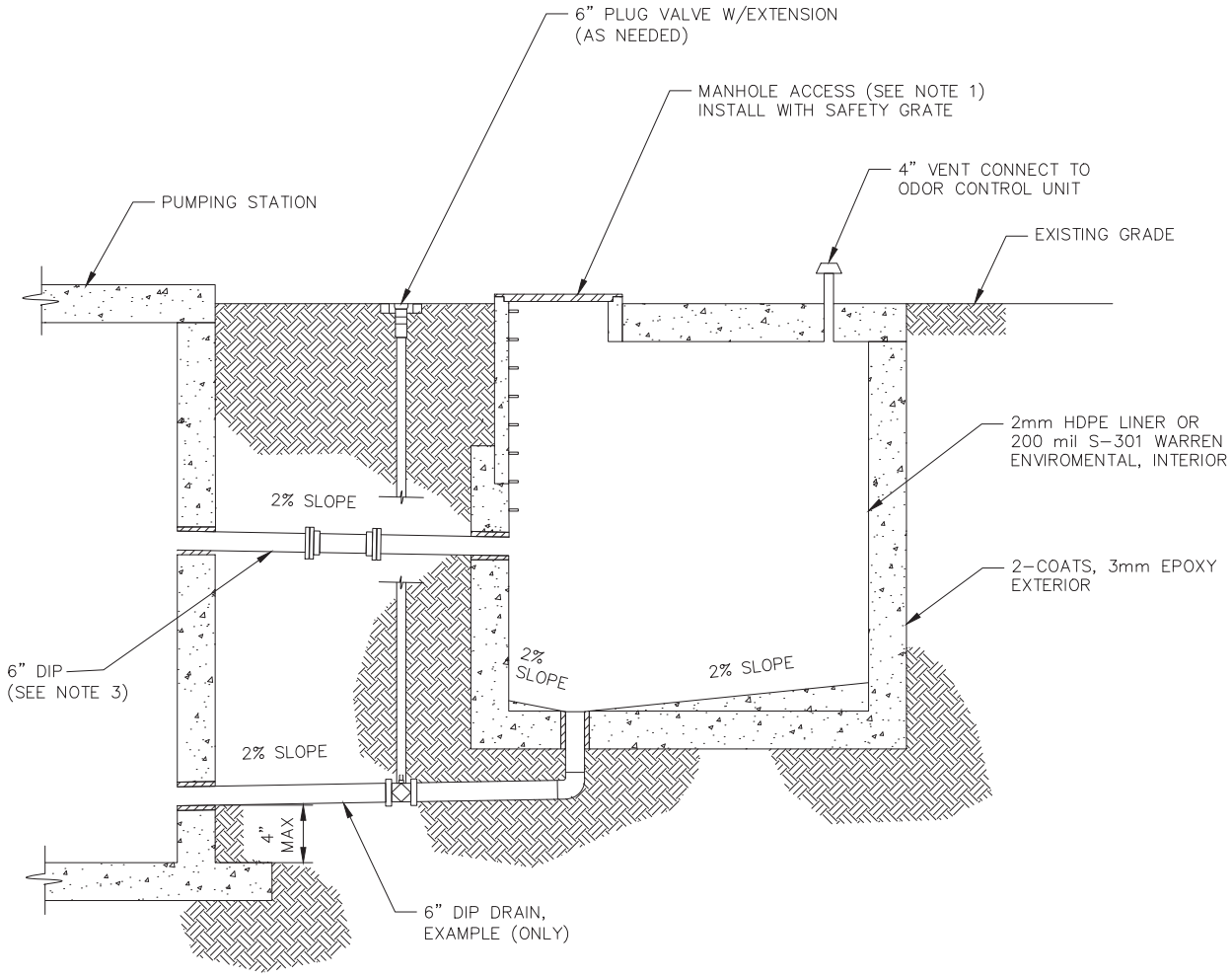
PUMP STATION
CABLE DETAIL

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-016



NOTES:

1. USE OF OVERFLOW TANK IS NOT ALLOWED EXCEPT WHEN SPECIFICALLY DIRECTED BY FCDPW.
2. FOLLOW REQUIREMENTS FOUND IN PART III GRAVITY STANDARDS FOR STEPS AND MANHOLE COVER REQUIREMENTS.
3. PIPES ARE ROTATED TO BE SHOWN IN THE SAME VIEW.
4. OVERFLOW PIPE INVERT SHALL BE EQUAL TO HIGH LEVEL ALARM.
5. VOLUME OF OVERFLOW SHALL BE EQUAL TO THREE HOURS OF STORAGE AT PEAK FLOW, MINIMUM 32,000 GALLONS.
6. OVERFLOW TANK MUST BE ENTIRELY WITHIN 150 FT BY 150 FT BUFFER AREA. MANHOLE ACCESS AND VENT TO BE LOCATED WITHIN FENCE AREA.
7. OVERFLOW VAULT TOP SLAB REINFORCEMENT SHALL BE DESIGNED TO WITHSTAND 80,000 LB LOAD.
8. ODOR CONTROL UNIT TO BE INCREASED FOR OVERFLOW TANK.
9. INSTALLATION OF OVERFLOW TANK DOES NOT REMOVE REQUIREMENT FOR BACKUP POWER GENERATOR.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

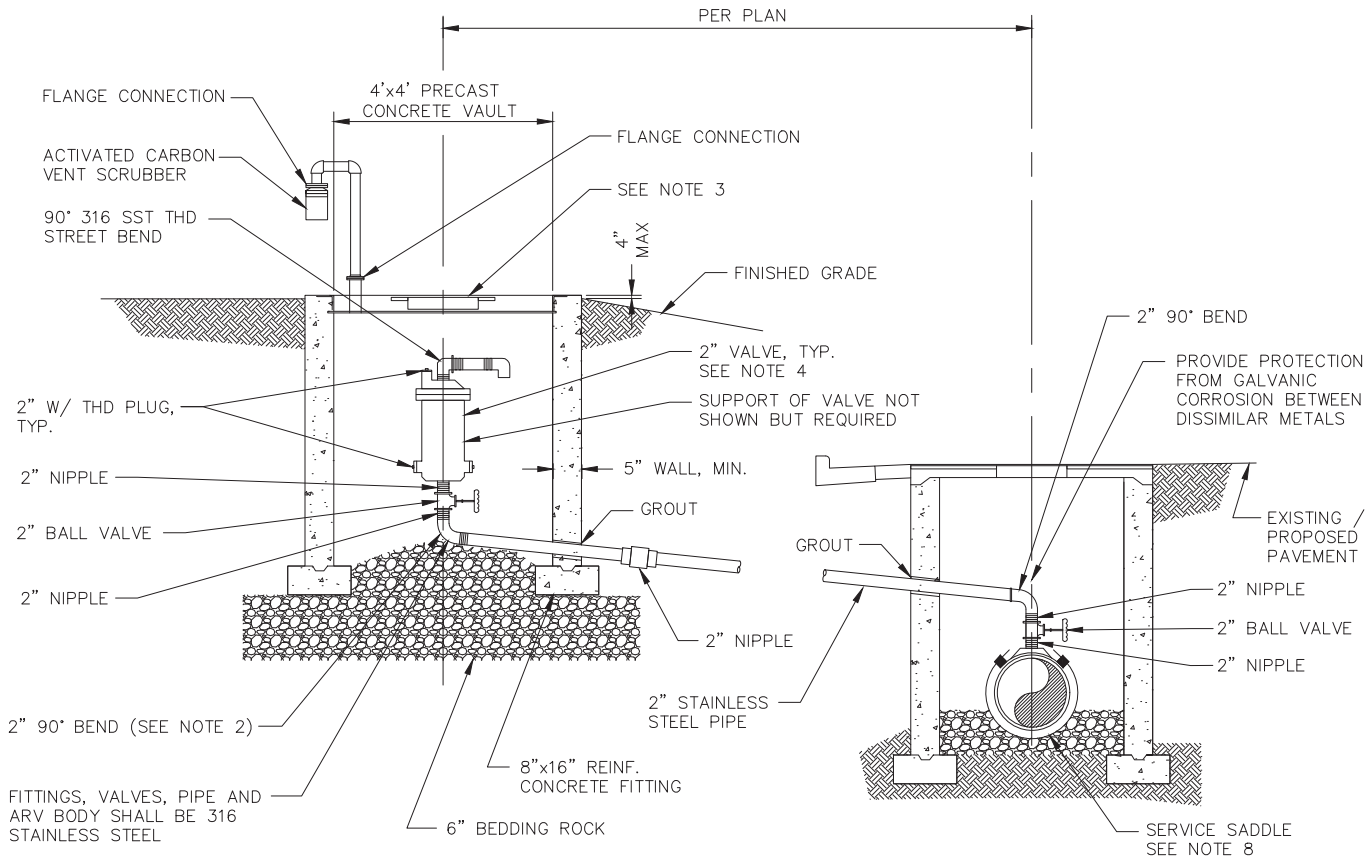
PUMP STATION
EXAMPLE OVERFLOW TANK

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-017



NOTES:

1. ABOVE DETAIL IS BASED ON A 2" WASTEWATER AIR/VACUUM RELEASE VALVE. VALVE SIZES SHALL BE DETERMINED BY THE DEVELOPER'S ENGINEER AND APPROVED BY FULTON COUNTY PUBLIC WORKS PRIOR TO INSTALLATION. SPECIFIC COMPONENTS WILL BE DIFFERENT BASED ON DIFFERENT SIZES.
2. THE MINIMUM DIMENSION FROM INVERT TO FINISHED GRADE SHALL BE 4.0 FEET.
3. FRAME AND COVER SHALL BE EQUIVALENT TO U.S. FOUNDARY USF 170-E-ORS.
4. VALVE SHALL BE VENT TECH OR VENT-O-MAT OR EQUAL. SIZE SHALL BE BASED ON FORCE MAIN SIZE.
5. THE WASTEWATER AIR/VACUUM RELEASE VALVE VAULT IS NOT DETAILED FOR VEHICULAR TRAFFIC LOADS AND IS NOT INTENDED FOR PLACEMENT WITHIN THE TRAVELED WAY.
6. VAULT VENT SHALL BE PROVIDED WITH ACTIVATED CARBON ODOR CONTROL CANISTER.
7. AIR-VACUUM VALVE SHALL BE PROVIDED WITH SUPPORTS.
8. PROVIDE SERVICE SADDLE WITH NTP THREADED OUTLETS:
   - DESIGNED FOR USE WITH DIP, PVC AND HDPE PIPES WITH A WORKING PRESSURE OF 300 PSI.
   - BODIES: DUCTILE IRON PER ASTM A536.
   - STRAPS: TYPE 304 STAINLESS STEEL. DOUBLE STRAP 1.50" WIDE.
   - NUTS: TYPE 304 STAINLESS STEEL FLUOROPOLYMER COATED.
   - WASHERS: TYPE 304 STAINLESS STEEL
   - STUDS: TYPE 304 STAINLESS STEEL
   - GASKET: NITRILE (BUNA N) NSF 61® COMPOUNDED TO RESIST OIL, ACIDS, ALKALIES, MOST (ALIPHATIC) HYDROCARBON FLUIDS, WATER AND OTHER CHEMICALS.
   - FINISH: FLEXI-COAT® FUSION-BONDED EPOXY FINISH PER AWWA C213.
   - AS MANUFACTURED BY SMITH BLAIR OR FCPW APPROVED EQUAL.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

PUMP STATION COMBINATION AIR-VACUUM VALVE INSTALLATION DETAIL

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-018

LEGEND

AH – ALARM HORN

AIT – ANALYSIS INDICATING TRANSMITTER

AL – ALARM LIGHT

ASB – ALARM SILENCE BUTTON

ATS – AUTOMATIC TRANSFER SWITCH

CCB – CONTROL CIRCUIT BREAKER

DRB – DUPLEX RECEPTACLE BREAKER

ECB – EMERGENCY CIRCUIT BREAKER

ETM – ELAPSE TIME METER

F – FUSE

FIT – FLOW INDICATING TRANSMITTER

FL – FLASHER

GFDR – GROUND FAULT DUPLEX RECEPTACLE

HOA – HANDS–OFF–AUTO SELECTOR SWITCH

LIT – LEVEL INDICATING TRANSMITTER

LSH – LEVEL SWITCH HIGH

MB – MOTOR BREAKER

MCB – MAIN CIRCUIT BREAKER

MSH – MOISTER SENSOR HIGH

MS – MOTOR STARTER

PL – PILOT LIGHT

PLC – PROGRAMABLE LOGIC CONTROLLER

PM – PHASE MONITOR

RCB – RTU CIRCUIT BREAKER

RL – RUNNING LIGHT

RTU – REMOTE TRANSMITTING UNIT

TB – TERMINAL BLOCK

TS – TEST SWITCH

TSH – TEMPERATURE SWITCH HIGH

TVSS – TRANSIENT VOLTAGE SURGE SUPPRESSER

XFMR – TRANSFORMER

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

PUMP STATION
ELECTRICAL LEGEND

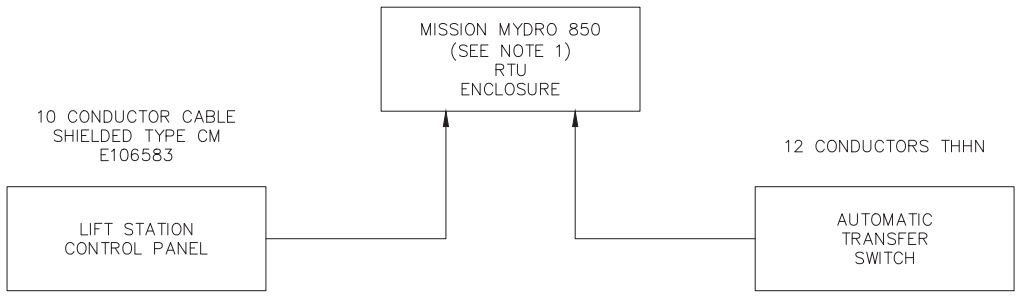
NOT TO SCALE

DATE: 01–21–2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404–612–7400
FAX: 404–224–0498

DETAIL NO. P–019

PUMPING STATION RTU CONNECTIONS



RTU ENCLOSURE MIXED I/O MODULE

FROM RTU ENCLOSURE DOOR LIMIT

1	SPARE	
2	SPARE	
3	SPARE	
4	WET WELL	
5	LOW WET WELL	
6	SITE SECURITY	
7	SPARE	
8	GEN INTRUSION	

#14 AWG FROM GEN TRANS

9	GENERATOR RUNNING	
10	PUMP 1 FAILURE	
11	PUMP 2 FAILURE	
12	HIGH WET WELL	
13	CONTROL VOLTAGE FAILURE/STATION FLOODED	
14	COMMON	
15	GEN FAULT	
16	GEN WARNING	

17	LOW FUEL LEVEL	
18	LOW GAS PRESSURE	
19	OVER RUN CONDITION	
20	HIGH ENGINE TEMP	
21	LOW ENGINE TEMP	
22	LOW COOLANT	
23	LOW OIL PRESSURE	
24	FUEL TANK RUPTURE BASIN ALARM	

25	NOT IN AUTO	
26	SOURCE 1 AVAILABLE	
27	SOURCE 1 CONNECTED	
28	SOURCE 2 AVAILABLE	
29	SOURCE 2 CONNECTED	
30	TRANSFER SWITCH NORMAL POSITION	
31	TRANSFER SWITCH EMERGENCY POSITION	
32	AC LINE FAILURE	

33	HIGH BATTERY VOLTAGE	
34	LOW BATTERY VOLTAGE	
35	SPARE	
36	LIT-1	
37	LIT-2	
38	FIT-1	
39	XIT-1	
40	AIT-1	

NOTE:

1. OR CURRENT MODEL AS DIRECTED BY FCPW.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

PUMP STATION
RTU CONNECTIONS

NOT TO SCALE

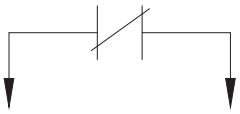
DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

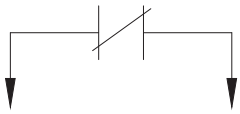
DETAIL NO. P-020

BASIC LIFT STATION CONTROL PANEL – RTU ALARM INPUTS

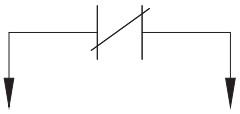
PUMP 1 FAILURE



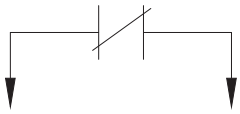
PUMP 2 FAILURE



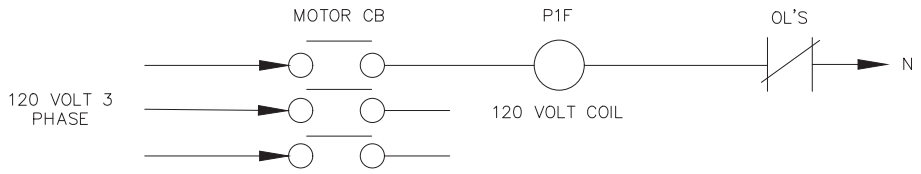
HIGH WET WELL



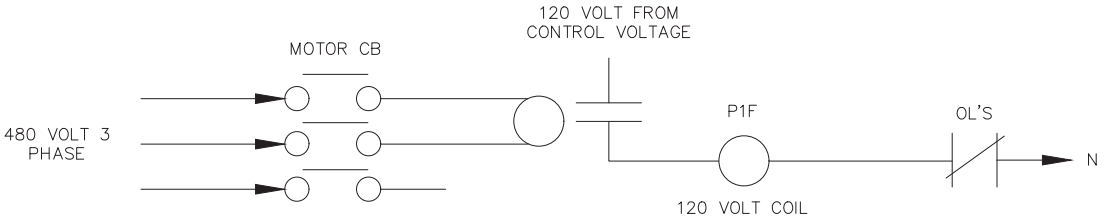
CONTROL VOLTAGE FAILURE
STATION FLOODED (IF NEEDED)



TYPICAL FOR 240V
3 PHASE POWER



TYPICAL FOR 480V
3 PHASE POWER
(PREFERED)



RELAY TYPE:
480 VOLT AC COIL, PORTER & BRUMFIELD PRD–11AYO–480 OF EQUAL.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

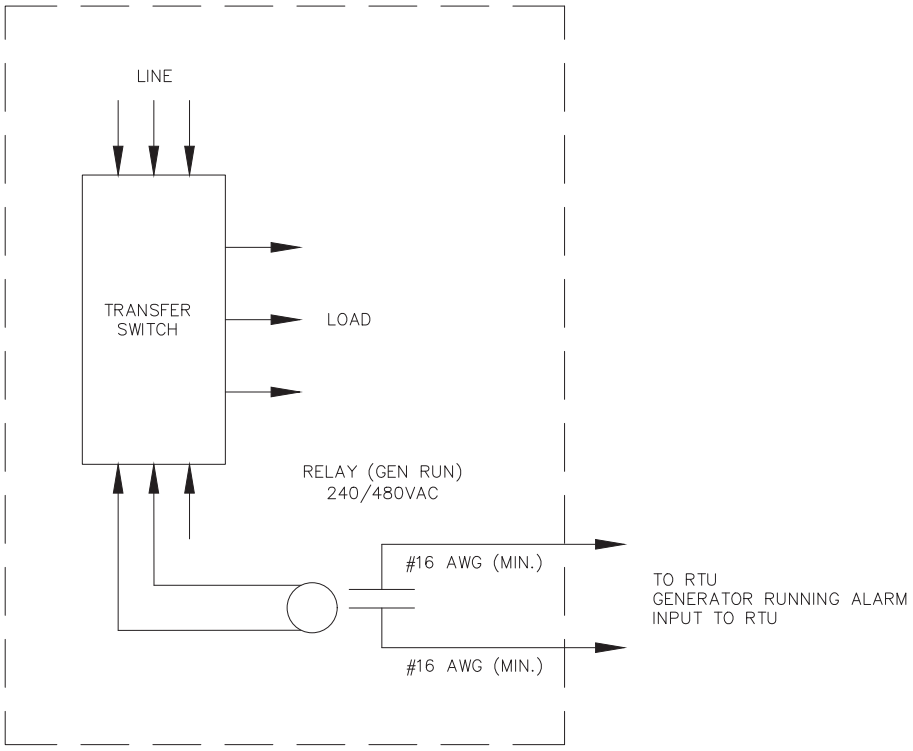
PUMP STATION
BASIC CONTROL PANEL DETAIL
RTU ALARM INPUTS

NOT TO SCALE

DATE: 01–21–2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404–612–7400
FAX: 404–224–0498

DETAIL NO. P–021



RELAY TYPES:
240VAC COIL, 8 PIN CUBE TYPE; 480VAC COIL PORTER & BRUMFIELD PRD-11AYO-480 OR EQUAL.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

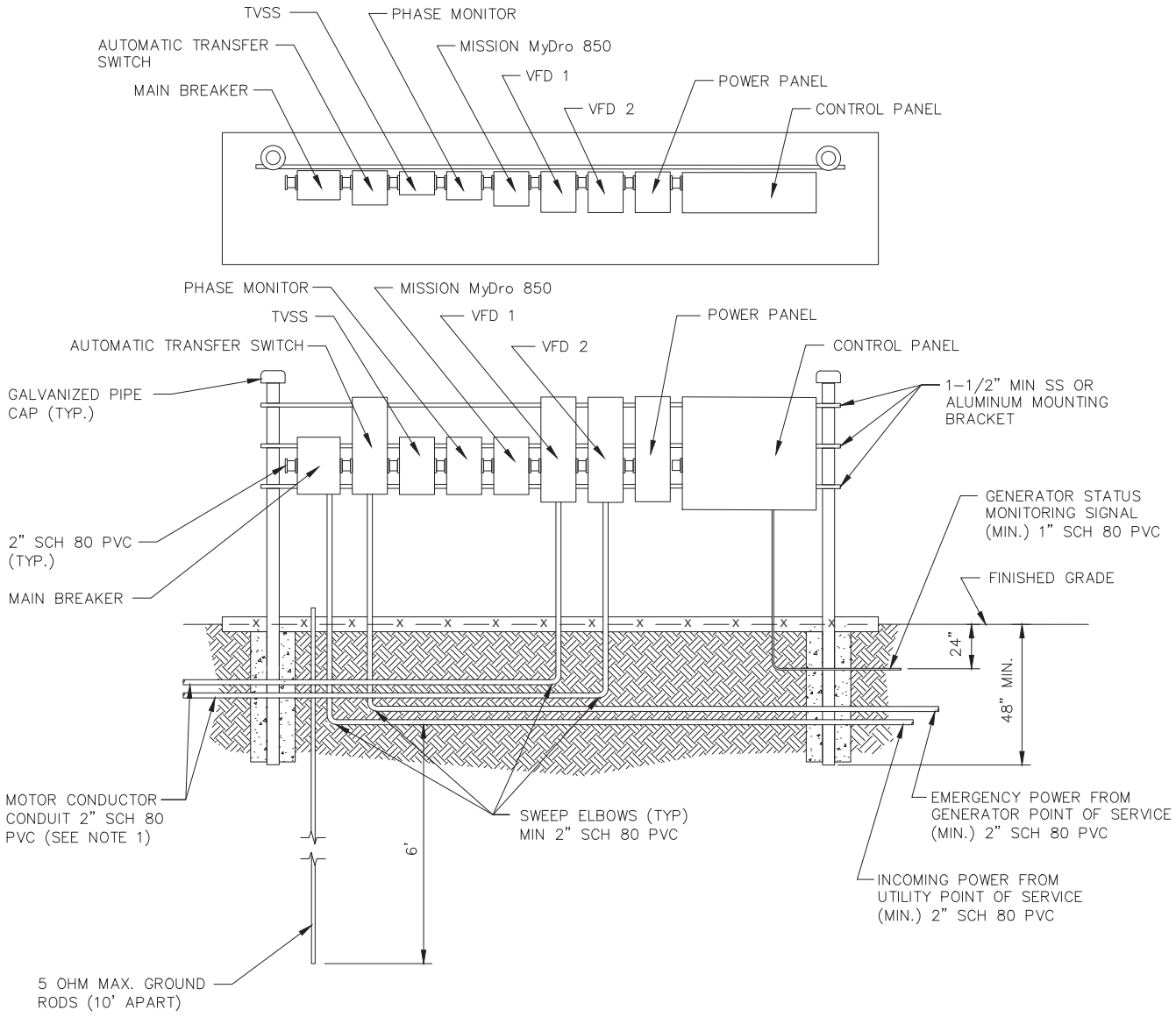
PUMP STATION
GENERATOR TRANSFER SWITCH
GENERATOR RUN ALARM

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-022



PANEL INSTALLATION NOTES:

1. PUMP MOTOR CONDUIT SHALL BE SIZED TO BE ONLY 40% FILLED. MINIMUM CONDUIT SIZE TO BE 2" SCH 80 PVC.
2. POWER SUPPLY SHALL BE UNDERGROUND ON THE LIFT STATION SITE AND SHALL BE 3-PHASE, FROM A 3-PHASE SOURCE ONLY.
3. AN ELECTRICAL GROUNDING SYSTEM SHALL BE INSTALLED AS PER THE NATIONAL ELECTRICAL CODE, LOCAL CODES AND ORDINANCES. AN UNDERGROUND PERIMETER CABLE GROUNDING SYSTEM SHALL BE INSTALLED WITH CONNECTIONS TO AT LEAST WET WELL COVER, VALVE VAULT COVER, CONTROL PANELS, GENERATOR, UTILITY COMPANY TRANSFORMER, MANUAL DISCONNECT SWITCH AND METAL FENCE.
4. ALL MOUNTING HARDWARE & BRACKETS SHALL BE 316 STAINLESS STEEL.
5. ON A 4-WIRE, DELTA SYSTEM, THE HIGH-LEG SHALL BE IDENTIFIED WITH ORANGE COLOR TAPE AT ALL CONNECTION POINTS AND SHALL BE LOCATED ON THE "B" PHASE AT THE LINE SIDE OF THE MAIN DISCONNECT.
6. PANELS AND ELECRICAL CXABINETS SHALL BE COVERED WITH A 4 FEET WIDE BY 8 FEET HIGH AWNING (NOT SHOWN).
7. ALL ELECTRICAL CONDUIT TO BE ENCASED IN CONCRETE. ADD RED DYE OR SPRINKLE RED DYE THROUGHOUT CONCRETE THAT IS ACCEPTABLE TO INSPECTOR.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

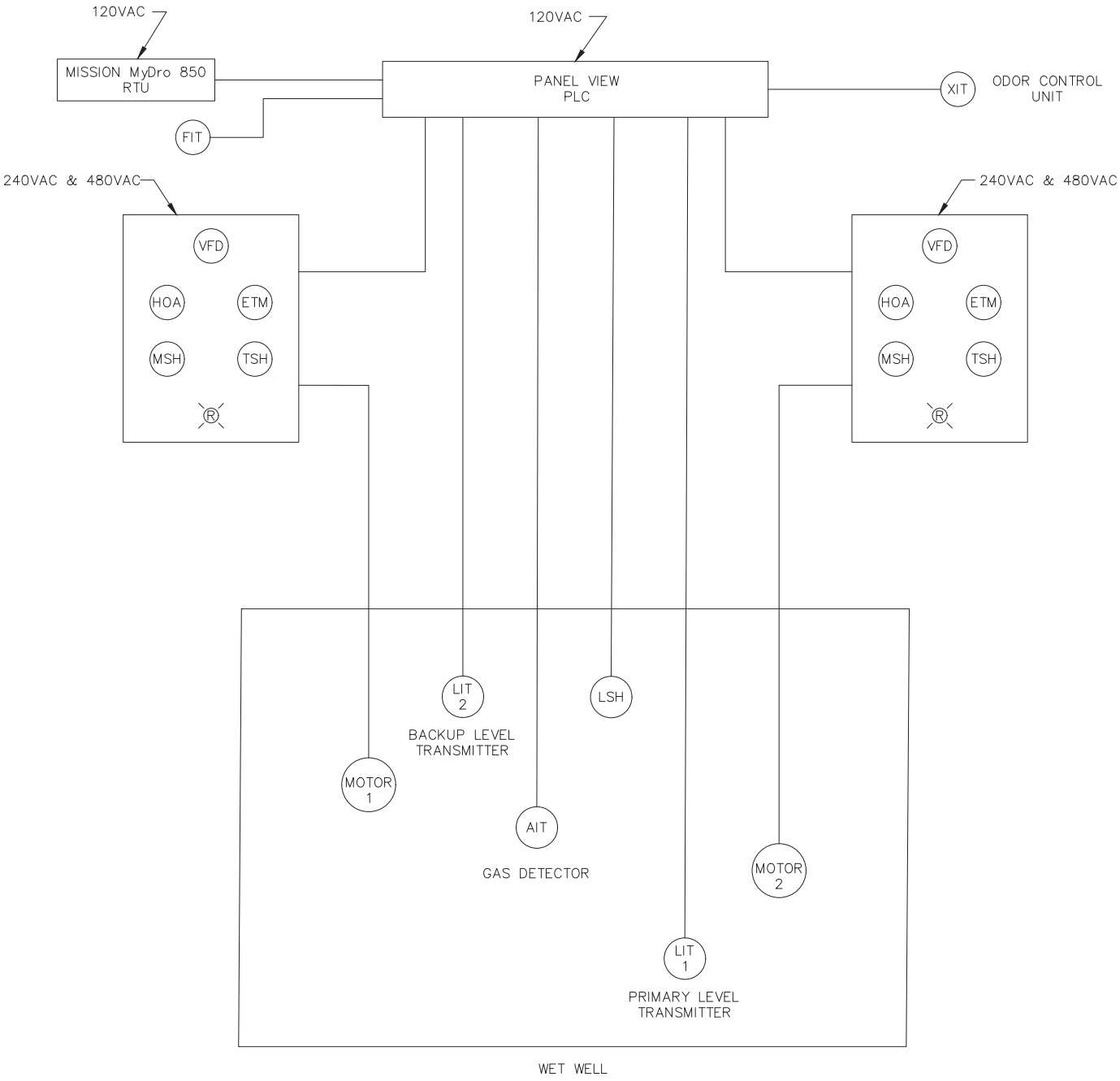
PUMP STATION
TYPICAL POWER AND CONTROL PANEL RACK
(240V, 480V)

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-023



NOTES:

1. PUMP'S MOISTURE/TEMPERATURE RELAYS TO BE MOUNTED AT RESPECTIVE VFDs.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

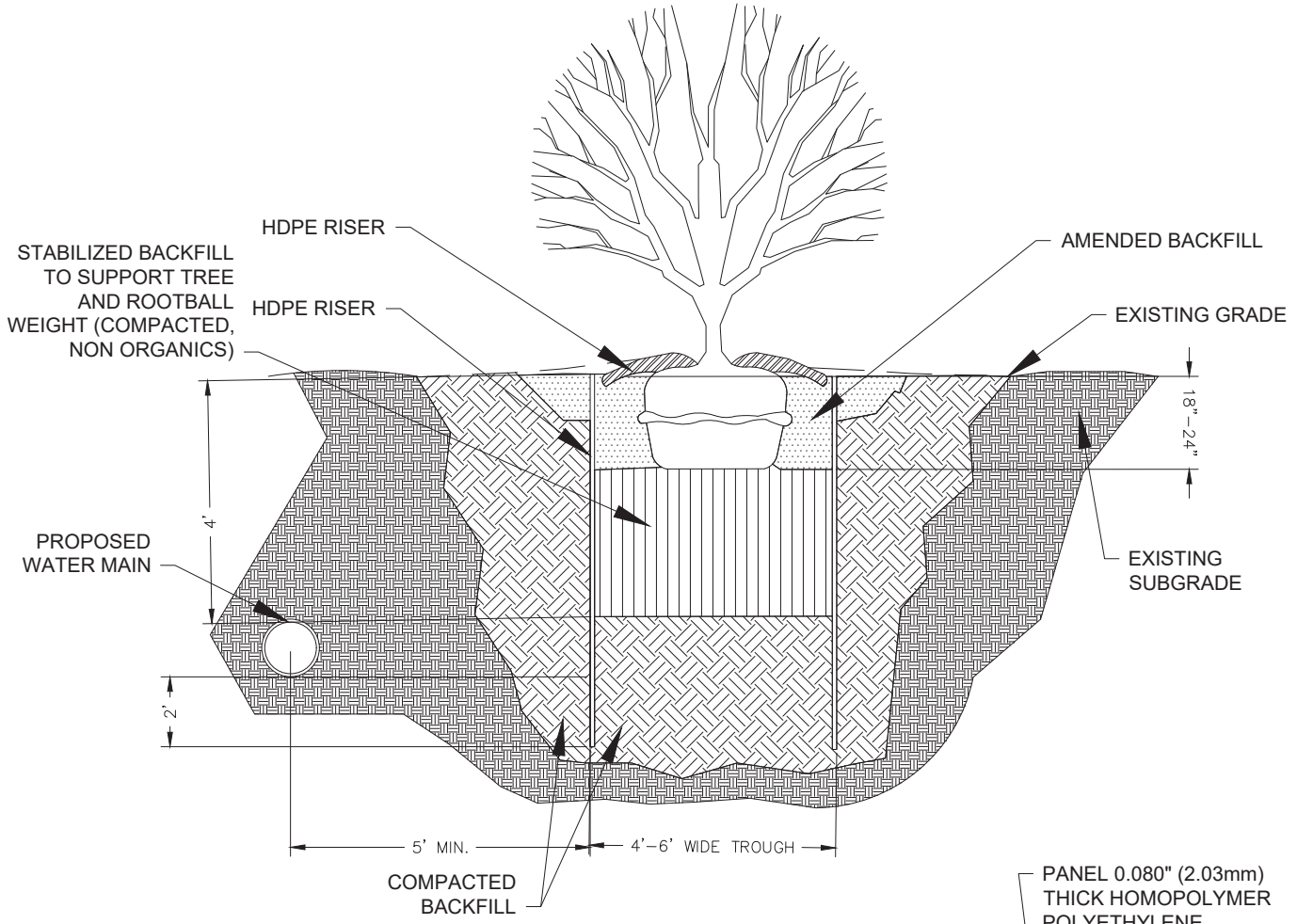
PUMP STATION
EXAMPLE DUPLEX PUMP CONTROL
BLOCK DIAGRAM (240V, 480V)

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-024

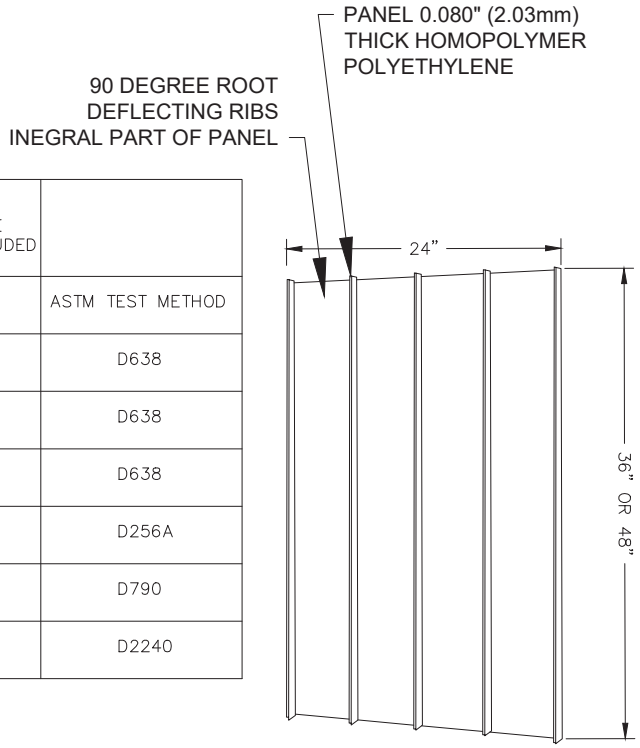


UB 36–2/UB 48–2 SPECIFICATIONS 36" AND 48" DEEPROOT TREE ROOT BARRIER

A. MATERIALS

1. THE CONTRACTOR SHALL FURNISH AND INSTALL TREE ROOT BARRIER AS SPECIFIED. THE ROOT BARRIER SHALL BE EITHER PRODUCT #UB 36–2 OR UB 48–2 AS MANUFACTURED BY DEEPROOT GREEN INFRASTRUCTURE, LLC, 530 WASHINGTON STREET, SAN FRANCISCO, CA, WWW.DEEPROOT.COM (800).458.7668).
2. ROOT BARRIER SHALL BE RECYCLABLE, BLACK, EXTRUDED PANELS WITH 0.80" (2.03MM) WALL THICKNESS IN MODULES 24" (609MM) LONG AND EITHER 36" (910MM) OR 48" (1220MM) DEEP.
3. ROOT BARRIER SHALL BE MANUFACTURED WITH 100% REPROCESSED HOMOPOLYMER POLYETHYLENE WITH ADDED ULTRAVIOLET INHIBITORS.
4. ROOT BARRIER SHALL BE COMPRISED OF 24" (609mm) MODULES. EACH PANEL SHALL HAVE NO LLESS THAN FOUR (4) MOLDED INTEGRAL VERTICAL ROOT DIRECTING RIBS OF A MINIMUM 0.080" (2.03mm) THICKNESS, PROTRUDING 1/2" (12.7mm) AT 90 DEGREES FROM INTERIOR OF THE BARRIER PANEL, SPACED 6" (152.4mm) APART. (SEE DETAIL A)
5. ROOT BARRIER SHALL HAVE AN INTEGRATED JOINING SYSTEM FOR ASSEMBLY BY SLIDING ONE PANEL INTO ANOTHER.

MATERIAL AND THICKNESS	HOMOPOLYMER POLYETHYLENE 0.080 INCH EXTRUDED	
PROPERTIES	TYPICAL VALUE	ASTM TEST METHOD
TENSILE STRESS @ YIELD	3800 PSI	D638
ELONGATION @ BREAK %	10%	D638
TENSILE MODULUS	155,000 PSI	D638
NOTCHED IZOD IMPACT	0.4 – 4.0	D256A
FLEXUAL MODULUS 73 PSI	145,000	D790
HARDNESS SHORE	P66	D2240



DETAIL A
TREE ROOT BARRIER FENCE

FULTON COUNTY

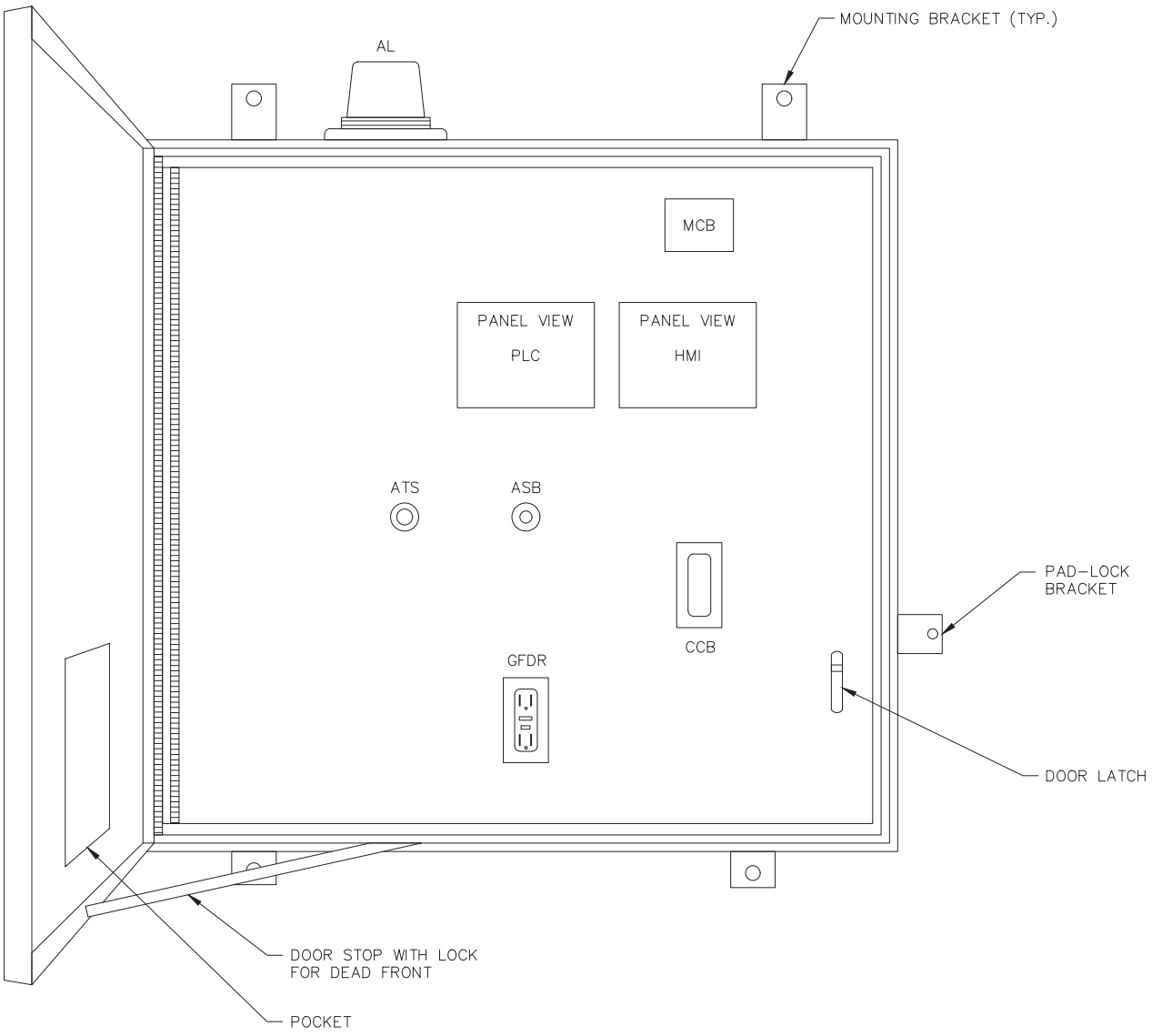
FULTON COUNTY STANDARD DETAILS

ROOT BARRIER SYSTEM
NOT TO SCALE

DATE: 01–21–2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404–612–7400
FAX: 404–224–0498

DETAIL NO. P–026



NOTES:

1. DEADFRONT LAYOUT NEMA TYPE 3R SS ENCLOSURE W/CONTINUOUS HINGE. ALL HARDWARE TYPE 316 SS TYPICAL, ACTUAL MAY VARY WITH HORSEPOWER AND NUMBER OF PUMPS.
2. ALL CONTROL WIRE TO BE #16 AWG, MINIMUM.
3. CONTROL PANEL SHALL BE UL LISTED AND LABELED.
4. PANEL VIEW PLC (HMI) SHALL BE 10-INCH MINIMUM.
5. EXTERIOR OF PANEL SHALL BE POWDER COATED WHITE.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

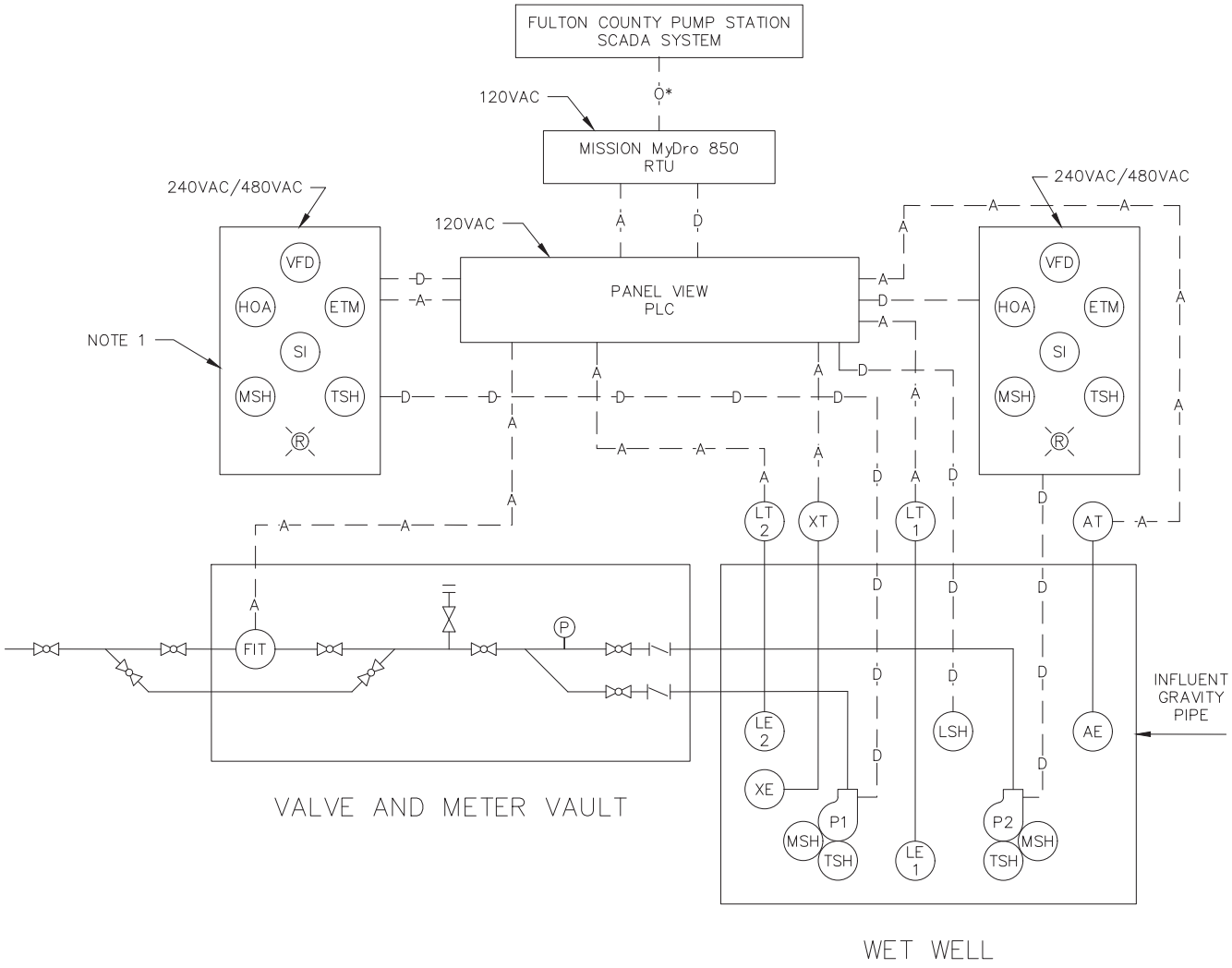
PUMP STATION
EXAMPLE DUPLEX CONTROL PANEL ENCLOSURE DEAD FRONT LAYOUT

NOT TO SCALE

DATE: 01-21-2026

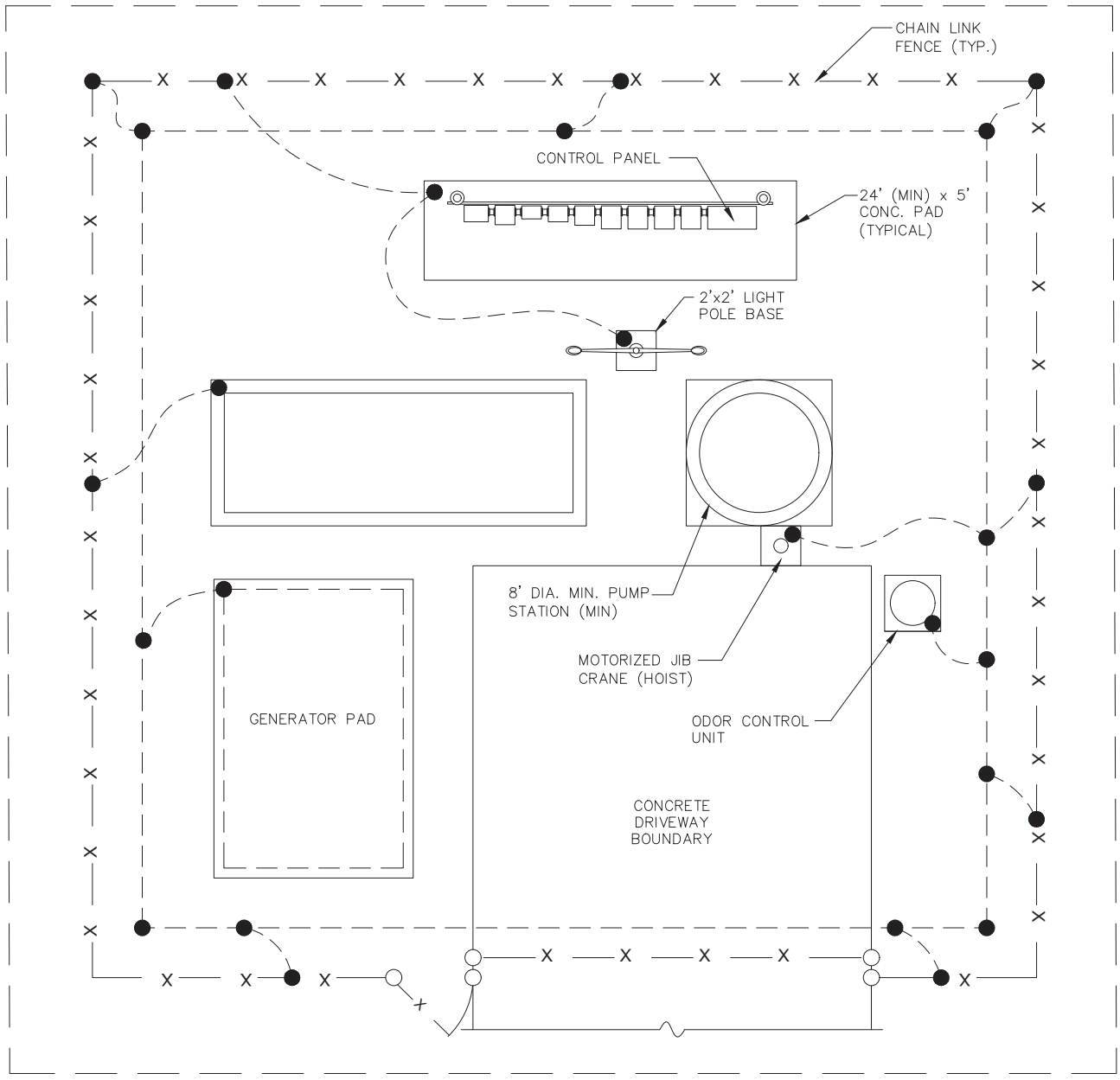
FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-027



*DATA

FULTON COUNTY	FULTON COUNTY STANDARD DETAILS	DATE: 01-21-2026
	PUMP STATION EXAMPLE PROCESS AND INSTRUMENTATION DIAGRAM NOT TO SCALE	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498
		DETAIL NO. P-028



NOTES:

GROUNDING ELECTRODE SYSTEM

1. A GROUNDING SYSTEM SHALL BE INSTALLED PER EOR THE NATIONAL ELECTRICAL CODE, LOCAL CODES AND ORDINANCES.
2. AN UNDERGROUND PERIMETER CABLE GROUNDING SYSTEM SHALL BE INSTALLED WITH CONNECTIONS TO AT LEAST THE FOLLOWING EQUIPMENT.
   a. WET WELL COVER.
   b. VAULT COVER.
   c. CONTROL PANEL MOUNTING RACK.
   d. MAIN DISCONNECT SWITCH.
   e. PUMP STATION FENCE.
   e. ODOR CONTROL SYSTEM.
3. BARE COPPER WIRE (#4) IS TO BE CONNECTED TO THE WET WELL COVER AND THE VALVE AND METER VAULT COVER BY WAY OF AN APPROVED MECHANICAL CONNECTION.
4. WIRE (#4) SHALL ALSO BE POURED INTO TOP SLAB OF WET WELL AND THE VALVE AND METER VAULT AT THE FOUNDRY WITH A TWELVE (12) INCH STUB-OUT FOR FIELD CONNECTION.
5. UNDER NO CIRCUMSTANCES SHALL WIRE BE ALLOWED TO RUN ACROSS THE OUTSIDE TOP SLABS.

FULTON COUNTY

FULTON COUNTY STANDARD DETAILS

PUMP STATION EXAMPLE SITE GROUNDING PLAN

NOT TO SCALE

DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST.
ATLANTA, GA. 30303
404-612-7400
FAX: 404-224-0498

DETAIL NO. P-029

GUIDELINES

FOR

SANITARY SEWER LOW PRESSURE PUMP STATION AND FORCE MAIN DESIGN

FULTON COUNTY

WASTEWATER COLLECTIONS AND RECLAMATION

DIVISION OF

FULTON COUNTY DEPARTMENT OF PUBLIC WORKS

Adopted January 21, 2026

1.01 General

A. Low-pressure sewer systems are wastewater systems consisting of multiple, privately owned small pump stations located at individual structures pumping into a common low pressure force main system which conveys the combined flows from these pump stations to a single discharge location Low pressure sewer may be installed only if approved in writing by the Director of FCDPW or the Designee. The low-pressure sewer system shall be reviewed and approved by the Deputy Directors of Water Distribution, Wastewater, and Technical Services or their Designee within the Department of Public Works. The Director of Public Works or the Designee shall issue the final approval. Low pressure sewers should only be approved in cases where gravity sewer installation is not feasible. For the Director to determine if low pressure sewer is a viable option an engineering package shall be provided to the Director for review. This submittal shall be made through the normal project submittal process. The review package should include:

1. A topographic plan showing the development property and the surrounding properties.

2. All adjacent upstream and downstream wastewater connection locations with invert elevations. Map will show distance from farthest development point to closest viable gravity sewer tie-in location.

3. As part of the review process, the Developer is to show the reasons why sewer is unavailable. Additional information may be requested to support the Developer's position on why a gravity sewer option is unavailable if the submitted information is not sufficient for the Director to approve the system.

B. If the Director approves a low pressure system, the Homeowner / Developer shall furnish and install a complete factory-built and tested Grinder Pump Stations, each consisting of grinder pump(s) suitably mounted in a basin constructed of Fiberglass Reinforced Polyester Resin for simplex or duplex stations, NEMA 6P electrical quick disconnect (EQD), pump removal system, shut-off valve, anti-siphon valve, check valve, each part assembled in the basin, electrical alarm panel, and all necessary internal wiring and controls. The basin shall have a minimum volume of 140 gallons to provide storage volume in case of an emergency. Component type grinder pump systems that require field assembly will not be acceptable due to the potential problems that can occur during field assembly. The Homeowner / Developer shall own, maintain, and operate all system piping and valves to the right-of-way up to the backflow preventer and plug valve assembly. The grinder pump station including all controls, valves and piping outside of the easement, shall be owned, maintained and operated by the Homeowner / Developer.

C. The Developer shall install the HDPE low pressure force main, including all piping, County isolation / check valve at the property line, low pressure mains, valves, flushing stations and related components.

D. At the completion of the warranty period, the County shall own, maintain and operate all low-pressure system piping and valves within the right-of-way and / or sewer easement, including the combination isolation / check valve at the connection to the customer lateral.

E. The Homeowner, Developer or Business Owner will own and maintain all components of the low pressure system on private property, including the private side service connection to the isolation / check valve, the low-pressure sewer service lateral, the low-pressure grinder pump system and its components such as the pump well, connection to the low-pressure sewer service lateral, control panel, cabling and electrical connections, connection to the house gravity inlet pipe and related components and the electrical components from the control panel to the house electrical system, including the disconnect breaker at the control panel.

F. Low Pressure Force Main Requirements

1. The minimum inside diameter of a low-pressure sewer public force main shall be 2-inches and the maximum inside diameter shall be 6-inches.

2. The minimum low-pressure sewer public force main velocity shall be 2.0 fps. The maximum force main velocity shall not exceed 8.0 fps.

3. Pipe and tubing used for low-pressure sewer force main under this standard shall be of high-density polyethylene (HDPE) with designation code PE3608 or higher and shall be of the nominal diameter indicated in the hydraulic analysis. Fittings shall be of HDPE unless specified otherwise.

4. The quick connect coupling and isolation valve shall be may accessible by a HDPE utility box a min. 13” x 24” x 15” deep. A HDPE lid shall be provided with each utility box.

5. Isolation valves shall be provided at a maximum spacing of every 1,000 feet along the low-pressure force main and at every point where a branch force main joins the force main.

6. Flushing stations shall be installed at maximum of 1,000 linear foot intervals and at each terminal end. Flushing stations shall also serve as emergency truck connections.

7. Each flushing station shall be constructed in accordance with standard details for an in-line or end-of-line station. The flushing station shall consist of a 2-inch, full port meter stops isolation valve, with locking wings, and a quick connect coupling.

8. Force mains shall be designed to include air release or combination air release/vacuum valve(s) at each high point.

9. Location and sizing of air release or combination air release / vacuum valves shall be determined by the Engineer through hydraulic modeling of the force main and shall be

verified by the valve manufacture. An approved odor control system shall be required for any air release / vacuum valves.

10. Force mains shall be designed to minimize the number of air release / vacuum valves.

11. At the point of connection between a proposed low-pressure force main and the public gravity sewer system, the receiving gravity sewer is to be protected against the potential for increased corrosion. The forcemain should discharge into an epoxy coated manhole that will discharge by gravity to the existing sewer system. In lieu of an odor control system, the lid may be sealed to prevent odors from releasing.

12. The Contractor/Installer shall install 3M™ Electronic Marking System (EMS) Warning Tape 7904-XT, Green, 4 in, WasteWater, shall be placed a minimum of 6 to 12 inches above the low-pressure force main line but no more than 4-feet deep from the discharge manhole to the shut-off isolation valve at the right of way line or easement boundary. The warning tape shall be installed simultaneously with the HDPE piping. Warning tape shall be properly spliced at each end connection and each service connection.

    The warning tape shall extend along the top of the force main to each flushing station and emergency truck connection, shut-off isolation valves, air relief valve, and force main discharge.

    Warning tape shall be installed by the Contractor / Installer once backfill has been placed and compacted to 6 to 12-inches above the top of the pipe and not more than 18 inches above the top of the pipe. Tapes shall be color-coded in accordance with APWA Uniform Color Codes with the following legends: Sewer Systems, Safety Precaution Green, “Caution Wastewater Line Buried Below”. Tape shall be permanently printed with no surface printing allowed. Tape width shall be a minimum of 4 inches.

13. No Warning tape will be required where pipe is installed using a directional boring machine, but a locate wire will be required. The Contractor / Installer shall install 12-gauge, green-coated locating wire along the length of the directional bore. The locator wire shall be installed simultaneously with the HDPE piping. Wire shall be properly spliced. Care shall be taken to adequately wrap and protect the wire at all splice locations. No bare wire shall be accepted. Locating wire shall be brought up to the surface at the end of each bore. Enough wire shall be coiled and stored near the surface to allow the tracer wire to be extended 12-inches above ground. The tracer wire shall be placed in a standard cleanout box.

G. Low Pressure Sewer Design Submittal to Include:

1. Engineering Review Package with FCDPW Director approval

2. Pump submittal with shop drawings and specifications.

3. Manufacturer approved system hydraulic analysis (including but not limited to pipe sizes, flows, velocities, retention times, etc…) of entire system. Calculations shall use Hazen Williams coefficient of 130 for the HDPE pipe. Include all minor losses with analysis.

4. Number and location of proposed valves and cleanouts.

5. Size and dimensions of proposed wetwell volumes and dimensions

6. Capacity calculations of receiving gravity system

7. Stamped by a Professional Engineer registered in the State of Georgia

8. Site development plan and profile, and construction details.

9. Plan of development topography demonstrating the inability to install a gravity sewer collection system.

H. Acceptable Low Pressure Sewer Manufacturers:
   1. Barnes Pressure Systems,
   2. Environment One Corporation,
   3. Liberty Pumps,
   4. Zoeller, or
   5. Approved Equal

Manufacturers shall have at least ten (10) years of experience in the design and manufacture of low-pressure sewer systems, as well, not less than one hundred (100) successful installations utilizing grinder pumps of like type. An installation is defined as a minimum of ten (10) pumps discharging into a common force main which forms a low-pressure sewer system.

1.02 Product Requirements

1. Each house shall have its own forcemain and grinder pump station. Sharing of pumps and service lines is not allowed.

2. Each grinder pump station shall include a NEMA 4X, UL listed ALARM PANEL suitable for wall mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic or fiberglass to assure corrosion resistance. The enclosure shall include a hinged, lockable cover, padlock, and secured dead front.

3. The Alarm Panel shall include the following features: audio & visual alarm, push-to-run switch, and high level (redundant) pump starting control. The alarm sequence is to be as follows:

a. When liquid level in the sewage wet-well rises above the alarm level, visual and audio alarms will be activated. The contacts on the alarm pressure switch will close. The redundant pump starting system will be energized.

b. The audio alarm may be silenced by means of the externally mounted, push-to-silence button.

c. Visual alarm remains illuminated until the sewage level in the wet-well drops below the “off” setting of the alarm pressure switch.

4. During a high-level alarm condition on a duplex station, the appropriate light will illuminate to indicate which pump core requires servicing. The audio alarm shall be a printed circuit board in conjunction with an 86-90 dB buzzer with quick mounting terminal strip mounted in the interior of the enclosure. The audio alarm shall be capable of being deactivated by depressing a push-type switch which is encapsulated in a weatherproof silicone boot and mounted on the enclosure.

5. Level detection for controlling pump and alarm operation shall be accomplished by use of a detection device specifically designed for use in a sewage grinder station. Level detection device shall not require any regular preventative maintenance. The level detection device shall consist of two independent switches, one for each function (High Water Alarm and On / Off actuation). In addition, the devices shall include a solid-state relay for directly controlling the pump motor.

6. The pumps shall be capable, at a minimum, of delivering 9-28 GPM against a rated total dynamic head of 0 feet (0 PSIG), 9-25 GPM against a rated total dynamic head of 100 feet and minimum head capability of 25 feet. The exact size, capacity and discharge head shall be determined by the Engineer. The pump(s) must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall inline piping or valving be allowed to create a false apparent head.

7. The grinder pump Manufacturer shall provide each low-pressure sewer pump station shall come with a five-year 100% parts, labor and travel warranty against manufacturing defects or failure of the equipment caused by normal wear and tear. The warranty period shall start from the date of the customer’s final acceptance of the equipment. Any manufacturing defects found during the warranty period will be reported to the Manufacturer by the customer and will be corrected by the Manufacturer at no cost to the customer.

8. The bulkhead penetration shall be factory installed and warranted by the Manufacturer to be watertight.

9. The grinder pump station shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely

assembled, factory wired and tested grinder pump station shall be U.L. listed. Grinder pump stations without U.L. listing will not be acceptable.

10. A push-to-run feature will be provided for field trouble shooting. All motor control components shall be mounted for ease of field service.

11. All electrical cables penetrating or passing through the silhouette of the pump station must be guaranteed to be water-tight by the Manufacturer and must be installed at the factory prior to shipment.

12. All necessary controls, including motor and level controls, may be located in the top housing of the core unit. The top housing may be attached with stainless steel fasteners.

13. The grinder pump / core unit shall have lifting hooks. All mechanical and electrical connections must provide easy disconnect capability for core unit removal and installation.

14. All grinder pump units will be delivered to the job site 100 percent completely assembled, including testing, ready for installation.

15. Each grinder pump installation shall also include one separate check valve for installation in the 1 ¼-2" service lateral between the grinder pump station and the sewer main, preferably next to the curb stop.

16. The access way shall include a single NEMA 6P electrical quick disconnect (EQD) for all power and control functions, factory installed with access way penetration warranted by the Manufacturer to be watertight. Plug-type connections of the power cable onto the pump housing will not be acceptable as a station disconnect due to the potential for leaks and electrical shorts.

17. The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve. The check valve will provide a full-ported passageway when open and shall introduce a friction loss of less than 6 inches of water at maximum rated flow.

18. The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper-type integral anti-siphon valve built into the discharge piping prior to the check valve.

19. Plug valve and backflow assembly shall be in accordance with Section 33 30 65 Part 2.01 and Part 2.02 of the Fulton County Wastewater Specifications or approved equivalent.

    A. Manufacturers: Acceptable Manufacturers are listed below. The manufacturer's standard product may require modification to conform to specified requirements:
        1. DeZurik
        2. Val-Matic
        3. Or approved equal

20. Backflow prevention assemblies shall be among those listed on the list below for the size of the wastewater force main service line.

    A. Double Check Assemblies
        1. Watts LF007 Double Check Assembly for 5/8 inch to 2 inch.
        2. Watts 774 Double Check Assembly for 2-1/2 inch to 12 inch.
        3. Or approved equal.

21. Plug valve and backflow assembly housing shall be a valve box is accordance with Fulton County Detail 819 with the lid labeled “Sewer”.

22. All materials exposed to wastewater shall have inherent corrosion protection.

23. The discharge piping shall include a 304 stainless steel ball valve with a minimum rated pressure of 200 psi. All valves shall be operable from ground level.

24. All pipes shall be high performance, high molecular weight, high density polyethylene pipe, as referenced in ASTM D 3350.

25. Pipe within water and sewer easement to be DR11 HDPE.

26. A backup power generator will be required. The generator shall be sufficient to operate the pump station in an event of a power outage and functions according to manufacturer’s specifications. Generators shall be capable of powering the pump motors’ starting current, electrical systems, instrumentation / controls and alarm systems and other auxiliary equipment as may be necessary to provide for the safe and effective operation of the pump station. The Engineer shall supply generator details, specifications, and shop drawings, along with automatic transfer switch specifications and shop drawings to the County for approval. The generator shall be capable of running for a minimum of 24 hours without refueling.

27. The pump station and generator shall be installed a minimum of one- (1-) foot above the 500-year flood elevation.

28. The engine generator set shall be a factory-assembled unit that is a standard production model with existing torsional analysis data. Mixing and matching engine and generator by a third-party supplier is not acceptable. Generators are to be run on natural gas, otherwise diesel or gasoline is acceptable. A spill containment system must be provided for gas or diesel generators. All gas piping and connecting equipment shall be installed in accordance with the Georgia State Amendments to the Standard Gas Code, latest edition. All gas supply lines must include a drip loop as well as all other equipment required for a safe and complete hook-up. All conduits and gas lines shall be installed underground. If gas is unavailable, a letter of exception must be obtained from FCPW.

29. Generators shall meet all applicable, current U.S. Environmental Protection Agency (USEPA) air emission standards. Generators shall be supplied with all auxiliary systems necessary for operation (i.e., batteries, battery charger, block heater, etc.) installed. Generators shall be properly grounded. A generator ground grid must be provided. Design

of the grounding system shall comply with NEC, IEEE and all other applicable codes and ordnances.

30. All generators shall be equipped with the quiet run package, including sound attenuating weather enclosure and critical grade muffler. The generator shall be housed in a weatherproof enclosure. Quiet site soundproofing shall be capable to reduce noise to sixty (60) db at a distance of 23 feet from the generator.
31. Generators shall be provided with special sequencing controls to delay lead and lag pump starts. Pumps shall start with a minimum 15 second lag time. Simultaneous starting of two (2) pumps shall be prevented. A connection shall be provided so that the generator can power an external, portable load bank for maintenance purposes.
32. Generators shall be placed on a reinforced concrete pad to be designed by Developer's Design Engineer based on the specific generator selected.
33. Generator control system shall include a programmable control device to allow automatic start-up and test functions.
34. Automatic Transfer Switch
    1. The standby power system shall include an automatic transfer switch to automatically start the generator in the following events:
    2. Loss of any phase of power
    3. Reverse power
    4. Low voltage brownout.
    5. The standby power transfer switch shall not engage until after thirty (30) seconds of continuous power loss or low voltage, occurs.
    6. Automatic transfer switch shall be rate for 100% of full load.
    7. The transfer switch shall be selectable for load or no load.
    8. The transfer switch shall be provided with three phase voltage and frequency sensors with adjustable settings.
    9. Exercise clock shall be provided as a configurable function.
    10. The transfer switch shall be provided with indicators for all phases of operation and be equipped with a fully programmable timer for exercising the equipment.
    11. The automatic transfer switch shall be configured to switch back when power is restored to the pump station.
    12. Automatic transfer switches shall be in a NEMA 4X Stainless Steel enclosure.
35. A demonstration that the generator is capable of providing the required power with all installed equipment operating simultaneously must be performed at the time of start-up. Provide power failure test on the system.
36. Provide 3 sets of Operation & Maintenance Manuals, 2 hard copies and 1 searchable electronic copy, to the owner for the Pump Station, Control Panel, Generator, and Automatic Transfer Switch.
37. Note is leu of a standby generator, a battery backup system can be installed. The battery backup system shall be capable of running a minimum of 24 hours. A charging system will be required.

1.03 **Installation**

1. The contractor shall mount the NEMA 4X alarm device in a conspicuous location, as per national and local codes.

2. Installation of pump station shall be accomplished so that 2” to 4” of access way, below the bottom of the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the excavated hole must be large enough to allow for the concrete anchor.

3. A 6” inch (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8” or more than 3/4” shall be used as bedding material under each grinder pump station unit.

4. A concrete anti-flotation collar sized according to the Manufacturer’s instructions may be required and shall be pre-cast to the grinder pump or poured in place.

5. Backfill of clean native earth, free of rocks, roots, and foreign objects shall be thoroughly compacted in lifts not exceeding 12” to a final Standard Proctor Density of not less than 85 percent. Improper backfilling may result in damaged access ways. The Grinder Pump Station shall be installed at a minimum depth from grade to assure minimum frost protection. Final grade shall slope away from the Grinder Pump Station.

6. A 15-foot private easement (minimum) owned by Fulton County within the Homeowners Association (HOA) property is required for low pressure sewer system installation. This easement shall run from the discharge manhole to the service lateral connection to the forcemain.

7. Sewers shall be designed with sufficient clearance from water and other existing utilities. A 10-foot separation is required from sewer and water laterals. Sewer lines may be no closer than 4’ to each other. No sewer may be installed between homes. Each lateral requires a separate connection to the county force main.

8. A valve box must be located within the easement owned by Fulton County. The valve box shall contain additional shut off for county control and connect directly to the forcemain line.

9. The Contractor/Installer shall install 3M™ Electronic Marking System (EMS) Warning Tape 7904-XT, Green, 4 in, WasteWater, shall be placed a minimum of 6 to 12 inches above the low-pressure force main line but no more than 4-feet deep from the discharge manhole to the shut-off isolation valve at the right of way line or easement boundary. The warning tape shall be installed simultaneously with the HDPE piping. Warning tape shall be properly spliced at each end connection and each service connection.

10. The warning tape shall extend along the top of the force main to each flushing station and emergency truck connection, shut-off isolation valves, air relief valve, and force main discharge.

11. Warning tape shall be installed by the Contractor/Installer once backfill has been placed and compacted to 6 to 12-inches above the top of the pipe and not more than 18 inches above the top of the pipe. Tapes shall be color coded in accordance with APWA Uniform Color Codes with the following legends: Sewer Systems, Safety Precaution Green, “Caution Wastewater Line Buried Below”. Tape shall be permanently printed with no surface printing allowed. Tape width shall be a minimum of 4 inches.

12. No Warning tape will be required where pipe is installed using a directional boring machine, but a locate wire will be required. The Contractor/Installer shall install 12-gauge, green-coated locating wire along the length of the directional bore. The locator wire shall be installed simultaneously with the HDPE piping. Wire shall be properly spliced. Care shall be taken to adequately wrap and protect wire at all splice locations. No bare wire shall be accepted. Locating wire shall be brought up to the surface at the end of each bore. Enough wire shall be coiled and stored near the surface to allow the tracer wire to be extended 12-inches above ground. The tracer wire shall be placed in a standard cleanout box.

13. A four (4) foot piece of four-inch SCH 40 PVC pipe with watertight cap shall be provided to locate the stub-out inlet for the property owners’ installation contractor, or as depicted on the contract drawings.

14. Force main line shall be located within the main road (under the pavement), located approximately 4 feet from the curb and at a depth of 6 feet to the top of the pipe. The force main shall not be installed between houses.

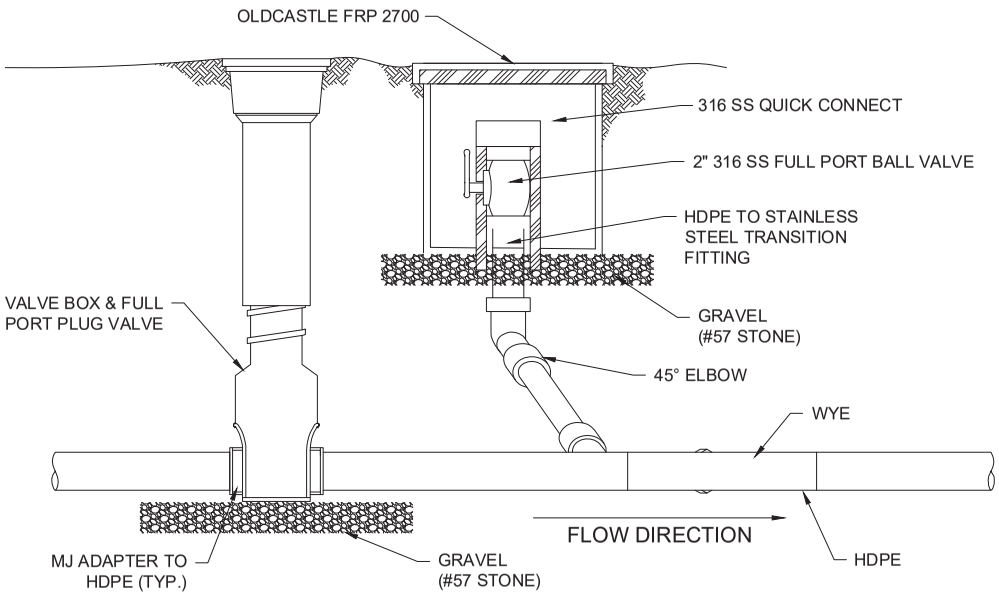
15. Receiving manholes shall be epoxy coated with sealed composite lids, or an odor control insert or system to be approved by the Director of FCDPW. A maximum of 4 community force main lines may discharge into the existing tie-in manhole.

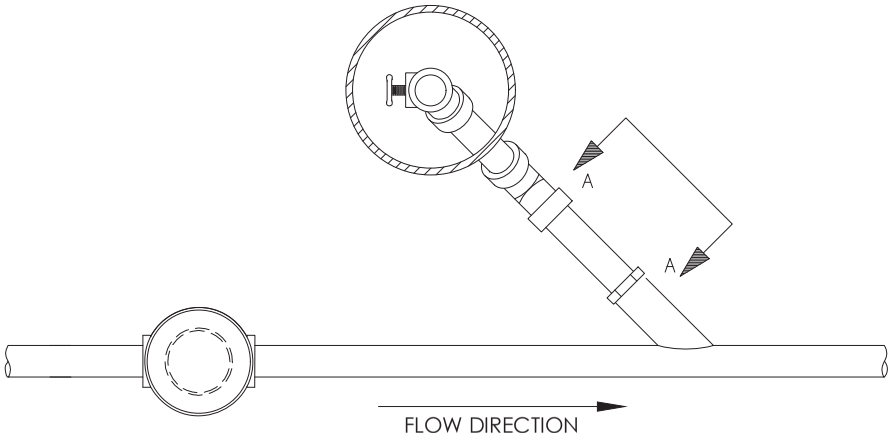
1.04 Start-Up and Field Testing

1. Upon completion of the start-up and testing, the Manufacturer shall submit to the County the start-up authorization form describing the results of the tests performed for each grinder pump station. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected.

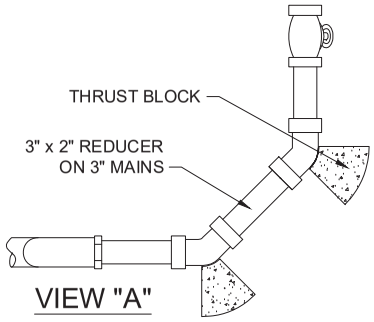
NOTES:

1. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL INSPECT TRENCH BEFORE INSTALLATION AND SUBMIT INSPECTION REPORT FOR COMPACTION OF TRENCH.
2. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL OBSERVE AND REPORT MARKING TAPE INSTALLATION.
3. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL STAMP AND SIGN ALL INSPECTION REPORTS.
4. 3M™ ELECTRONIC MARKING SYSTEM (EMS) CAUTION TAPE 7904, GREEN, 6 IN, WASTE WATER, SHALL BE INSTALLED AT A DEPTH OF 3-FEET FROM FINAL GRADE CENTERED OVER THE FORCEMAIN AND SERVICE LATERALS. THE ENCASEMENT AND MARKING TAPE SHALL BE INSTALLED ALONG THE PUBLIC SYSTEM FROM THE BACKFLOW CHECK VALVES TO DISCHARGE MANHOLE.
5. FINAL PLAT MUST SHOW AND RECORD A 15-FOOT EASEMENT TO BE DEDICATED TO FULTON COUNTY PUBLIC WORKS FOR THE COMMON LOW-PRESSURE FORCEMAIN. EASEMENT SHOULD EXTEND 7.5-FEET ON EACH SIDE OF THE COMMON FORCEMAIN CENTERLINE, AND 1-FOOT PAST THE BOX FOR THE FLUSHING CONNECTION. FULTON COUNTY MAINTENANCE RESPONSIBILITY STARTS AT THE PUBLIC MANHOLE AND ENDS 1-FOOT OUTSIDE OF THE BOX FOR THE FLUSHING CONNECTION ASSEMBLY.
6. EACH SYSTEM SHALL BE INDIVIDUALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS OR DESIGNEE.
7. ADDITIONAL CONDITIONS MAY BE ADDED TO THE SYSTEM BASED ON THE DESIGN AND TOPOGRAPHY





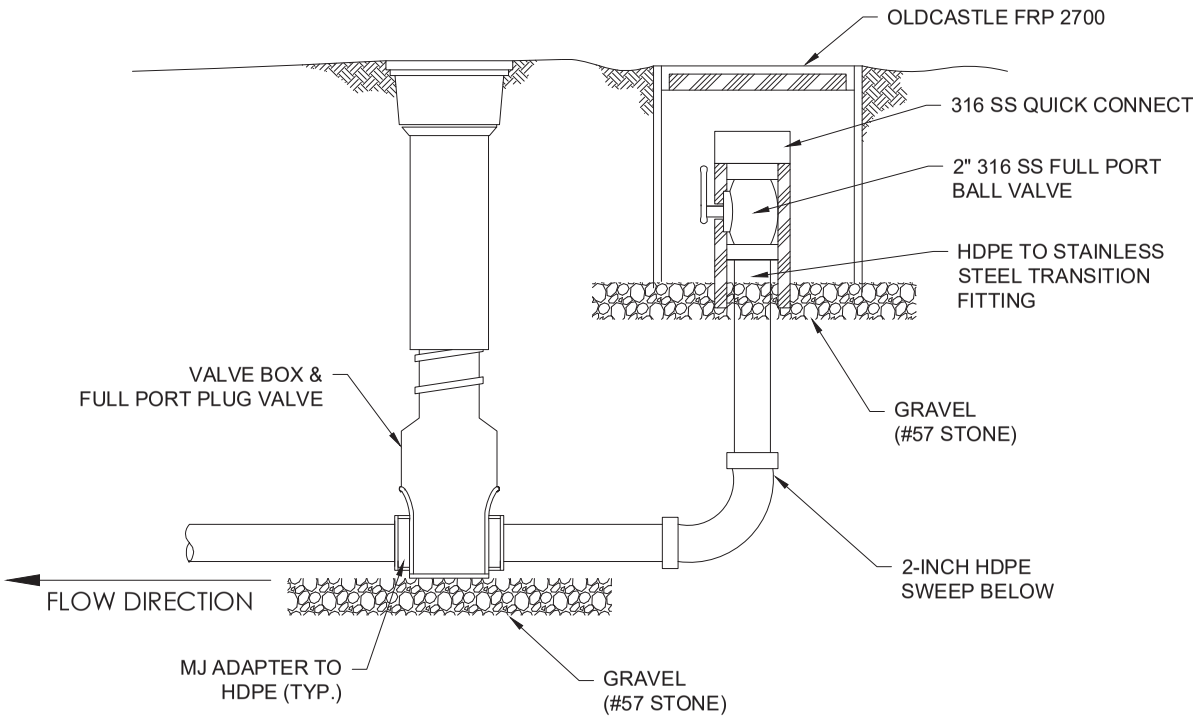
PLAN VIEW

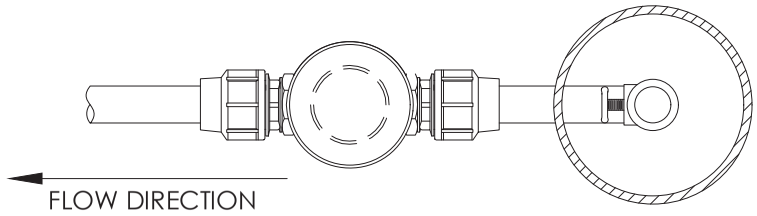


VIEW "A"

FULTON COUNTY STANDARD DETAIL 715		DATE	REVISIONS	DATE	REVISIONS	DGS/DRN/CHKD: HM/HM/--	FULTON COUNTY	FULTON COUNTY PUBLIC WORKS 141 PRYOR ST. ATLANTA, GA. 30303 404-612-7400 FAX: 404-224-0498	DRAWING NO.
TYPICAL IN-LINE FLUSHING CONNECTION LOW PRESSURE SEWER SYSTEM						APPROVED: --			715
						DATE: 01-21-2026			

715-S.dwg December 08, 2025 - 9:41am





PLAN VIEW

NOTES:

1. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL INSPECT TRENCH BEFORE INSTALLATION AND SUBMIT INSPECTION REPORT FOR COMPACTION OF TRENCH.
2. FULTON COUNTY PUBLIC WORKS REPRESENTATIVE SHALL OBSERVE AND REPORT MARKING TAPE INSTALLATION.
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5. FINAL PLAT MUST SHOW AND RECORD A 15-FOOT EASEMENT TO BE DEDICATED TO FULTON COUNTY PUBLIC WORKS FOR THE COMMON LOW-PRESSURE FORCEMAIN. EASEMENT SHOULD EXTEND 7.5-FEET ON EACH SIDE OF THE COMMON FORCEMAIN CENTERLINE, AND 1-FOOT PAST THE BOX FOR THE FLUSHING CONNECTION.
6. EACH SYSTEM SHALL BE INDIVIDUALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS AND DESIGNEE.
7. ADDITIONAL CONDITIONS MAY BE ADDED TO THE SYSTEM BASED ON THE DESIGN AND TOPOGRAPHY

FULTON COUNTY STANDARD DETAIL 716

TYPICAL END-OF-LINE FLUSHING CONNECTION
LOW PRESSURE SEWER SYSTEM

DATE	REVISIONS	DATE	REVISIONS

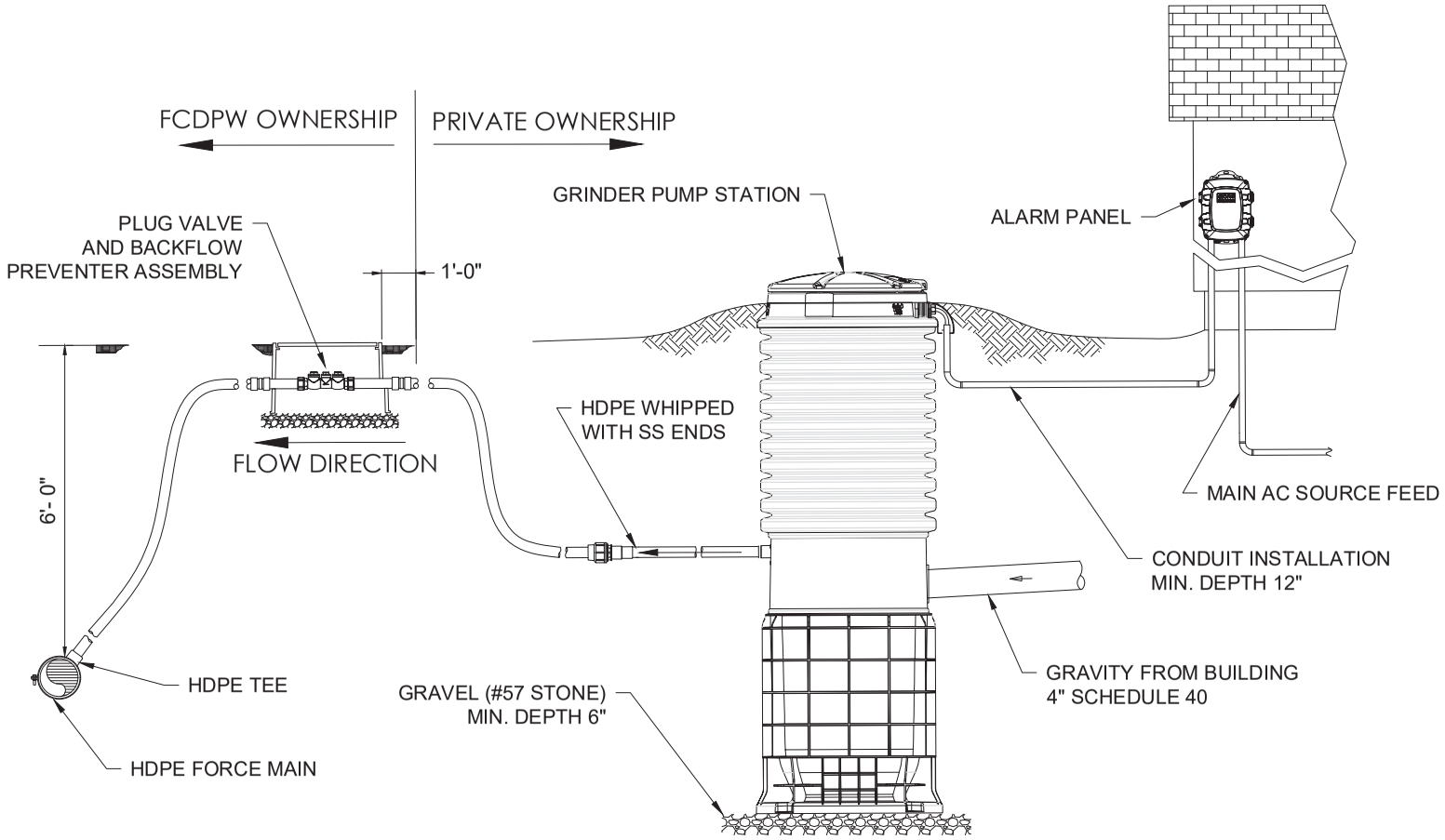
DGS/DRN/CHKD: HM/HM/KK
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
716

716-S.dwg December 08, 2025 - 9:41am



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5. FINAL PLAT MUST SHOW AND RECORD A 15-FOOT EASEMENT TO BE DEDICATED TO FULTON COUNTY PUBLIC WORKS FOR THE COMMON LOW-PRESSURE FORCEMAIN. EASEMENT SHOULD EXTEND 7.5-FEET ON EACH SIDE OF THE COMMON FORCEMAIN CENTERLINE. EASEMENTS SHALL ALSO EXTEND ALL THE WAY UP TO AND INCLUDE THE SERVICE CONNECTION AND VALVE BOX. THE EASEMENT SHOULD EXTEND 1-FOOT PAST THE BOX FOR THE PLUG VALVE AND BACKFLOW PREVENTER ASSEMBLY.
6. FULTON COUNTY PUBLIC WORKS WILL APPROVE THE PRIVATE LOW-PRESSURE SYSTEM PROVIDED THAT THE DEVELOPER/HOMEOWNERS ASSOCIATION (HOA) PROVIDES A SIGNED MAINTENANCE AGREEMENT WITH A QUALIFIED, LICENSED CONTRACTOR OR PLUMBER. FULTON COUNTY MAINTENANCE RESPONSIBILITY STARTS AT THE PUBLIC MANHOLE AND ENDS JUST OUTSIDE OF THE BOX FOR THE PLUG VALVE AND BACKFLOW PREVENTER ASSEMBLY.
7. EACH SYSTEM SHALL BE INDIVIDUALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS OR DESIGNEE.
8. ADDITIONAL CONDITIONS MAY BE ADDED TO THE SYSTEM BASED ON THE DESIGN AND TOPOGRAPHY.

1640

FULTON COUNTY STANDARD DETAIL 717

TYPICAL SERVICE CROSS SECTION
LOW PRESSURE SEWER SYSTEM

DATE	REVISIONS	DATE	REVISIONS

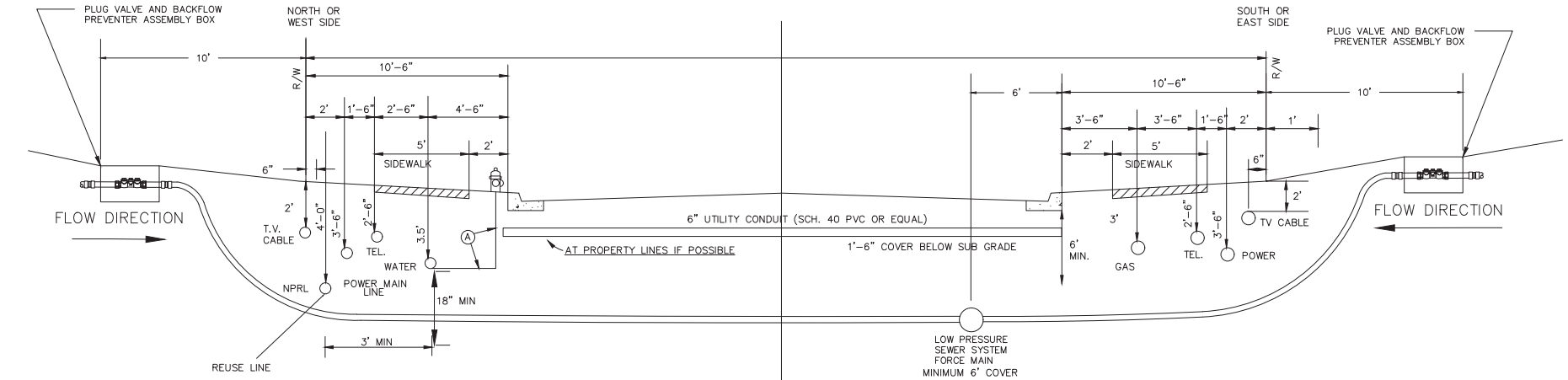
DGS/DRN/CHKD: HM/HM/KK
APPROVED: TM
DATE: 01-21-2026

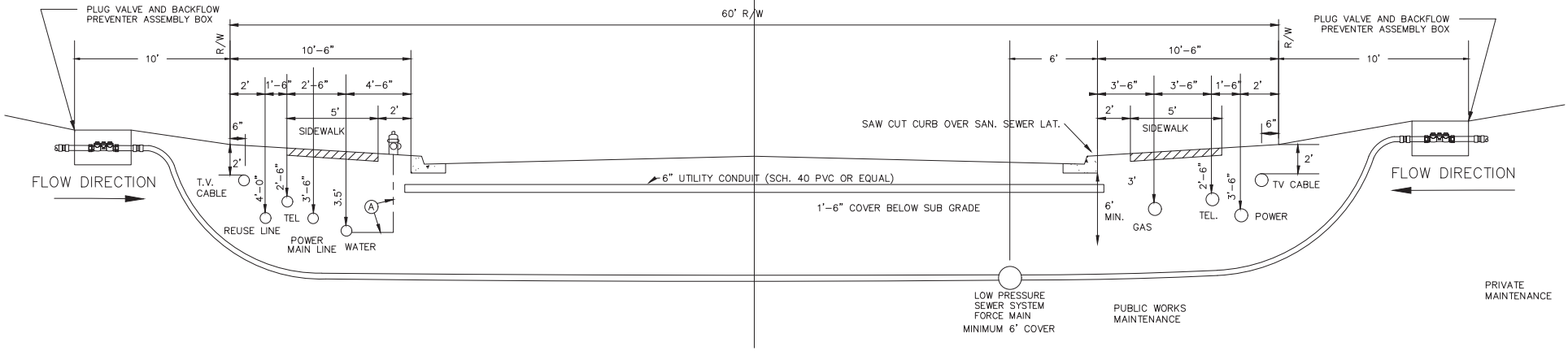
FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
717

717-S.dwg December 08, 2025 - 9:41am





FULTON COUNTY STANDARD DETAIL 718
TYPICAL SERVICE CROSS SECTION
UTILITY LOCATION
LOW PRESSURE SEWER SYSTEM

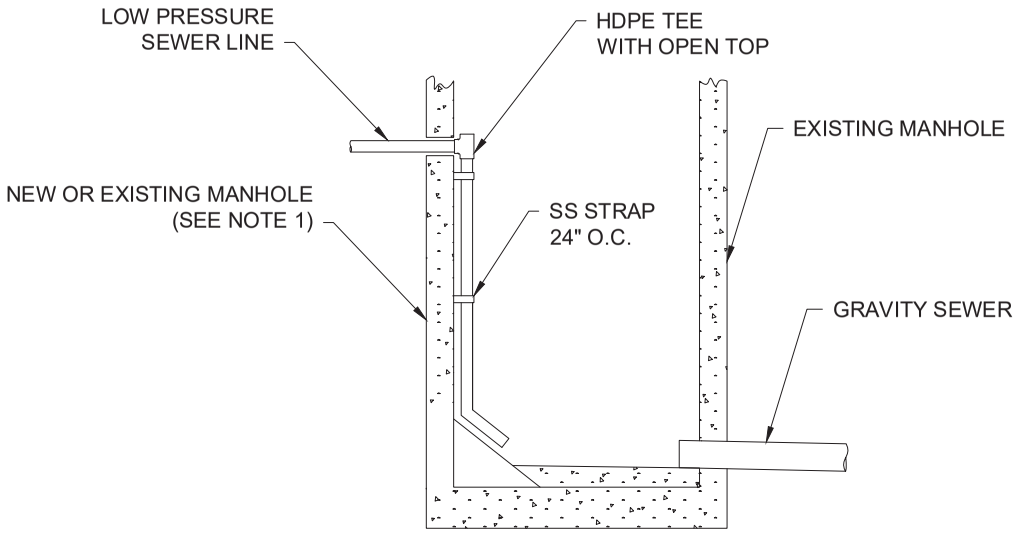
DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: HM/HM/KK
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO. 718

718-S.dwg December 08, 2025 - 9:41am



NOTES:

1. FOR NEW MANHOLE INSTALL PER DETAIL 114-A OR 114-B STANDARD HDPE MANHOLE. FOR TIE-IN TO EXISTING MANHOLE, CORE FROM INSIDE. CORE SHALL BE AWAY FROM BARREL JOINTS.
2. EXISTING MANHOLE SHALL BE PREPARED AND LINED WITH COATING CAPABLE OF RESISTING CORROSION CAUSED BY HYDROGEN SULFIDE GASES AND OTHER CONSTITUENTS FOUND IN WASTEWATER.
3. NEW MANHOLE SHALL BE HDPE.
4. THE INSTALLED PIPE SHALL BE ALLOWED TO REST A MINIMUM OF 12 HOURS BEFORE TIE-IN TO THE DISCHARGE MANHOLE.
5. HDPE PIPE ENTERING A MANHOLE SHALL BE INSTALLED PER MANHOLE STANDARD DETAIL WITH FLEXIBLE RUBBER CONNECTOR, OR BOOT, TO NEW MANHOLE.
6. DROPS TO BE CONSTRUCTED OF SCHEDULE 80 PVC.
7. USE $\frac{1}{2}$ INCH DIAMETER EXPANSION TYPE STAINLESS STEEL CINCH BOLTS WITH STAINLESS STEEL WASHER AND NUTS TO ATTACH STRAPS.
8. MINIMUM OF TWO STRAPS REQUIRED.
9. MINIMUM SIZE OF MANHOLE WITH INSIDE DROP SHALL BE 60-INCH.

FULTON COUNTY STANDARD DETAIL 719

TYPICAL DROP CONNECTION
LOW PRESSURE SEWER SYSTEM IN MANHOLE

DATE	REVISIONS	DATE	REVISIONS

DGS/DRN/CHKD: HM/HM/KK
APPROVED: TM
DATE: 01-21-2026

FULTON COUNTY

FULTON COUNTY PUBLIC WORKS
141 PRYOR ST. ATLANTA, GA. 30303
404-612-7400 FAX: 404-224-0498

DRAWING NO.
719

719-S.dwg December 10, 2025 - 12:55pm

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0098 **Meeting Date:** 2/18/2026

Department
Senior Services

Requested Action
Request approval of a recommended proposal - Senior Services, 25RFP1421145A-KM, Food Services Management in the amount not to exceed $669,600.00 with Nourish Food Services (Grayson, GA) to provide food service management services for the five senior multipurpose facilities and three training centers. Effective March 2, 2026, through December 31, 2026, with two renewal options.

Requirement for Board Action
In accordance with Purchasing Code Section 102-374, all competitive sealed proposals shall be forwarded to the Board of Commissioners for approval.

Strategic Priority Area related to this item
Health and Human Services

Commission Districts Affected
All Districts ☒
District 1 ☐
District 2 ☐
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?
Yes

Summary & Background: The Department of Senior Services and Behavioral Health recommends approval of this request for food services and management agreement with Nourish Food Services. This contract provides an additional layer of nutritional services expertise that includes menu development, meal preparation, diverse recipes, nutrition analysis, staff training, and implementation of food operation standards to our four senior facility main kitchens and training centers.

Scope of Work: The contractor is responsible for daily kitchen operations management at the five

senior multipurpose facilities and three training centers through oversight of the following tasks: menu development, food procurement, food production and service, sanitation/safety, and quality control.

Community Impact: Increased quality of food, more standardized menus and a better overall customer experience.

Department Recommendation: The Department of Senior Services recommends approval.

Project Implications: More standardization of services throughout the facilities, saving in food purchases, commercial food services culinary arts expertise, comprehensive ongoing training, implementation of standard kitchen policies, procedures, and standards of operations, inventory control, and improved cash management via the implementation of a point of sales software system.

Community Issues/Concerns: There are no community issues/concerns regarding this item.

Department Issues/Concerns: The Department has no issues/concerns regarding this item.

Contract Modification: This is a new procurement.

Contract & Compliance Information

Contract Value: **$669,600.00**

Prime Vendor: **Nourish Food Services**
Prime Status: **African American Male Business Enterprise**
Location: **Grayson, GA**
County: **Gwinnett County**
Prime Value: **$669,600.00 or 100.00%**
Subcontractor: **None**

Total Contract Value: **$669,600.00 or 100.00%**
Total Certified Value: **-0-**

Exhibits Attached

Exhibit 1: Evaluation Committee Recommendation Memo
Exhibit 2: Performance Evaluation

Contact Information

Ladisa Onyiliogwu, Director, Department of Senior Services, 404-281-4042

Contract Attached

No

Previous Contracts

No

Total Contract Value

Original Approved Amount:	$0.00
Previous Adjustments:	$0.00
This Request:	$669,600.00
TOTAL:	$669,600.00

Fiscal Impact / Funding Source

Funding Line 1:

100-183-183S-1154: General, Senior Services, Food Services - $53,640.00

Funding Line 2:

100-183-183T-1154: General, Senior Services, Food Services - $107,280.00

Funding Line 3:

100-183-183U-1154: General, Senior Services, Food Services - $103,704.00

Funding Line 4:

100-183-183V-1154: General, Senior Services, Food Services - $92,976.00

Funding Line 5:

100-183-183S-1160: General, Service Services, Professional Services - $25,500.00

Funding Line 6:

100-183-183T-1160: General, Service Services, Professional Services - $25,500.00

Funding Line 7:

100-183-183U-1160: General, Service Services, Professional Services - $25,500.00

Funding Line 8:

100-183-183V-1160: General, Service Services, Professional Services - $25,500.00

Funding Line 9:

100-183-18BB-1154: General, Service Services, Professional Services - $114,000.00

Agenda Item No.: 26-0098 **Meeting Date:** 2/18/2026

Funding Line 10:

100-755-8226-1154: General, Behavioral Health & Developmental Disabilities, Food Services - $96,000.00

Key Contract Terms	
Start Date: 3/2/2026	**End Date:** 12/31/2026
Cost Adjustment:	**Renewal/Extension Terms**: Tv renewal options

Overall Contractor Performance Rating: New Vendor

Would you select/recommend this vendor again?
Choose an item.

Report Period Start: **7/1/2026**

Report Period End: **12/31/2026**

INTEROFFICE MEMORANDUM

FULTON COUNTY

TO: Felicia Strong-Whitaker, Director
Department of Purchasing & Contract Compliance

FROM: Evaluation Committee Recommendation Letter

DATE: January 27, 2026

PROJECT: 25RFP1421145A-KM, Food Services Management

In accordance with the Purchasing Code, a duly appointed Evaluation Committee has reviewed the proposals submitted in response to the above-reference project on behalf of the Department of Senior Services.

Three (3) qualified firms submitted proposals for evaluation and consideration for award of this project:

1. Nourish Food Services
2. Healthcare Services Group, Inc.
3. Piccadilly Holdings LLC

After reviewing the technical proposal, the following firms were short listed.

1. Nourish Food Services
2. Healthcare Services Group, LLC

After reviewing, evaluation and consideration of all available information related to the requirements and evaluation criteria of the RFP, the Evaluation Committee has determined that the proposal submitted by **Nourish Food Services**, with a total score of **82.06%**, is the recommended vendor for the award of 25RFP1421145A-KM, Food Services Management.

Docusign Envelope ID: F24391D0-BB8E-418C-B0B2-FCE564621985

The Evaluation Committee members attest that each member scored each proposal independently in accordance with the evaluation criteria set forth in the Request for Proposal and that their score is a part of the final scores in the attached Evaluation Matrix.

SELECTION COMMITTEE MEMBERS:

Andre Gregory _____
Andre Gregory, Senior Program Manager
Department of Senior Services

Terryl Sparkman _____
Terryl Sparkman, Multipurpose Facility
Manager, Department of Senior Services

Brandy Coffee _____
Brandy Coffee, Nutrition Coordinator
Department of Senior Services

Darlene Whitlow _____
Darlene Whitlow, Department Accountant
Department of Behavioral Health and
Developmental Disabilities

_____
Leon Rosen, Program Manager
Department of Behavioral Health and
Developmental Disabilities

INTEROFFICE MEMORANDUM

FULTON COUNTY

TO: Felicia Strong-Whitaker, Director
Department of Purchasing & Contract Compliance

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Andre Gregory, Senior Program Manager
Department of Senior Services

Terryl Sparkman _____
Terryl Sparkman, Multipurpose Facility
Manager, Department of Senior Services

Brandy Coffee _____
Brandy Coffee, Nutrition Coordinator
Department of Senior Services

Darlene Whitlow _____
Darlene Whitlow, Department Accountant
Department of Behavioral Health and
Developmental Disabilities

_____
Leon Rosen, Program Manager
Department of Behavioral Health and
Developmental Disabilities

EVALUATION CRITERIA	WEIGHT	Nourish Food Service	Healthcare Services Group, Inc.
Project Plan	25%	22.50%	15.00%
Qualifications of Key Personnel	20%	16.00%	13.00%
Relevant Project Experience/Past Exp.	20%	17.00%	12.00%
Availability of Key Personnel	18%	17.10%	6.30%
Local Preference	5%	0.00%	0.00%
Service Disabled Veterans Preference	2%	0.00%	0.00%
Total Technical Scores		72.60%	46.30%
Cost	10%	10.00%	5.87%
TOTAL SCORE:	100%	82.60%	52.17%

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0063 **Meeting Date:** 2/18/2026

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Request approval of a Resolution affirming the protection of Constitutional Rights at Fulton County facilities and limiting ICE enforcement activities. **(Arrington) (HELD ON 2/4/26)**

A RESOLUTION AFFIRMING THE PROTECTION OF CONSTITUTIONAL RIGHTS OF ALL PERSONS IN FULTON COUNTY FACILITIES AND LIMITING ICE ENFORCEMENT ACTIVITIES; AND FOR OTHER PURPOSES.

WHEREAS, Fulton County is the largest county in the state of Georgia and is home to more than one million residents; and

WHEREAS, Fulton County owns, leases, and operates numerous buildings and facilities; and

WHEREAS, Fulton County is committed to the safety and well-being of its residents, visitors, officials, employees, and those doing business in and with the County; and

WHEREAS, Fulton County is committed to protecting the Constitutional rights of all people within the county; and

WHEREAS, Fulton County believes in the rule of law, the rights and dignity of all people, and responsible government; and

WHEREAS, since early 2025, the Federal Government has drastically expanded its federal immigration enforcement program with a stated goal of deporting millions of people who do not have legal immigration status; and

WHEREAS, there has been widespread public concern regarding violations and potential violations of constitutional rights by federal officials, including agents of Customs and Border Protection ("CBP"), and Immigration and Customs Enforcement ("ICE"); and

WHEREAS, public concern has grown more acute in recent weeks following, amongst other reported incidents, the deaths of two American citizens in Minnesota, both of whom were shot and killed by federal agents engaged in the immigration enforcement efforts; and

WHEREAS, federal officials have also reportedly asserted the ability for immigration enforcement officers, including ICE and CBP officers, to enter property, including private property, without warrants signed by a judge; and

WHEREAS, the members of Board of Commissioners are keenly aware of and share the public concern regarding the potential for violation(s) of constitutional rights by federal officials; and

WHEREAS, Fulton County, including its law enforcement personnel, are not tasked with nor authorized to enforce federal immigration laws; and

WHEREAS, Fulton County recognizes the County and its employees are not required to actively assist in the performance of federal immigration enforcement activities, but also may not obstruct federal officials in the performance of legal, constitutional enforcement activities; and

WHEREAS, to best serve the citizens of Fulton County, the Board of Commissioners finds it necessary to establish a policy regarding access to county facilities by federal law enforcement personnel, including federal immigration officials and agents; and

WHEREAS, documentation and oversight of enforcement activities are important contributors in ensuring safety, confidence, and trust for and among residents, law enforcement officers, and government institutions.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Commissioners of Fulton County hereby establish that its officials and employees shall not permit law enforcement personnel engaged in enforcement activities or investigations, including but not limited to CBP and ICE, access to any facilities, or portions of facilities, that are non-

public locations, including but not limited to areas with restricted access and employee work areas, without a constitutionally sufficient warrant signed by a judge.

BE IT FURTHER RESOLVED, that the County Manager, or his designee, in consultation with the County Attorney, may determine and clarify the county facilities and portions of county facilities that are non-public areas.

BE IT FURTHER RESOLVED, Fulton County officials and employees may take reasonable, legal steps to ensure their own constitutional rights and the constitutional rights of individuals within County facilities are protected if it is physically safe to do so.

BE IT FURTHER RESOLVED, in response to federal immigration enforcement activities:

Documentation of Federal Enforcement Activity

The Fulton County Police Department ("FCPD") shall document federal immigration enforcement activities occurring at any Fulton County facilities, or within unincorporated areas of Fulton County, according to department policy and applicable law, including the nature, time, location, and observed actions of the enforcement activities.

Capture and Preservation of Body Worn Camera Footage

FCPD officers shall activate their body worn camera(s) during any interaction with, or observation of, applicable federal immigration enforcement activities and shall preserve any such footage obtained including footage related to use of force, detentions, injuries, or other enforcement activities, consistent with FCPD policy.

Identification and Verification of Supervisory Federal Officers

FCPD officers shall make reasonable efforts to identify any supervisory officer present on scene during federal immigration enforcement activities. Such identification should include the supervisor's name, credentials, and badge number. The identification and verification process, including refusal(s) to provide requested information, shall be recorded via body worn camera with the footage preserved.

Reporting Violations of Law

FCPD shall formally report any suspected violations of constitutional rights, state or local law by federal law enforcement personnel, including federal immigration officials and agents, consistent with department policy. All such reports shall be made to appropriate operational and legal county authorities, including referring potential felony matters to the appropriate prosecutorial authority in accordance with Georgia law.

Response to Medical Emergencies

FCPD officers shall immediately call for emergency medical services and render aid to any injured person at the scene of federal immigration enforcement activities, regardless of immigration status or agency affiliation and take all reasonable legal steps to ensure emergency medical aid can be rendered without undue interference to lawful enforcement activities.

Public Reporting and Transparency

Fulton County shall maintain and publish data regarding reported legal and constitutional violations by federal immigration enforcement officials. Said reporting shall be conducted in a manner protecting sensitive information, active investigations, and individual(s) privacy while providing the maximum public transparency and accountability legally possible.

BE IT FINALLY RESOLVED, that this Resolution shall become effective upon its adoption, and that all resolutions and parts of resolutions in conflict with this Resolution are hereby repealed to the extent of the conflict.

SO PASSED AND ADOPTED, this 18th day of February 2026.

FULTON COUNTY BOARD OF COMMISSIONERS

SPONSORED BY:

By: _____
Marvin S. Arrington, Jr.
Commissioner, District 5

ATTEST:

_____
Tonya R. Grier
Clerk to the Commission

APPROVED AS TO FORM:

_____
Y. Soo Jo,
County Attorney

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0099 **Meeting Date:** 2/18/2026

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*

Request approval of a Resolution to reallocate at least two percent of the fiscal year 2026 budget towards affordable housing, homelessness prevention programs, and wrap-around services; to direct the County Manager or his designee to propose a similar budget allocation in subsequent fiscal years; and for other purposes. **(Ivory)**

A RESOLUTION TO REALLOCATE AT LEAST TWO PERCENT OF THE FISCAL YEAR 2026 BUDGET TOWARDS AFFORDABLE HOUSING, HOMELESSNESS PREVENTION PROGRAMS, AND WRAP-AROUND SERVICES; TO DIRECT THE COUNTY MANAGER OR HIS DESIGNEE TO PROPOSE A SIMILAR BUDGET ALLOCATION IN SUBSEQUENT FISCAL YEARS; AND FOR OTHER PURPOSES.

WHEREAS, according to the National Low Income Housing Coalition ("NLIHC") nationally, there is a shortage of more than 7 million affordable homes for the nation's 10.8 million extremely low-income families; and

WHEREAS, the United States Department of Housing and Urban Development ("HUD") defines extremely low-income households as those with incomes at or below 30 percent of the area median income or the federal poverty line, whichever is higher; and

WHEREAS, according to the NLIHC, there is a shortage of affordable rental homes available to low-income households across Georgia; and

WHEREAS, HUD defines low-income households as those with incomes at or below 80 percent of the area median income; and

WHEREAS, many of these low-income households are severely cost burdened, spending more than half of their income on housing; and

WHEREAS, severely cost burdened low-income households are more likely than other renters to sacrifice necessities such as nutritious food and healthcare in order to afford rent; and

WHEREAS, severely cost burdened low-income households face a higher risk of housing instability, including evictions, homelessness and housing insecurity; and

WHEREAS, according to the Atlanta Regional Commission's 2025 survey data, affordable housing is the top concern of many issues facing metro-Atlanta residents; and

WHEREAS, on July 13, 2022, the Fulton County Board of Commissioners adopted Resolution 22-0498, acknowledging the affordable housing crisis in Fulton County, and called upon Federal, State, and Local Legislators, and Elected Officials to enact legislation supporting home ownership and rent stabilization; and

WHEREAS, without stable and affordable housing, basic public interest outcomes for households, including but not limited to educational attainment, job security, entrepreneurial opportunity, health, and wealth, are greatly diminished; and

WHEREAS, in addition to affordable housing, homelessness is a significant issue in Fulton County; and

WHEREAS, according to the NLIHC, as of early 2026, data indicates that over 3,200 individuals experience homelessness in Fulton County on any given night.

WHEREAS, pairing affordable housing assistance with voluntary, flexible wrap-around support services - such as case management, medical care, and mental health treatment - enables independent living and prevents homelessness; and

WHEREAS, research has shown that affordable housing initiatives, homelessness prevention programs, and wrap-around services not only help resolve homelessness and increase housing stability, but also improve health, and lower public costs by reducing the use of publicly-funded crisis services, including shelters, hospitals, psychiatric centers, jails, and prisons; and

WHEREAS, the Fulton County Board of Commissioners recognizes that a dedicated annual budget allocation towards affordable housing, homelessness prevention programs, and wrap-around services would be in the best interests of the low-income citizens of Fulton County who are severely cost burdened and susceptible to housing insecurity and homelessness; and

WHEREAS, funding for affordable housing and wrap-around services for homeless and low income citizens in Fulton County is authorized pursuant to Fulton County Code § 1-117, which provides that the Board of Commissioners has exclusive jurisdiction and control over all the property of the county, as they may deem expedient, according to law, having the care, management, keeping, collecting, or disbursement, of money belonging to the county, or appropriated for its use and benefit, making such rules and regulations for the support of the poor of the county, and for the promotion of health, as are not inconsistent with law, and to exercise such other powers as are granted by law, or are indispensable to their jurisdiction over county matters and county finances.

NOW, THEREFORE, BE IT RESOLVED, that for the Fiscal Year 2026, the Board of Commissioners authorizes a reallocation of at least two percent of the Fiscal Year 2026 Budget toward affordable housing, homelessness prevention programs, and wrap-around services for low-income citizens of Fulton County who are severely cost burdened and susceptible to housing insecurity and homelessness and who would also benefit from flexible wrap-around support services.

BE IT FURTHER RESOLVED, that the Board of Commissioners hereby directs the County Manager or his designee to propose budgets in upcoming fiscal years that will include at least a two percent budget allocation towards affordable housing initiatives,

homelessness prevention programs, and wrap-around services to those low-income citizens of Fulton County who are severely cost burdened and susceptible to housing insecurity and homelessness.

BE IT FINALLY RESOLVED, that this Resolution shall become effective upon its adoption, and that all resolutions and parts of resolutions in conflict with this Resolution are hereby repealed to the extent of the conflict.

BE IT FURTHER RESOLVED, this 18th day of February, 2026.

FULTON COUNTY
BOARD OF COMMISSIONERS

Sponsored by:

_____
Moraima Ivory, Commissioner
District 4

ATTEST:

_____
Tonya Grier
Clerk to the Commission

APPROVED AS TO FORM:

_____
Y. Soo Jo
County Attorney

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0100 **Meeting Date:** 2/18/2026

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Request approval of a Resolution increasing the amount of the stipend paid to each member of the Fulton County Board of Equalization from $100.00 per day to $150.00 per day and for other purposes. **(Pitts)**

A RESOLUTION INCREASING THE AMOUNT OF THE STIPEND PAID TO EACH MEMBER OF THE FULTON COUNTY BOARDS OF EQUALIZATION FROM $100.00 PER DAY TO $150.00 PER DAY; AND FOR OTHER PURPOSES

WHEREAS, the Fulton County Boards of Equalization were created pursuant to the authority provided to the General Assembly of Georgia in local constitutional amendment, 1952 Ga. Laws (Act No. 148), page 592; and

WHEREAS, pursuant to O.C.G.A. § 48-5-311 the Boards of Equalization are tasked with the responsibility of hearing and determining appeals from tax assessments and denials of homestead exemptions; and

WHEREAS, the duties of the Boards of Equalization are integral to the tax appeal process; and

WHEREAS, pursuant to O.C.G.A. § 48-5-311, the members serving on the Boards of Equalization are appointed by the Grand Jury of Fulton County; and

WHEREAS, the provisions of O.C.G.A. § 48-5-311 expressly provide that each member of a county board of equalization shall be compensated by the county per diem for time expended in considering appeals; and

WHEREAS, O.C.G.A. § 48-5-311 further provides that such compensation shall be paid at a rate of not less than $25.00 per day and shall be determined by the county governing authority; and

WHEREAS, the Board of Commissioners, on September 19, 2018, via Resolution 18-0672, set the rate of compensation for members serving on the Board of Equalization at $100.00 per day; and

WHEREAS, the Board of Commissioners has determined that it is in Fulton County's best interest to increase such rate of compensation from $100.00 per day to $150.00 per day.

NOW, THEREFORE, BE IT RESOLVED, by the Board of Commissioners, that the rate of compensation paid to each member serving on the Fulton County Boards of Equalization is increased from $100.00 per day to $150.00 per day.

BE IT FURTHER RESOLVED, that the Clerk to the Commission shall provide a copy of this Resolution to the Finance Department and the Fulton County Boards of Equalization.

BE IT FINALLY RESOLVED, that this Resolution shall become effective when adopted, and that all resolutions or parts of Resolutions in conflict with this Resolution are hereby repealed to the extent of the conflict.

PASSED AND ADOPTED by the Board of Commissioners of Fulton County, Georgia, this 18TH day of February 2026.

FULTON COUNTY BOARD OF COMMISSIONERS

SPONSORED BY:

_____
Robert L. Pitts (At-Large)
Chairman

ATTEST:

_____
Tonya R. Grier
Clerk to the Commission

APPROVED AS TO FORM:

_____
Y. Soo Jo
County Attorney

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0101 **Meeting Date:** 2/18/2026

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Request approval of a Resolution to support affordable housing in partnership with Cosmopolitan AME Church, Good Place, and Collaborative Housing Solutions by approving a grant from funds previously set aside to aid in the construction of a 70-unit new construction multifamily development in Vine City that includes 63 affordable units and 7 market rate units, and for other purposes. **(Barrett)**

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0103 **Meeting Date:** 2/18/2026

Department
External Affairs

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Presentation: 2026 State Legislative Session Update.

Requirement for Board Action *(Cite specific Board policy, statute or code requirement)*
Request Approval

Strategic Priority Area related to this item *(If yes, note strategic priority area below)*
Open and Responsible Government

Commission Districts Affected

All Districts	☒
District 1	☐
District 2	☐
District 3	☐
District 4	☐
District 5	☐
District 6	☐

Is this a purchasing item?
No

Summary & Background *(First sentence includes Agency recommendation. Provide an executive summary of the action that gives an overview of the relevant details for the item.)*

Scope of Work:

Community Impact:

Department Recommendation:

Project Implications:

Community Issues/Concerns:

Agenda Item No.: 26-0103 **Meeting Date:** 2/18/2026

Department Issues/Concerns:

Fiscal Impact / Funding Source

Funding Line 1:

n/a

Fulton County Board of Commissioners

Agenda Item Summary

Agenda Item No.: 26-0104 **Meeting Date:** 2/18/2026

Department
Select Fulton

Requested Action *(Identify appropriate Action or Motion, purpose, cost, timeframe, etc.)*
Presentation: Annual Development Authority of Fulton County Governmental Accounting Standards Board, GASB 77.

Requirement for Board Action *(Cite specific Board policy, statute or code requirement)*

Strategic Priority Area related to this item *(If yes, note strategic priority area below)*
Infrastructure and Economic Development

Commission Districts Affected
All Districts ☒
District 1 ☐
District 2 ☐
District 3 ☐
District 4 ☐
District 5 ☐
District 6 ☐

Is this a purchasing item?
No

DEVELOP FULTON

FISCAL YEAR '24 REPORT



Development Authority of Fulton County

Discussion Topics



- About Develop Fulton
- GASB 77 FY 2024 Report
- Economic Impact Summary

About Develop Fulton



PRO-BUSINESS

Develop Fulton delivers innovative services connecting qualified projects with taxable and tax-exempt bond financing and a diversity of targeted economic development services.

PRO-COMMUNITY

Develop Fulton's incentivized projects bring community benefits like roadway and pedestrian safety improvements, better access to affordable housing and retail options, environmental remediation, and career training opportunities.

OUR MISSION

To stimulate quality economic development that expands and diversifies the tax base, provides quality jobs, retains existing businesses, and sustains the quality of life for residents throughout Fulton County.

DEVELOP FULTON

DEVELOP FULTON:

- Support high quality investment that generates jobs and tax revenue
- Expand Fulton County's commercial tax base
- Reduce long term pressure on residential taxpayers

- Major investments recently supported:

amazon DURACELL Mercedes-Benz MILLER ZELL

- Commercial growth helps shift the tax burden toward businesses rather than residents













PROJECT HIGHLIGHTS:

CATALYTIC REDEVELOPMENT EXAMPLES

Medley – Johns Creek Town Center

- $400 million mixed-use development
- Retail, office, and housing
- 956 jobs
- Approximately $600,000 in annual taxes prior to redevelopment
- Approximately $29 million in taxes over the incentive period

EDGE Project – Former Rail Yard Site

- Previously tax exempt for approximately 60 years
- Zero property taxes prior to redevelopment
- Approximately $69 million in property taxes generated over the incentive period

FUTURE FOCUS: PARTNERSHIPS

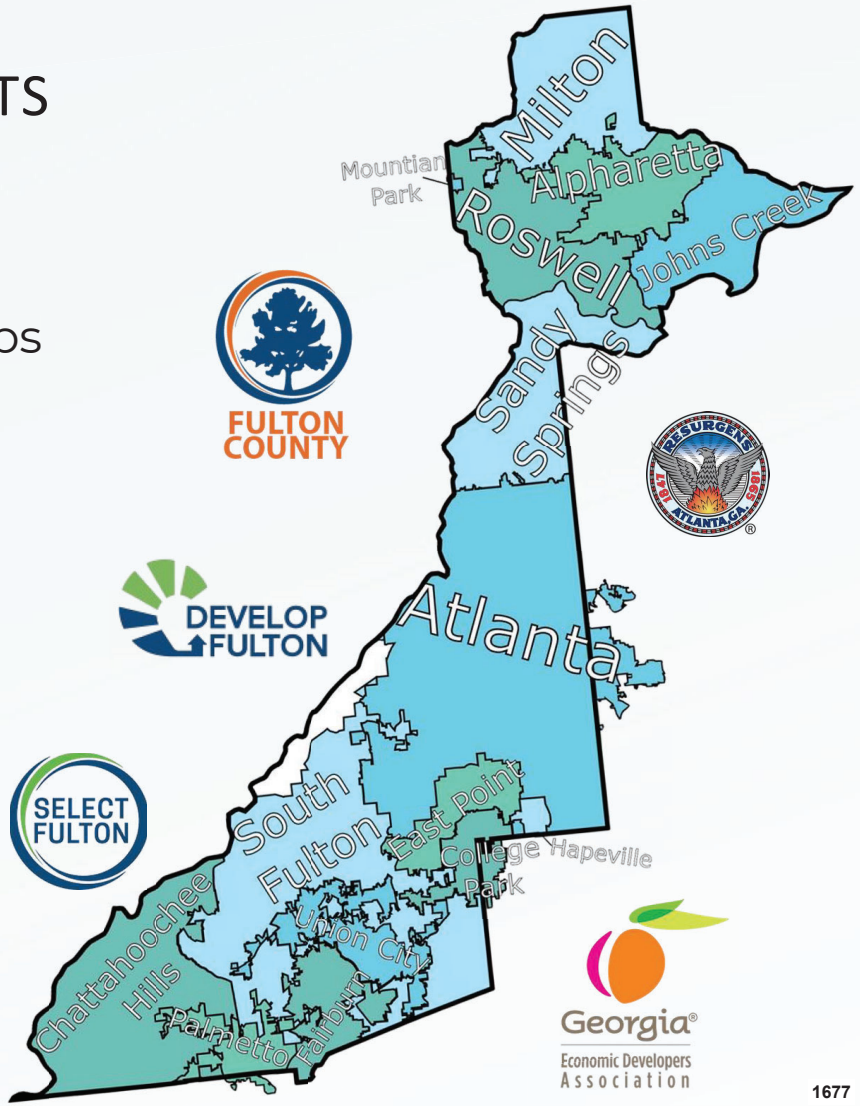
QUALITY DEVELOPMENT WITH CLEAR RESULTS

South Fulton example:

- Recent approved project Hutch, $200M, 400 jobs
- Strong partnerships with City of South Fulton
- Develop Fulton, South Fulton, state Dept of Transportation: all working together

Partnerships are key for the future:

- Develop Fulton Board chaired by Chairman Kwanza Hall
- Fulton County Board of Commissioners
- Select Fulton
- All 15 Fulton County cities
- State Econ Dev Office



Fulton County programs impacted by GASB 77



- The Governmental Accounting Standards Board (GASB) issued Statement 77, which requires disclosures about a government's tax abatement agreements.
- Fulton County reports reductions in **property tax revenue**

PROGRAMS IMPACTED IN FULTON COUNTY

- Taxable Bond Deals
- Rehabilitated Historic Properties
- Enterprise Zones

Fulton County Abatement Schedule

Year	Abatement Percentage
1	50%
2	45%
3	40%
4	35%
5	30%
6	25%
7	20%
8	15%
9	10%
10	5%

DEVELOP FULTON 1678

GASB 77
FY2024 Report

GASB 77 FY2024 Financial Reporting Update

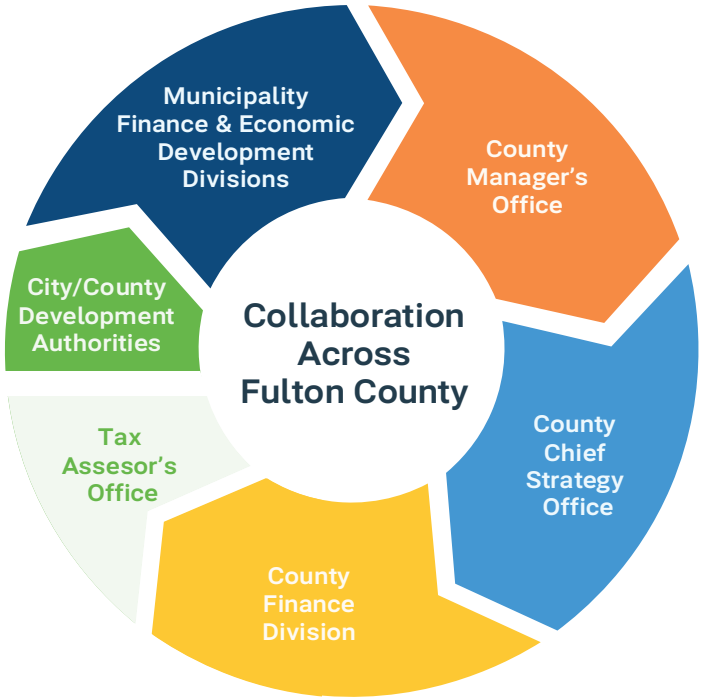
- Engagement with EY
- Seventh year of GASB 77 compliance
- Continued coordination with 15 municipalities, the Tax Assessors Office, and the Finance Division

Beyond GASB

- 2024 Economic Impact Analysis of Develop Fulton projects
- Net New Revenue Impact Analyses and Reporting
- Fulton County, City of Atlanta, APS and FCSD

Transparent Evaluation Process

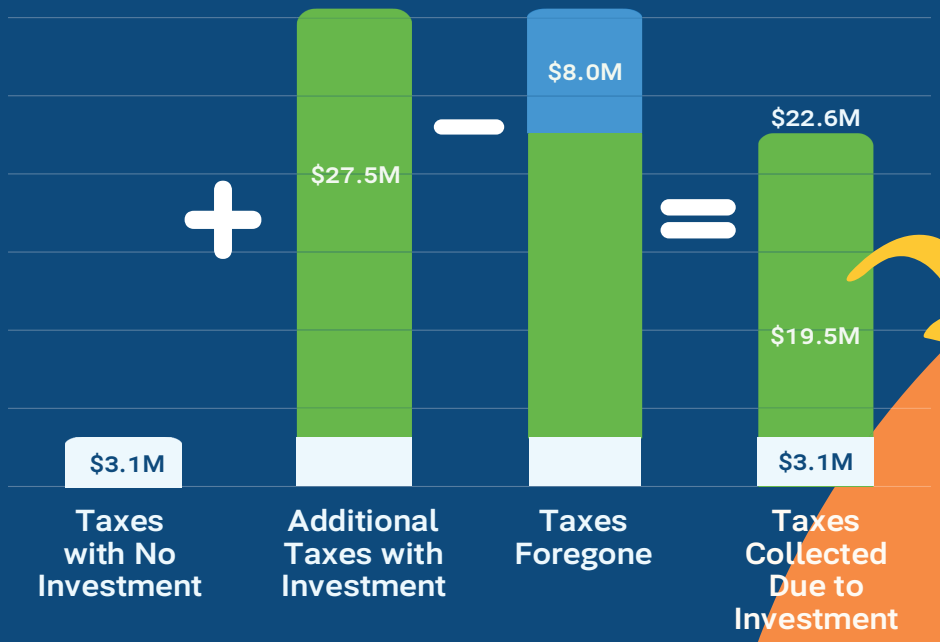
- ROI Model
- Hurdle Rate
- Deal Review Packages



DEVELOP FULTON 1679

Net New Property Taxes for Fulton County in 2024

Net new 2024 property taxes due to active incentive projects approved over a 10-year period: $19.5M



Source: EY analysis using Fulton County Board of Assessors data on property parcels receiving an incentive in 2024.
Note: Figures may not sum due to rounding.

Net Benefit: $19.5M

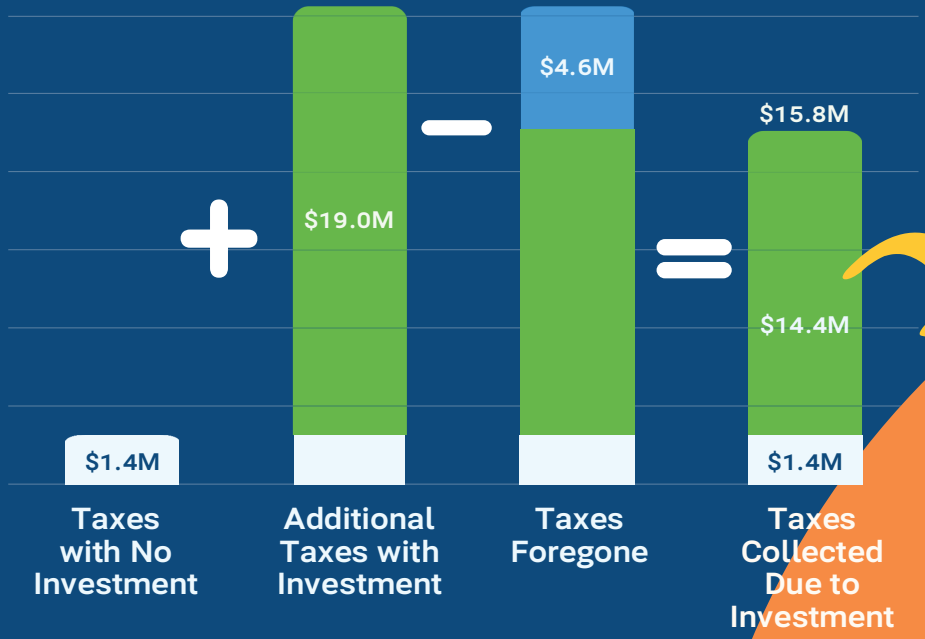
Taxes pre-investment: $3.1M
Plus Additional taxes due to investment: $27.5M
Less Tax incentives: $8.0M
Equals 2024 taxes paid: $22.6M
Less Taxes pre-investment taxes of $3.1M
Equals 2024 Net benefit of $19.5M

Note: $2.4M of the $19.5M net incentive benefit was allocated to tax allocation districts. Thus, $17M of the net incentives benefit was allocated to the county.

Note 2: $8.0M of incentives represents 1.0% of the total property taxes, based on the 2024 CAFR of total property taxes collected.

Net New Property Taxes for Fulton County School District in 2024

Net new 2024 property taxes due to active incentive projects approved over a 10-year period: $14.4M



Taxes pre-investment: $1.4M
Plus Additional taxes due to investment: $19.0M
Less Tax incentives: $4.6M
Equals 2024 taxes paid: $15.8M
Less Taxes pre-investment of $1.4M
Equals 2024 Net benefit of $14.4M

Net Benefit: $14.4M

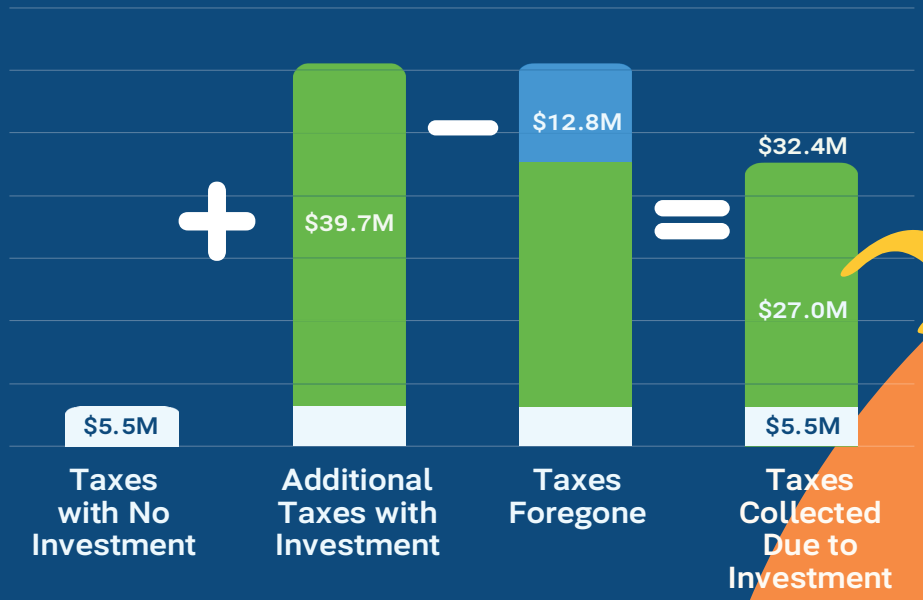
Note: $1.4M of the $14.4M net incentive benefit was allocated to tax allocation districts. Thus, $13.1M of the net incentive benefit was allocated to the FCSD.

Source: EY analysis using Fulton County Board of Assessors data on property parcels receiving an incentive in 2024.
Note: Figures may not sum due to rounding.

DEVELOP FULTON

Net New Property Taxes for Atlanta Public Schools in 2024

Net new 2024 property taxes due to active incentive projects approved over a 10-year period: $27M



Net Benefit: $27M

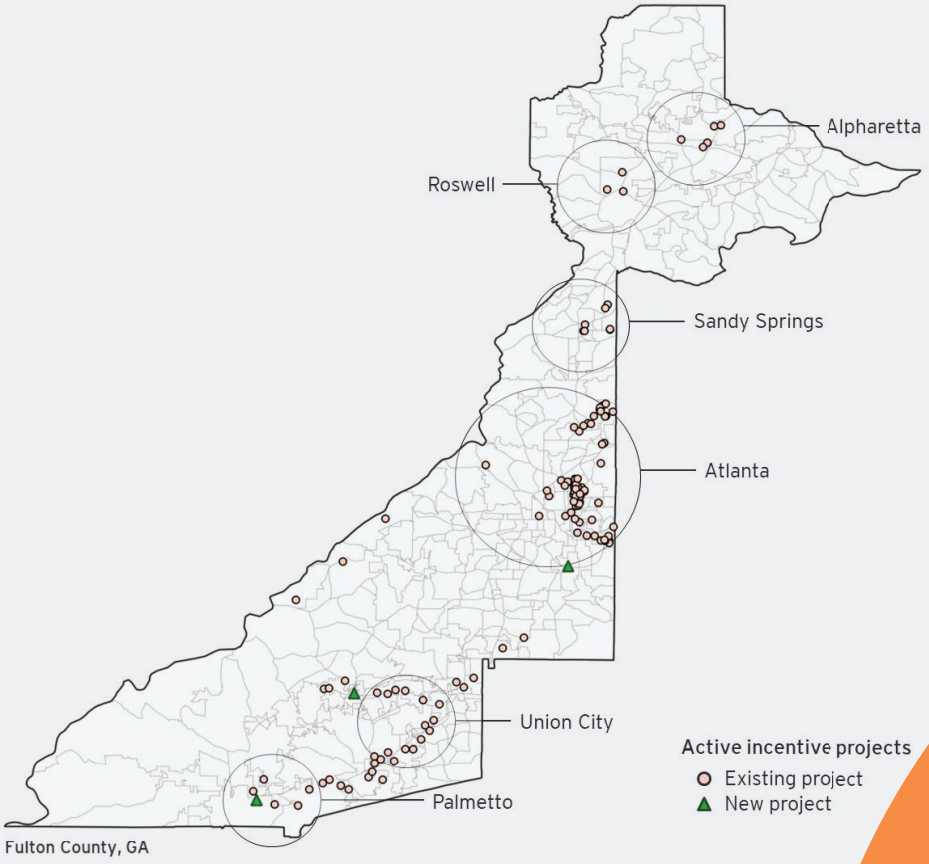
Taxes pre-investment: $5.5M
Plus Additional taxes due to investment: $39.7M
Less Tax incentives: $12.8M
Equals 2024 taxes paid: $32.4M
Less Taxes pre-investment of $5.5M
Equals 2024 Net benefit of $27M

Note: $4M of the $27M net incentive benefit was allocated to tax allocation districts. Thus, $23M of the net incentive benefit was allocated to APS.

Source: EY analysis using Fulton County Board of Assessors data on property parcels receiving an incentive in 2024.
Note: Figures may not sum due to rounding.

DEVELOP FULTON 1682

Active DAFC incentive projects in 2024

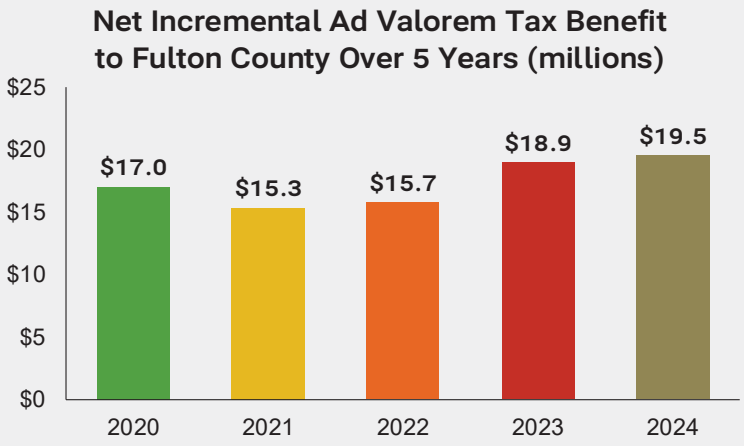


Source: EY analysis of Develop Fulton data, Census TIGER/Line

	CY2024
# of Active Projects	135
Job Commitments	41,065
Capital Expenditures (billions)	$9.8

DEVELOP FULTON

Five-Year Snapshot



	CY2020	CY2021	CY2022	CY2023	CY2024
# of Active Projects	101	121	134	137	135
Job Commitments	31,849	32,746	43,905	45,000	41,065
Capital Expenditures (billions)	$7.6	$8.6	$10.0	$10.4	$9.8
Total Incentives Received (millions)	$9.5	$9.5	$9.7	$9.9	$7.7
Net Ad Valorem Tax Benefit (millions)	$17.0	$15.3	$15.7	$18.9	$19.5

DEVELOP FULTON

Economic Approach

DEVELOP FULTON

Results are for projects actively receiving a property tax incentive in 2024

These projects invested in Fulton County within the past 10 years

Total contributions consist of:
direct, indirect, induced

- Direct impacts — stem from projects
- Indirect impacts — suppliers
- Induced impacts — consumption related

1. Direct Impacts

2. Indirect impacts: Jobs, employee compensation, economic output, and taxes related to supply chain.

3. Induced impacts: Jobs, employee compensation, economic output, and taxes related to employee spending on local goods and services.



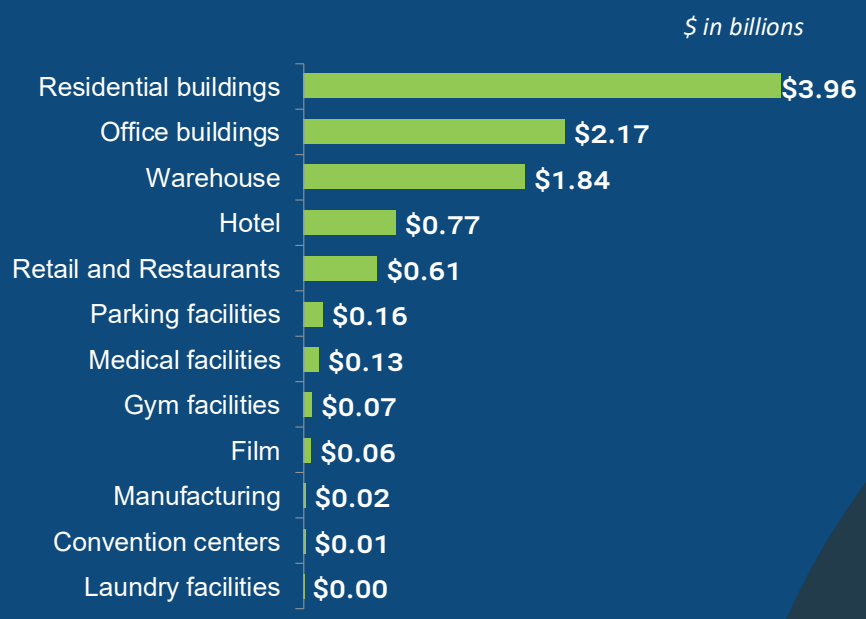
Real estate & finance | Manufacturing | Retail & wholesale | Professional services & information | Health care & social assistance

CONTRIBUTIONS IN OTHER INDUSTRIES

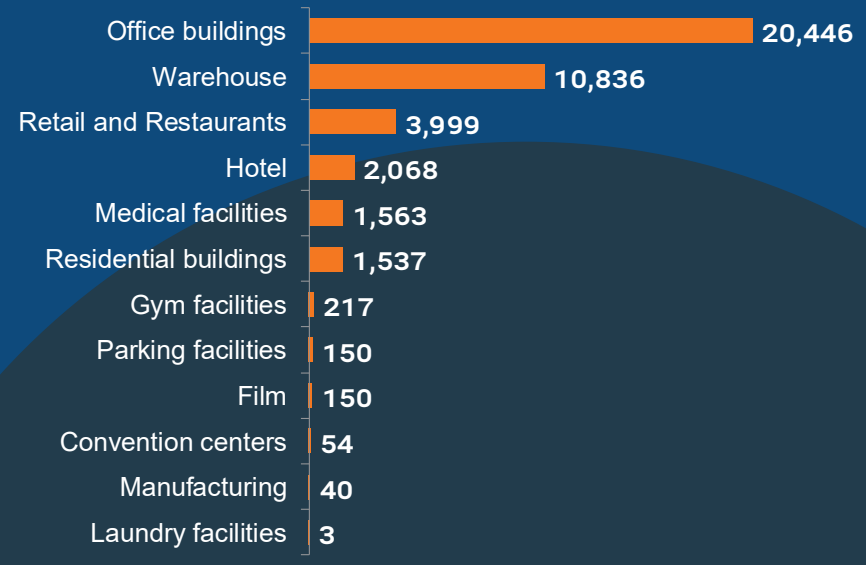
DIRECT CAPITAL INVESTMENT & JOB COMMITMENTS of 135 projects* with an active incentive in 2024

DEVELOP FULTON

Capital investment by active incentive projects
Total: $9.8 billion



Job commitments by active incentive projects
Total: 41,065



* Projects approved during the past 10 years
Source: DAFC MOAs

Summary of 2024 Total Economic Contributions of Active Incentive Projects

	Total economic impacts *(Direct, indirect, and induced)*		
Type of property	**Jobs**	**Labor income ($M)**	**Economic output ($M)**
Office buildings	28,674	$3,091	$4,768
Warehouse	13,999	$795	$1,601
Retail and Restaurants	5,023	$316	$663
Hotel	2,662	$182	$463
Residential buildings	2,462	$146	$628
Medical facilities	2,391	$276	$495
Film	285	$24	$86
Gym facilities	253	$9	$22
Parking facilities	180	$6	$17
Convention centers	70	$5	$10
Manufacturing	51	$4	$12
Laundry facilities	4	$0	$0
Total all projects	56,053	$4,853	$8,765

- ✓ **Total employment:** Full- and part time jobs, which includes the 41,065 direct jobs
- ✓ **Total labor income:** Wage and benefits paid to employees
- ✓ **Total economic output:** Typically measured as the sales of a company

Source: EY analysis using data provided by DAFC on agreements; 2023 IMPLAN model of Fulton County

DEVELOP FULTON 1687

Avalon real estate incentive example

Project has added $607 million in real estate value since 2016 and has added $5.9 million in new property taxes in 2024

Increase in fair market value (FMV) of the project:

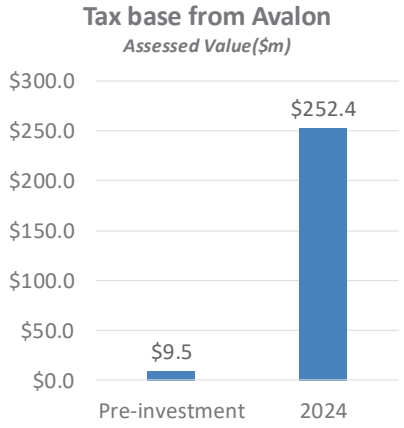
- Investments across 13 parcels between 2016 and 2021
- Total fair market value has grown from **$23.7 million to $631.1 million**

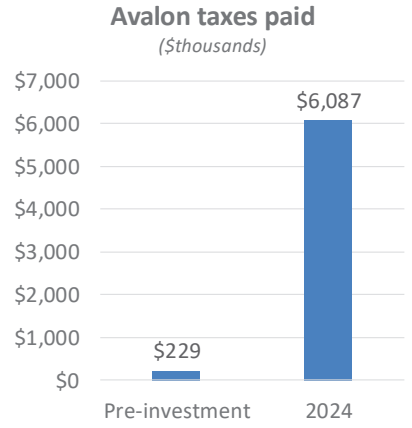
Tax base and tax payments have increased:

- Total assessed value has increased from $5.4 million pre-investment to $246.1 million in 2024
- Using current millage rates, the total tax payments for these parcels would be $226 thousand at pre-investment property values and was $6.1 million in 2024 with the investments

First year of abatement	Parcel ID	Property Name	Market value Pre- project	Market value in 2024
2016	12284108020897	Avalon Development	$9.4	$284.6
2018	12284108021150	Container Store	$5.1	$8.6
2018	12284108021531	CHICK-FIL-A	$5.1	$2.0
2017	12284108031548	The Container Store Parking	$0.0	$5.3
2018	12297008540418	Land	$0.6	$9.1
2018	12297008540434	Veranda luxury apartments	$1.3	$98.6
2018	12297008540491	Avalon retail	$0.2	$7.0
2018	12297008540509	Avalon office buildings	$0.1	$63.5
2019	12297008540392	Parking deck	$1.1	$18.4
2019	12297008540467	Avalon conference center	$0.0	$7.0
2019	12297008540475	Hotel at Avalon	$0.0	$47.0
2021	12297008540426	PR Avalon	$0.6	$80.0
		Total	**$23.7**	**$631.1**

Source: EY analysis using Fulton County Board of Assessors data on property parcels related to Project Avalon. Pre-investment FMV based in year prior to first year of abatement. Parcel 12297008540400 has been grouped with 12297008540392 because it is an associated parking deck.





Note: Taxes paid in 2024 from tax records. "Pre-investment" tax payment estimate based on aggregated fair market value in pre-investment year for each parcel, converted to assessed value at 40% of FMV, and multiplied by 2024 property tax rates.

Avalon real estate incentive example

Since 2016, incentives have decreased, and property taxes increased from $2.5 million to $6.1 million annually.

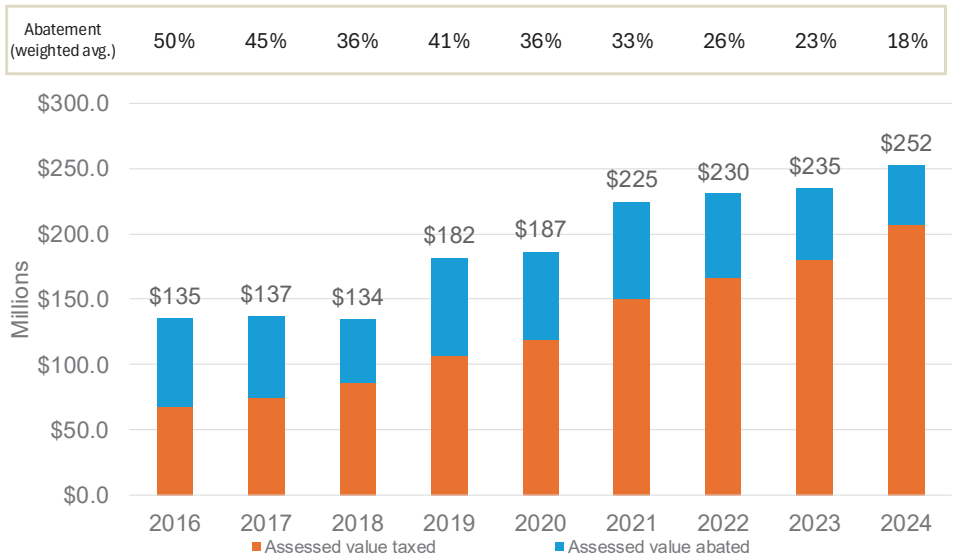
Assessed value from 2016 to 2024:

- Property assessed value has grown from $135m to $252m
- In 2024 the weighted average abatement over all parcels was 18%

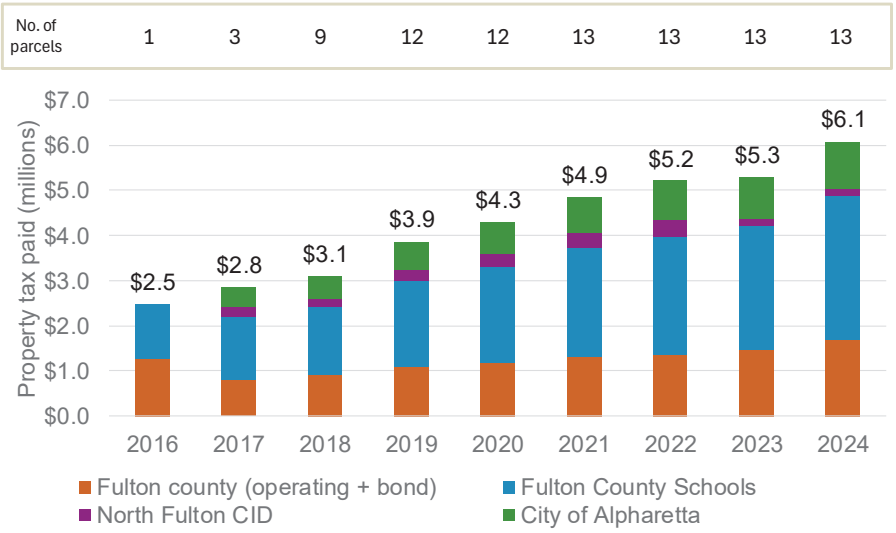
Tax payment 2019 to 2024:

- Total payments have grown from $2.5m to $6.1m as the property value has grown and the abatement percentage has decreased

Avalon project assessed value taxed and abated



Avalon project property taxes paid



Source: EY analysis using Fulton County Board of Assessors data on property parcels related to Project Avalon

Note: Payment for Fulton County Bond is under $4,000 each year

Future Focused



- Developer collaboration in underserved areas
- Quality workforce and affordable housing
- Community benefits