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

John H. Eaves, Commission Chair
Board of Commissioners

ATTEST:

Tonya R. Grier
Interim Clerk to the Commission
(Seal)

CONTRACTOR:

BUILDSMART/TEBARCO, A JOINT VENTURE, LLC.

Darrell P. Stallings
Vice Chairman

ATTEST:

Secretary/
Assistant Secretary

(Affix Corporate Seal)

APPROVED AS TO FORM:

Office of the County Attorney

APPROVED AS TO CONTENT:

Gabriel Morley, Director
Atlanta-Fulton Public Library System

Ellis Kirby, Director
Department of Real Estate and Asset Management

END OF SECTION

ITEM # 17-0528 RCS 06/21/2017
RECESS MEETING

FULTON COUNTY

Vision

People *Families* *Neighborhoods*

Mission

To serve, protect and govern in concert with local municipalities

Values

People *Customer Services*
Ethics *Resource Management*
Innovation *Equal Opportunity*

CONTRACT DOCUMENTS FOR

#17RFP020717K-EC

DESIGN/BUILD SERVICES FOR LIBRARY CIP RENOVATIONS – GROUP 4

For

ATLANTA-FULTON PUBLIC LIBRARY SYSTEM

OWNER - CONTRACTOR AGREEMENT

#17RFP020717K-EC Design/Build Services for Library CIP Renovations – Group 4

Contractor: BuildSmart/Tebarco a Joint Venture, LLC. Project No. 17RFP020717K-EC

Address: 1690 Bluegrass Lakes Parkway Telephone: 678-409-6523
Alpharetta, Georgia 30004

Contact: Darrell P. Stallings, Vice Chairman Email: dstallings@buildsmartenterprises.com

THIS AGREEMENT is effective as of the _____ day of _____, 20___, by and between Fulton County, a political subdivision of the State of Georgia (hereinafter called the "County"), and the above named CONTRACTOR in accordance with all provisions of this Construction Agreement ("Contract"), which consists of the following: Owner-Contractor Agreement, Owner's invitation for proposals, instructions to proposers, cost proposal form, performance bond, payment bond, acknowledgments, general conditions, special conditions, scope of work and specifications, plans, drawings, exhibits, addenda, Purchasing forms, Office of Contract Compliance Forms, Risk Management insurance provisions forms and written change orders.

The specific Exhibits of this Contract are as follows:

Exhibit A: General Conditions
Exhibit B: Special Conditions (applicable)
Exhibit C: Addenda
Exhibit D: Cost Proposal Form
Exhibit E: Bonds (Proposal, Payment and Performance Bonds)
Exhibit F: Scope of Work and Technical Specifications
Exhibit G: Exhibits
Exhibit H: Purchasing Forms
Exhibit I: Office of Contract Compliance Forms
Exhibit J: Risk Management Insurance Provisions Forms

WITNESSETH: That the said Contractor has agreed, and by these present does agree with the said County, for and in consideration of a Contract Price of **Two Million Six Hundred Seventy Five Thousand Three Hundred Sixty Eight Dollars and Zero Cents, ($2,675,368.00)** and other good and valuable consideration, and under the penalty expressed on Bonds hereto attached, to furnish all equipment, tools, materials, skill, and labor of every description necessary to carry out and complete in good, firm, and workmanlike manner, the Work specified, in strict conformity with the Drawings and the Specifications hereinafter set forth, which Drawings and Specifications together with the bid submittals made by the Contractor, General Conditions, Special Provisions, Detailed Specifications, Exhibits, and this Construction Agreement, shall all form essential parts of this Contract. The Work covered by this Contract includes all Work indicated on Plans and Specifications and listed in the Bid entitled:

Project Number: #17RFP020717K-EC

Design/Build Services for Library CIP Renovations – Group 4

The Contractor, providing services as an Independent Contractor, shall commence the Work with adequate force and equipment within 10 days from receipt of Notice to Proceed ("NTP") from the County, and shall complete the work within **800** calendar days from the Notice to Proceed or the date work begins, whichever comes first. The Contractor shall remain responsible for performing, in accordance with the terms of the Contract, all work assigned prior to the expiration of the said calendar days allowed for completion of the work even if the work is not completed until after the

expiration of such days. The Contractor shall agree that in the performance of this Contract he will comply with all lawful agreements, if any, which the contractor has made with any association, union or other entity, with respect to wages, salaries and working conditions, so as not to cause inconvenience, picketing or work stoppage.

For each calendar day that any work remains uncompleted after the time allowed for completion of the work, the Contractor shall pay the County the sum of $500.00 not as a penalty but as liquidated damages, which liquidated damages the County may deduct from any money due the contractor. At the County's convenience and not to it prejudice the County may provide written notice of the commencement of the assessment of liquidated damages.

As full compensation for the faithful performance of this Contract, the County shall pay the Contractor in accordance with the General Conditions and the prices stipulated in the Bid, hereto attached.

It is further mutually agreed between the parties hereto that if, at any time after the execution of this Agreement and the Surety Bonds hereto attached for its faithful performance, the County shall deem the surety or sureties upon such bonds to be unsatisfactory, or, if, for any reason, such bonds cease to be adequate to cover the performance of the Work, the Contractor shall, at his expense, within five days after receipt of notice from the County so to do, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the County. In such event no further payment to the Contractor shall be deemed to be due under this Agreement until such new or additional security for the faithful performance of the Work shall be furnished in manner and form satisfactory to the County.

The Contractor hereby assumes the entire responsibility and liability for any and all injury to or death of any and all persons, including the Contractor's agents, servants, and employees, and in addition thereto, for any and all damages to property caused by or resulting from or arising out of any act or omission in connection with this contract or the prosecution of work hereunder, whether caused by the Contractor or the Contractor's agents, Servants, or employees, or by any of the Contractor's subcontractors or suppliers, and the Contractor shall indemnify and hold harmless the County, the Program Manager, County's Commissioners, officers, employees, successors, assigns and agents, or any of their subcontractors from and against any and all loss and/or expense which they or any of them may suffer or pay as a result of claims or suits due to, because of, or arising out of any and all such injuries, deaths and/or damage, irrespective of County or Program Manager negligence (except that no party shall be indemnified for their own sole negligence). The Contractor, if requested, shall assume and defend at the Contractor's own expense, any suit, action or other legal proceedings arising there from, and the Contractor hereby agrees to satisfy, pay, and cause to be discharged of record any judgment which may be rendered against the County and the Program Manager arising there from.

In the event of any such loss, expense, damage, or injury, or if any claim or demand for damages as heretofore set forth is made against the County or the Program Manager, the County may withhold from any payment due or thereafter to become due to the Contractor under the terms of this Contract, an amount sufficient in its judgment to protect and indemnify it and the Program Manager, County's Commissioners, officers, employees, successors, assigns and agents from any and all claims, expense, loss, damages, or injury; and the County, in its discretion, may require the Contractor to furnish a surety bond satisfactory to the County providing for such protection and indemnity, which bond shall be furnished by the Contractor within five (5) days after written demand has been made therefore. The expense of said Bond shall be borne by the Contractor. **[See General Conditions for similar provision]**

This Contract constitutes the full agreement between the parties, and the Contractor shall not sublet, assign, transfer, pledge, convey, sell or otherwise dispose of the whole or any part of this Contract or his right, title, or interest therein to any person, firm or corporation without the previous consent of the County in writing. Subject to applicable provisions of law, this Contract shall be in full force and effect as a Contract, from the date on which a fully executed and

approved counterpart hereof is delivered to the Contractor and shall remain and continue in full force and effect until after the expiration of any guarantee period and the Contractor and his sureties are finally released by the County.

This agreement was approved by the Fulton County Board of Commissioner on June 21, 2017 #17-0528.

[SIGNATURES NEXT PAGE]

EXHIBIT A

GENERAL CONDITIONS

00700-1 FAMILIARITY WITH SITE

Execution of this agreement by the Design/Builder is a representation that the Design/Builder has visited the site, has become familiar with the local conditions under which the work is to be performed, and has correlated personal observations with the requirements of this agreement.

00700-2 CONTRACT DOCUMENTS

This agreement consists of Owner's invitation for bid, instructions to bidders, bid form, performance bond, payment bond, acknowledgments, the contract, general conditions, special conditions, specifications, plans, drawings, exhibits, addenda, and written change orders.

A. Notice of Award of Contract:

B. Execution of Contract Documents

Upon notification of Award of Contract, the Owner shall furnish the Design/Builder the conformed copies of Contract Documents for execution by the Design/Builder and the Design/Builder's surety.

Within ten (10) days after receipt the Design/Builder shall return all the documents properly executed by the Design/Builder and the Design/Builder's surety. Attached to each document shall be an original power-of-attorney for the person executing the bonds for the surety and certificates of insurance for the required insurance coverage.

After receipt of the documents executed by the Design/Builder and his surety with the power-of-attorney and certificates of insurance, the Owner shall complete the execution of the documents. Distribution of the completed documents will be made upon completion.

Should the Design/Builder and/or Surety fail to execute the documents within the time specified; the Owner shall have the right to proceed on the Bid Bond accompanying the bid.

If the Owner fails to execute the documents within the time limit specified, the Design/Builder shall have the right to withdraw the Design/Builder's bid without penalty.

Drawings and Specifications:

The Drawings, Specifications, Contract Documents, and all supplemental documents, are considered essential parts of the Contract, and requirements occurring in one are as binding as though occurring in all. They are intended to define, describe and provide for all Work necessary to complete the Project in an acceptable manner, ready for use, occupancy, or operation by the Owner.

In case of conflict between the Drawings and Specifications, the Specifications shall govern. Figure dimensions on Drawings shall govern over scale dimensions, and detailed Drawings shall govern over general Drawings.

In cases where products or quantities are omitted from the Specifications, the description and quantities shown on the Drawings shall govern.

Any ambiguities or need for clarification of the Drawings or Specifications shall be immediately reported to the Program Manager in writing. Any such ambiguity or need for clarification shall be handled by the Program Manager in writing. No clarification of the Drawings and Specifications hereunder by the Program Manager shall entitle the

Design/Builder to any additional monies unless a Change Order has been processed as provided by "Changes in the Contract" hereof.

Any work done by the Design/Builder following a discovery of such differing site condition or ambiguity or need for clarification in the Contract Drawings and Specifications prior to a written report to the Program Manager shall not entitle the Design/Builder to additional monies and shall be done at the Design/Builder's risk.

The Design/Builder shall have available at all times on the Project site one (1) full, current set of the Contract Drawings and Specifications.

00700-3 DEFINITIONS

The following terms as used in this agreement are defined as follows to the extent the definitions herein differ or conflict with those in the Instructions for Proponents, Section 00100, the definitions herein shall control.

Architect/Engineer (AE) – The Architectural firm acting in conjunction with a Construction Manager on either a sub-consultant basis or as Joint Venture partner as the Designer for the Design/Build firm. The Architectural firm and all its consultants that compose the building and site design team for the Design/Builder on the project including but not necessarily limited to Life Safety; Design; LEED Consultant; Civil Engineering; Landscaping; Irrigation; Structural Engineering; Plumbing; Mechanical and Electrical Engineering; Fire Alarm; Fire Protection and Commissioning according to the scope of work described by Section 3 of the Request for Proposal.

Alternate bids – the amount stated in the bid or proposal to be added to or deducted from the amount of the base bid or base proposal if the corresponding change in project scope or alternate materials or methods of construction is accepted.

Base bid – the amount of money stated in the bid or proposal as the sum for which the bidder or proposer offers to perform the work.

Change Order - an alteration, addition, or deduction from the original scope of work as defined by the contract documents to address changes or unforeseen conditions necessary for project completion. A written order to the Design/Builder issued by the County pursuant to Fulton County Policy and Procedures 800-6 for changes in the work within the general scope of the contract documents, adjustment of the contract price, extension of the contract time, or reservation of determination of a time extension.

Contract Documents include the Contract Agreement, Design/Builder's Proposal (including all documentation accompanying the Proposal and any post-Bid documentation required by the County prior to the Notice of Award), Bonds, all Special Conditions, General Conditions, Supplementary Conditions, Specifications, Drawings and addenda, together with written amendments, change orders, field orders and the Program Manager's written interpretations and clarifications issued in accordance with the General Conditions on or after the date of the Contract Agreement.

Shop drawing submittals reviewed in accordance with the General Conditions, geotechnical investigations and soils report and drawings of physical conditions in or relating to existing surface structures at or contiguous to the site are not Contract Documents.

Contract Price - The sum specified in the Agreement to be paid to the Design/Builder in consideration of the Work.

Contract Time shall mean the number of consecutive calendar days as provided in the Contract Agreement for completion of the Work, to be computed from the date of Notice to Proceed.

Owner or County shall mean Fulton County Government, party of the first part to the Contract Agreement, or its authorized and legal representatives.

Day - A calendar day of twenty-four hours lasting from midnight of one day to midnight the next day.

Design/Builder shall mean the party of the second part to the Contract Agreement or the authorized and legal representative of such party and who is the single corporate entity contractually responsible to the Owner for development of the Project. The Design/Builder can be: (1) a firm possessing either design and construction resources in-house, or (2) a construction contractor led team with the architect in a Sub-Contractor role, or (3) a joint venture team between construction contractor and architect.

Director - Director of the Atlanta-Fulton Public Library System of Fulton County, Georgia or the designee thereof.

Final Completion shall mean the completion of all work as required in accordance with the terms and conditions of the contract documents.

Liquidated Damages shall mean the amount, stated in the Contract Agreement, which the Design/Builder agrees to pay to the Owner for each consecutive calendar day beyond the Contract time required to complete the Project or for failing to comply with associated milestones. Liquidated Damages will end upon written notification from the Owner of Final Acceptance of the Project or upon written notification of from the Owner of completion of the milestone.

Notice to Proceed - A written communication issued by the County to the Design/Builder authorizing it to proceed with the work, establishing the date of commencement and completion of the work, and providing other direction to the Design/Builder.

Products shall mean materials or equipment permanently incorporated into the work.

Program Manager - shall mean the individual designated in writing, by the Director of the Atlanta-Fulton Public Library System.

Project Manual - The Contract Documents.

Provide shall mean to furnish and install.

Substantial Completion - The date certified by the AE of the Design/Builder and agreed upon by the County and Program Manager when all or a part of the work, as established pursuant to General Condition 00700-81, is sufficiently completed in accordance with the requirements of the contract documents so that the identified portion of the work can be utilized for the purposes for which it is intended.

Work or Project - All of the services specified, indicated, shown or contemplated by the contract documents, and furnishing by the Design/Builder of all materials, equipment, labor, methods, processes, construction and manufacturing materials and equipment, tools, plans, supplies, power, water, transportation and other things necessary to complete such services in accordance with the contract documents to insure a functional and complete facility.

00700-4 CODES

All codes, specifications, and standards referenced in the contract documents shall be the latest editions, amendments and revisions of such referenced standards in effect as of the date of the request for proposals for this contract.

00700-5 REVIEW OF CONTRACT DOCUMENTS

Before making its proposal to the County, and continuously after the execution of the agreement, the Design/Builder shall carefully study and compare the contract documents and shall at once report to the Program Manager any error, ambiguity, inconsistency or omission that may be discovered, including any requirement which may be contrary to any law, ordinance, rule, or regulation of any public authority bearing on the performance of the work. By submitting its proposal, the Design/Builder agrees that the contract documents, along with any supplementary written instructions issued by or through the Program Manager/County that have become a part of the contract documents, appear accurate, consistent and complete insofar as can be reasonably determined. If the Design/Builder has timely reported in writing any error, inconsistency, or omission to the Program Manager, has properly stopped the affected work until instructed to proceed, and has otherwise followed the instructions of the Program Manager/County, the Design/Builder shall not be liable to the County for any damage resulting from any such error, inconsistency, or omission in the contract documents. The Design/Builder shall not perform any portion of the work without the contract documents, approved plans, specifications, products and data, or samples for such portion of the work. For purposes of this section "timely" is defined as the time period in which the Design/Builder discovers, or should have discovered, the error, inconsistency, or omission, with the exercise of reasonable diligence.

00700-6 STRICT COMPLIANCE

No observation, inspection, test or approval of the County or Program Manager shall relieve the Design/Builder from its obligation to perform the work in strict conformity with the contract documents except as provided in General Condition 00700-48.

00700-7 APPLICABLE LAW

All applicable State laws, County ordinances, codes, and rules and regulations of all authorities having jurisdiction over the construction of the project shall apply to this agreement. The Design/Builder shall comply with the requirements of any Fulton County program concerning non-discrimination in contracting. All work performed within the right of way of the Georgia Department of Transportation and any railroad crossing shall be in accordance with Georgia Department of Transportation regulations, policies and procedures and, where applicable, those of any affected railroad. The Design/Builder shall comply with all laws, ordinances, codes, rules and regulations bearing on the conduct of the work as specified and the Design/Builder agrees to indemnify and hold harmless the County, its officers, agents and employees, as well as the Program Manager and the Program Manager against any claim or liability arising from or based on the violation of any law, ordinance, regulation, order or decree affecting the conduct of the work, whether occasioned by the Design/Builder, his agents or employees.

00700-8 PERMITS, LICENSES AND BONDS

All permits and licenses necessary for the work shall be secured and paid for by the Design/Builder. If any permit, license or certificate expires or is revoked, terminated, or suspended as a result of any action on the part of the Design/Builder, the Design/Builder

shall not be entitled to additional compensation or time. The Design/Builder shall obtain and keep in force at all times performance and payment bonds payable to Fulton County in penal amounts equal to 100% of the Contract price.

00700-9 TAXES

A. The Design/Builder shall pay all sales, retail, occupational, service, excise, old age benefit and unemployment compensation taxes, consumer, use and other similar taxes, as well as any other taxes or duties on the materials, equipment, and labor for the work provided by the Design/Builder which are legally enacted by any municipal, county, state or federal authority, department or agency at the time bids are received, whether or not yet effective. The Design/Builder shall maintain records pertaining to such taxes and levies as well as payment thereof and shall make the same available to the County at all reasonable times for inspection and copying. The Design/Builder shall apply for any and all tax exemptions which may be applicable and shall timely request from the County such documents and information as may be necessary to obtain such tax exemptions. The County shall have no liability to the Design/Builder for payment of any tax from which it is exempt.

B. The Design/Builder is obligated to comply with all local and State Sales and Use Tax laws. The Design/Builder shall provide the Owner with documentation to assist the Owner in obtaining sales and/or use tax refunds for eligible machinery and equipment used for the primary purpose of reducing or eliminating air or water pollution as provided for in Chapter 48-8-3 (36) and (37) of the Official Code of Georgia. All taxes shall be paid by the Design/Builder. All refunds will accrue to the Owner.

Acceptance of the project as complete and final payment will not be made by the Owner until the Design/Builder has fully complied with this requirement.

00700-10 DELINQUENT DESIGN/BUILDERS

The County shall not pay any claim, debt, demand or account whatsoever to any person firm or corporation who is in arrears to the County for taxes. The County shall be entitled to a counterclaim, back charge, and offset for any such debt in the amount of taxes in arrears, and no assignment or transfer of such debt after the taxes become due shall affect the right of the County to offset any taxes owed against said debt.

00700-11 LIEN WAIVERS

The Design/Builder shall furnish the County with evidence that all persons who have performed work or furnished materials pursuant to this agreement have been paid in full prior to submitting its demand for final payment pursuant to this agreement. A final affidavit, Exhibit A, must be completed, and submitted to comply with requirements of 00700-85. In the event that such evidence is not furnished, the County may retain sufficient sums necessary to meet all lawful claims of such laborers and materialmen. The County assumes no obligation nor in any way undertakes to pay such lawful claims from any funds due or that may become due to the Design/Builder.

00700-12 MEASUREMENT

All items of work to be paid for per unit of measurement shall be subject to inspection, measurement, and confirmation by the Program Manager.

00700-13 ASSIGNMENT

The Design/Builder shall not assign any portion of this agreement or moneys due there from (include factoring of receivables) without the prior written consent of the County. The Design/Builder shall retain personal control and shall provide personal attention to the fulfillment of its obligations pursuant to this agreement. Any assignment without the express written consent of the County shall render this contract voidable at the sole option of the County.

00700-14 FOREIGN DESIGN/BUILDERS

In the event that the Design/Builder is a foreign corporation, partnership, or sole proprietorship, the Design/Builder hereby irrevocably appoints the Secretary of State of Georgia as its agent for service of all legal process for the purpose of this contract only.

00700-15 INDEMNIFICATION

The Design/Builder hereby assumes the entire responsibility and liability for any and all injury to or death of any and all persons, including the Design/Builder's agents, servants, and employees, and in addition thereto, for any and all damages to property caused by or resulting from or arising out of any act or omission in connection with this contract or the prosecution of work hereunder, whether caused by the Design/Builder or the Design/Builder's agents, Servants, or employees, or by any of the Design/Builder's subcontractors or suppliers, and the Design/Builder shall indemnify and hold harmless the County, the Program Manager, County's Commissioners, officers, employees, successors, assigns and agents, or any of their subcontractors from and against any and all loss and/or expense which they or any of them may suffer or pay as a result of claims or suits due to, because of, or arising out of any and all such injuries, deaths and/or damage, irrespective of County or Program Manager negligence (except that no party shall be indemnified for their own sole negligence). The Design/Builder, if requested, shall assume and defend at the Design/Builder's own expense, any suit, action or other legal proceedings arising there from, and the Design/Builder hereby agrees to satisfy, pay, and cause to be discharged of record any judgment which may be rendered against the County and the Program Manager arising there from.

In the event of any such loss, expense, damage, or injury, or if any claim or demand for damages as heretofore set forth is made against the County or the Program Manager, the County may withhold from any payment due or thereafter to become due to the Design/Builder under the terms of this Contract, an amount sufficient in its judgment to protect and indemnify it and the Program Manager, County's Commissioners, officers, employees, successors, assigns and agents from any and all claims, expense, loss, damages, or injury; and the County, in its discretion, may require the Design/Builder to furnish a surety bond satisfactory to the County providing for such protection and indemnity, which bond shall be furnished by the Design/Builder within five (5) days after written demand has been made therefore. The expense of said Bond shall be borne by the Design/Builder.

00700-16 SUPERVISION OF WORK AND COORDINATION WITH OTHERS

The Design/Builder shall supervise and direct the work using the Design/Builder's best skill and attention. The Design/Builder shall be solely responsible for all construction methods and procedures and shall coordinate all portions of the work pursuant to the contract subject to the overall coordination of the Program Manager. All work pursuant to this agreement shall be performed in a skillful and workmanlike manner.

The County reserves the right to perform work related to the Project with the County's own forces and to award separate contracts in connection with other portions of the project, other work on the site under these or similar conditions of the contract, or work which has been extracted from the Design/Builder's work by the County.

When separate contracts are awarded for different portions of the project or other work on the site, the term "separate Contractors/Firm" in the Contract Documents in each case shall mean the Contractor/Firm who executes each separate County Agreement.

The Design/Builder shall cooperate with the County and separate Contractor/Firm in arranging the introduction and storage of materials and equipment and execution of their work, and shall cooperate in coordinating connection of its work with theirs as required by the Contract Documents.

If any part of the Design/Builder's Work depends for proper execution or results upon the work of the County or any separate Contractor/Firm, the Design/Builder shall, prior to proceeding with that portion of the Work, promptly report to the Program Manager any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results **within fourteen (14) days** of discovery of such discrepancy or defect. Failure of the Design/Builder to so report in writing shall constitute an acceptance of the County's or separate Contractor/Firm work as fit and proper to receive the Work, except as to any defects which may subsequently become apparent in such work by others.

Any costs caused by defective or untimely work shall be borne by the party responsible therefore.

Should the Design/Builder wrongfully cause damage to the work or property of the County or to other work or property on the site, including the work of separate Contractor/Firms, the Design/Builder shall promptly remedy such damage at the Design/Builder's expense.

Should the Design/Builder be caused damage by any other Contractor/Firm on the Project, by reason of such other Contractor/Firm's failure to perform properly his contract with the County, no action shall lie against the County or the Program Manager inasmuch as the parties to this agreement are the only beneficiaries hereof and there are no third party beneficiaries and neither the County nor the Program Manager shall have liabilities therefore, but the Design/Builder may assert his claim for damages solely against such other Contractor/Firm. The Design/Builder shall not be excused from performance of the contract by reason of any dispute as to damages with any other Contractor/Firm or third party.

Where the Work of this Contract shall be performed concurrently in the same areas as other construction work, the Design/Builder shall coordinate with the Program Manager and the separate Contractor/Firm in establishing mutually acceptable schedules and procedures that shall permit all jobs to proceed with minimum interference.

If a dispute arises between the Design/Builder and separate Contractor/Firm as to their responsibility for cleaning up, the County may clean up and charge the cost thereof to the Design/Builder or Contractor/Firm responsible therefore as the County shall determine to be just.

00700-17 ADMINISTRATION OF CONTRACT

The Program Manager shall provide administration services as hereinafter described.

For the administration of this Contract, the Program Manager shall serve as the County's primary representative during design and construction and until final payment to the Design/Builder is due. The Program Manager shall advise and consult with the County and the Design/Builder. The primary point of contact for the Design/Builder shall be the Program Manager. All correspondence from the Design/Builder to the County shall be forwarded through the Program Manager. Likewise, all correspondence and instructions to the Design/Builder shall be forwarded through the Program Manager.

The Program Manager will determine in general that the construction is being performed in accordance with design and engineering requirements, and will endeavor to guard the County against defects and deficiencies in the Work.

The Program Manager will not be responsible for or have control or charge of construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, nor will it be responsible for the Design/Builder's failure to carry out the Work in accordance with the Contract Documents. The Program Manager will not be responsible for or have control or charge over the acts or omissions of the Design/Builder, its engineers, consultants, subcontractors, or any of their agents or employees, or any other persons performing the Work.

Based on the Program Manager's observations regarding the Design/Builder's Applications for Payment, the Program Manager shall determine the amounts owing to the Design/Builder, in accordance with the payment terms of the Contract, and shall issue Certificates for Payment in such amount to the County.

The Program Manager shall render interpretations necessary for the proper execution or progress of the Work. Either party to the Contract may make written requests to the Program Manager for such interpretations.

Claims, disputes and other matters in question between the Design/Builder and the County relating to the progress of the Work or the interpretation of the Contract Documents shall be referred to the Program Manager for interpretation.

All interpretations of the Program Manager shall be consistent with the intent of and reasonably inferable from the Contract Documents and shall be in writing or in graphic form.

Except as otherwise provided in this Contract, the Program Manager shall issue a decision on any disagreement concerning a question of fact arising under this Contract. The Program Manager shall reduce the decision to writing and mail or otherwise furnish a copy thereof to the Design/Builder. The decision of the Program Manager shall be final and conclusive unless, within thirty (30) days from the date of receipt of such copy, the Design/Builder files a written appeal with the Director of Atlanta-Fulton Public Library System and mails or otherwise furnishes the Program Manager a copy of such appeal. The decision of the Director Atlanta-Fulton Public Library System or the Director's duly authorized representative for the determination of such appeals shall be final and conclusive. Such final decision shall not be pleaded in any suit involving a question of fact arising under this Contract, provided such is not fraudulent, capricious, arbitrary, so grossly erroneous as necessarily implying bad faith, or is not supported by substantial evidence. In connection with any appeal proceeding under this Article, the Design/Builder shall be afforded an opportunity to be heard and to offer evidence in support of Design/Builder's appeal. Pending any final decision of a dispute hereunder,

the Design/Builder shall proceed diligently with the performance of the Contract as directed by the Program Manager.

The Program Manager shall have authority to reject Work which does not conform to the Contract Documents or Fulton County Building Standards. Whenever, in the Program Manager's opinion, it is considered necessary or advisable for the implementation of the intent of the Contract Documents, the County shall have authority to require special inspection or testing of the Work whether or not such Work be then fabricated, installed or completed. The Design/Builder shall pay for such special inspection or testing if the Work so inspected or tested is found not to comply with the requirements of the contract; the County shall pay for special inspection and testing if the Work is found to comply with the contract. Neither the Program Manager's authority to act under this Subparagraph, nor any decision made by the Program Manager in good faith either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the Program Manager to the Design/Builder, any subcontractor, any of their agents or employees, or any other person performing any of the Work.

The Design/Builder shall provide such shop drawings, product data, and samples as may be required by the Program Manager and/or as required by these Contract Documents.

The Program Manager and County shall conduct inspections to determine Substantial Completion and Final Completion, and shall receive and forward to the County for review written warranties and related documents required by the Contract Documents and assembled by the Design/Builder. The Program Manager shall approve and issue Certificates for Payment upon compliance with Substantial and Final Completion requirements indicated in General Conditions 00700-81, 00700-82, 00700-84 and 00700-85 of this Agreement.

Except as provided in General Condition 00700-48, the Design/Builder shall not be relieved from the Design/Builder's obligations to perform the work in accordance with the contract documents by the activities or duties of the County or any of its officers, employees, or agents, including inspections, tests or approvals, required or performed pursuant to this agreement.

00700-18 RESPONSIBILITY FOR ACTS OF EMPLOYEES

The Design/Builder shall employ only competent and skilled personnel. The Design/Builder shall, upon demand from the Program Manager, immediately remove any superintendent, foreman or workman whom the Program Manager may consider incompetent or undesirable.

The Design/Builder shall be responsible to the County for the acts and omissions of the Design/Builder's employees, subcontractors, and agents as well as any other persons performing work pursuant to this agreement for the Design/Builder.

00700-19 LABOR, MATERIALS, SUPPLIES, AND EQUIPMENT

Unless otherwise provided in this agreement, the Design/Builder shall make all arrangements with necessary support agencies and utility companies provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the execution and completion of the work.

00700-20 DISCIPLINE ON WORK SITE

The Design/Builder shall enforce strict discipline and good order among its employees and subcontractors at all times during the performance of the work, to include compliance with the Fulton County Drug Free Work Place Policy. The Design/Builder shall not employ any subcontractor who is not skilled in the task assigned to it. The Program Manager may, by written notice, require the Design/Builder to remove from the work any subcontractor or employee deemed by the Program Manager to be incompetent.

00700-21 HOURS OF OPERATION

All work at the construction site shall be performed during regular business hours of the Fulton County government, except upon the Program Manager's prior written consent to other work hours. It is further understood that the Design/Builder's construction schedule is based on a normal 40 hours, five day work week, less Fulton County-recognized holidays. Design/Builders work schedule shall not violate Fulton County Noise Ordinance by working hours inconsistent with the Fulton County Noise Ordinance. The County's current noise ordinance or other applicable ordinance shall govern. If the Design/Builder desires to work in excess of this limit, the Design/Builder shall submit a written request to the Program Manager, a minimum of five days prior to the desired work date. The Design/Builder shall be responsible for any additional expenses incurred by the Owner as a result of the extended work hours, including resident inspection overtime. The cost associated with resident inspector overtime shall be deducted from the Design/Builder monthly payment request.

00700-22 FAMILIARITY WITH WORK CONDITIONS

The Design/Builder shall take all steps necessary to ascertain the nature and location of the work and the general and local conditions which may affect the work or the cost thereof. The Design/Builder's failure to fully acquaint itself with the conditions which may affect the work, including, but not limited to conditions relating to transportation, handling, storage of materials, availability of utilities, labor, water, roads, weather, topographic and subsurface conditions, other separate contracts to be entered into by the County relating to the project which may affect the work of the Design/Builder, applicable provisions of law, and the character and availability of equipment and facilities necessary prior to and during the performance of the work shall not relieve the Design/Builder of its responsibilities pursuant to this agreement and shall not constitute a basis for an equitable adjustment of the contract terms. The County reserves the right to perform with its own forces or to contract with other entities for other portions of the project work, in which case the Design/Builder's responsibility to assure its familiarity with work conditions hereunder shall include all coordination with such other Design/Builders and the County necessary to insure that there is no interference between Design/Builders as will delay or hinder any Design/Builder in its prosecution of work on the project. The County assumes no responsibility for any understandings or representations concerning conditions of the work made by any of its officers, agents, or employees prior to the execution of this agreement.

00700-23 RIGHT OF ENTRY

The County reserves the right to enter the site of the work by such agent, including the Program Manager, as it may elect for the purpose of inspecting the work or installing such collateral work as the County may desire. The Design/Builder shall provide safe facilities for such access so that the County and its agents may perform their functions.

00700-24 NOTICES

Any notice, order, instruction, claim or other written communication required pursuant to this agreement shall be deemed to have been delivered or received as follows:

Upon personal delivery to the Design/Builder, its authorized representative, or the Program Manager on behalf of the County. Personal delivery may be accomplished by in-person hand delivery or bona fide overnight express service.

Three days after depositing in the United States mail a certified letter addressed to the Design/Builder or the Program Manager for the County. For purposes of mailed notices, the County's mailing address shall be 141 Pryor Street, 6^{lh} Floor, Atlanta, Georgia 30303, or as the County shall have otherwise notified the Design/Builder. The Design/Builder's mailing address shall be the address stated in its proposal or as it shall have most recently notified the Program Manager in writing.

00700-25 SAFETY

A. SAFETY, HEALTH AND LOSS PREVENTION

The Design/Builder shall be responsible for implementing a comprehensive project-specific safety, health and loss prevention program and employee substance abuse program for this project. All Sub-Design/Builders must either implement their own program or follow the Design/Builder's safety, health and loss prevention program and employee substance abuse program.

The Design/Builder's safety, health and loss prevention program and employee substance abuse program must meet or exceed all governmental regulations (OSHA, EPA, DOT, State, local), and any other specific Fulton County requirements

B. COUNTY'S SAFETY, HEALTH, AND LOSS PREVENTION PROCESS GUIDELINES AND REQUIREMENTS

The County and its agents reserve the right, but assume no duty, to establish and enforce safety, health, and loss prevention guidelines and to make the appropriate changes in the guidelines, for the protection of persons and property and to review the efficiency of all protective measures taken by the Design/Builder. The Design/Builder shall comply with all safety, health, and loss prevention process guidelines and requirements and changes made by the County or its agent(s). The issuance of any such guidelines or changes by the County or its agent(s) shall not relieve the Design/Builder of its duties and responsibilities under this Agreement, and the County or its agent(s) shall not thereby assume, nor be deemed to have assumed, any such duties or responsibilities of the Design/Builder.

C. COMPLIANCE OF WORK, EQUIPMENT, AND PROCEDURES WITH ALL APPLICABLE LAWS and REGULATIONS

All Work, whether performed by the Design/Builder or its Sub-Contractors of any tier, or anyone directly or indirectly employed by any of them, and all equipment, appliances, machinery, materials, tools and like items incorporated or used in the Work, shall be in compliance with and conform to:

1. All applicable laws, ordinances, rules, regulations and orders of any public, quasi-public or other governmental authority relating to the safety of persons and their protection against injury, specifically including, but in

no event limited to, the Federal Occupational Safety and Health Act of 1970, as amended, and all rules and regulations now or hereafter in effect pursuant to said Act.

2. All rules, regulations, and requirements of the County or its agent(s) and its insurance carriers relating there to. In the event of a conflict or differing requirements the more stringent shall govern.

D. PROTECTION OF THE WORK

1. The Design/Builder shall, throughout the performance of the Work, maintain adequate and continuous protection of all Work and temporary facilities against loss or damage from whatever cause, shall protect the property of the County and third parties from loss or damage from whatever cause arising out of the performance of the Work, and shall comply with the requirements of the County or its agent(s) and its insurance carriers, and with all applicable laws, codes, rules and regulations, (as same may be amended) with respect to the prevention of loss or damage to property as a result of fire or other hazards.

2. The County or its agent(s) may, but shall not be required to, make periodic inspections of the Project work area. In such event, however, the Design/Builder shall not be relieved of its aforesaid responsibilities and the County or its agent(s) shall not assume, nor shall it be deemed to have assumed, any responsibility otherwise imposed upon the assurance of Design/Builder by this Agreement.

E. SAFETY EQUIPMENT

1. The Design/Builder shall provide to each worker on the Project work area the proper safety equipment for the duties being performed by that worker and will not permit any worker on the Project work area who fails or refuses to use the same. The County or its agent shall have the right, but not the obligation, to order the removal of a worker from the Project work site for his/her failure to comply with safe practices or substance abuse policies.

F. EMERGENCIES

1. In any emergency affecting the safety of persons or property, or in the event of a claimed violation of any federal or state safety or health law or regulation, arising out of or in any way connected with the Work or its performance, the Design/Builder shall act immediately to prevent threatened damage, injury or loss and to remedy said violation. Failing such action, the County or its agent(s) may immediately take whatever steps it deems necessary including, but not limited to, suspending the Work as provided in this Agreement.

2. The County or its agent(s) may offset any and all costs or expenses of whatever nature, including attorneys' fees, paid or incurred by the County or its agent(s) (whether such fees are for in-house counsel or counsel retained by the County or its agent), in taking the steps authorized by Section 00700-25(G) (1) above against any sums then or thereafter due to the Design/Builder. The Design/Builder shall defend, indemnify and hold the County, its officers, agents, and employees harmless against any and all costs or expenses caused by or arising from the exercise by the

County of its authority to act in an emergency as set out herein. If the Design/Builder shall be entitled to any additional compensation or extension of time change order on account of emergency work not due to the fault or neglect of the Design/Builder or its Sub-Contractors, such additional compensation or extension of time shall be determined in accordance with General Condition 00700-52 and General Condition 00700-87 of this Agreement.

G. SUSPENSION OF THE WORK

1. Should, in the judgment of the County or its agent(s), the Design/Builder or any Sub-Contractor fail to provide a safe and healthy work place, the County or its agent shall have the right, but not the obligation, to suspend work in the unsafe areas until deficiencies are corrected. All costs of any nature (including, without limitation, overtime pay, liquidated damages or other costs arising out of delays) resulting from the suspension, by whomsoever incurred, shall be borne by the Design/Builder.

2. Should the Design/Builder or any Sub-Contractor fail to provide a safe and healthy work place after being formally notified in writing by the County or its agents of such non-compliance, the contract may be terminated following the termination provision of the contract.

H. DESIGN/BUILDER'S INDEMNITY OF THE COUNTY FOR DESIGN/BUILDER'S NON-COMPLIANCE WITH SAFETY PROGRAM

1. The Design/Builder recognizes that it has sole responsibility to assure its Safety Program is implemented and to assure its construction services are safely provided. The Design/Builder shall indemnify, defend and hold the County and its agents harmless, from and against any and all liability (whether public or private), penalties (contractual or otherwise), losses, damages, costs, attorneys' fees, expenses, causes of action, claims or judgments resulting, either in whole or in part, from any failure of the Design/Builder, its Sub-Contractors of any tier or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, to comply with the safety requirements of the contract. The Design/Builder shall not be relieved of its responsibilities under the safety requirements of the Contract should the County or its agent(s) act or fail to act pursuant to its rights hereunder.

2. The Design/Builder shall not raise as a defense to its obligation to indemnify under this Subparagraph I any failure of those indemnified hereunder to assure Design/Builder operates safely, it being understood and agreed that no such failure shall relieve the Design/Builder from its obligation to assure safe operations or from its obligation to so indemnify. The Design/Builder also hereby waives any rights it may have to seek contribution, either directly or indirectly, from those indemnified hereunder.

3. In any and all claims against those indemnified hereunder by any employee of the Design/Builder, any Sub-Contractor of any tier or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Subparagraph I shall not be limited in any way as to the amount or type of

damages, compensation or benefits payable by or for the Design/Builder or any Sub-Contractor of any tier under any workers' compensation act, disability benefit or other employee benefit acts.

00700-26 BLASTING AND EXCAVATION

The Design/Builder acknowledges that it is fully aware of the contents and requirements of O.C.G.A. § 25-9-1 through 25-9-12 concerning blasting and excavation near underground gas pipes and facilities and shall fully comply therewith.

00700-27 HIGH VOLTAGE LINES

The Design/Builder acknowledges that it is fully aware of the contents and requirements O.C.G.A. § 46-3-30 through 46-3-39 concerning safeguards against contact with high voltage lines, and the Design/Builder shall fully comply with said provisions.

00700-28 SCAFFOLDING AND STAGING

The Design/Builder acknowledges that it is the person responsible for employing and directing others to perform labor within the meaning of O.C.G.A. § 34-1-1 and agrees to comply with said provisions.

00700-29 CLEAN-UP

The Design/Builder shall clean up all refuse, rubbish, scrap materials, and debris caused by its operations to the end that the site of the work shall present a neat, orderly and workmanlike appearance at all times.

00700-30 PROTECTION OF WORK

The Design/Builder shall be responsible for maintenance and protection of the work, which shall include any County-furnished supplies, material, equipment, until final completion of this agreement and acceptance of the work as defined herein. Any portion of the work suffering injury, damage or loss shall be considered defective and shall be corrected or replaced by the Design/Builder without additional cost to the County.

00700-31 REJECTED WORK

The Design/Builder shall promptly remove from the project all work rejected by the Program Manager/County for failure to comply with the contract documents and the Design/Builder shall promptly replace and re-execute the work in accordance with the contract documents and without expense to the County. The Design/Builder shall also bear the expense of making good all work of other Contractors/Firms destroyed or damaged by such removal or replacement.

00700-32 DEFECTIVE WORK

If the Design/Builder defaults or neglects to carry out any portion of the work in accordance with the contract documents, and fails within three days after receipt of written notice from the Program Manager/County to commence and continue correction of such default or neglect with diligence and promptness, the County may, after three days following receipt by the Design/Builder of an additional written notice and without prejudice to any other remedy the County may have, make good such deficiencies and complete all or any portion of any work through such means as the County may select, including the use of a separate Design/Builder. In such case, an appropriate change order shall be issued deducting from the payments then or thereafter due the Design/Builder the cost of correcting such deficiencies. In the event the payments then

or thereafter due the Design/Builder are not sufficient to cover such amount, the Design/Builder shall pay the difference to the County on demand.

The County may, at its option, accept defective or nonconforming work instead of requiring its removal or correction. In such case, a change order shall be issued reducing the price due the Design/Builder to the extent appropriate and equitable. Such contract price adjustment shall be effected whether or not final payment has been made.

00700-33 WARRANTY OF NEW MATERIALS

The Design/Builder warrants to the County that all materials and equipment furnished under this contract will be new unless otherwise specified, and the Design/Builder further warrants that all work will be of good quality, free from faults and defects, and in conformance with the contract documents. The warranty set forth in this paragraph shall survive final acceptance of the work.

00700-34 DESIGN/BUILDER'S WARRANTY OF THE WORK

If within one year after the date of issuance of the certificate of final payment pursuant to General Condition 00700-84, or within such longer period of time as may be prescribed by law or by the term of any applicable special warranty required by the contract documents, any of the work is found to be defective or not in accordance with the contract documents, the Design/Builder shall correct such work promptly after receipt of written notice from the Program Manager to do so. This obligation shall survive both final payment for the work and termination of the contract.

00700-35 ASSIGNMENT OF MANUFACTURERS' WARRANTIES

Without limiting the responsibility or liability of the Design/Builder pursuant to this agreement, all warranties given by manufacturers on materials or equipment incorporated in the work are hereby assigned by the Design/Builder to the County. If requested, the Design/Builder shall execute formal assignments of said manufacturer's warranties to the County. All such warranties shall be directly enforceable by the County.

00700-36 WARRANTIES IMPLIED BY LAW

The warranties contained in this agreement, as well as those warranties implied by law, shall be deemed cumulative and shall not be deemed alternative or exclusive. No one or more of the warranties contained herein shall be deemed to alter or limit any other.

00700-37 STOP WORK ORDERS

In the event that the Design/Builder fails to correct defective work as required by the contract documents or fails to carry out the work in accordance with contract documents, the Program Manager, in writing, may order the Design/Builder to stop work until the cause for such order has been eliminated. This right of the County to stop work shall not give rise to any duty on the part of the County or the Program Manager to execute this right for the benefit of the Design/Builder or for any other person or entity.

00700-38 TERMINATION FOR CAUSE

If the Design/Builder is adjudged bankrupt, makes a general assignment for the benefit of creditors, suffers the appointment of a receiver on account of its insolvency, fails to supply sufficient properly skilled workers or materials, fails to make prompt payment to subcontractors or materialmen, disregards laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction, fails to diligently prosecute the work, or is otherwise guilty of a material violation of this agreement and fails within seven days after

receipt of written notice to commence and continue correction of such default, neglect, or violation with diligence and promptness, the County may, after seven days following receipt by the Design/Builder of an additional written notice and without prejudice to any other remedy the County may have, terminate the employment of the Design/Builder and take possession of the site as well as all materials, equipment, tools, construction equipment and machinery thereon. The County may finish the work by whatever methods the County deems expedient. In such case, the Design/Builder shall not be entitled to receive any further payment until the work is completed. If the unpaid balance of the contract price exceeds the cost of completing the work, such excess shall be paid to the Design/Builder. If such costs exceed the unpaid balance, the Design/Builder shall pay the difference to the County on demand. This obligation for payment shall survive the termination of the contract. Termination of this agreement pursuant to this paragraph may result in disqualification of the Design/Builder from bidding on future County contracts.

00700-39 TERMINATION FOR CONVENIENCE

The County may, at any time upon written notice to the Design/Builder, terminate the whole or any portion of the work for the convenience of the County. The effective date of the terminations shall be provided in the written notice. Said termination shall be without prejudice to any right or remedy of the County provided herein. In addition, in the event this agreement has been terminated due to the default of the Design/Builder, and if it is later determined that the Design/Builder was not in default pursuant to the provisions of this agreement at the time of termination, then such termination shall be considered a termination for convenience pursuant to this paragraph.

00700-40 TERMINATION FOR CONVENIENCE - PAYMENT

If the Contract is terminated for convenience by the Owner as provided in this article, Design/Builder will be paid compensation for those services actually performed as approved by the Owner or his representative. Partially completed tasks will be compensated for based on a signed statement of completion prepared by the Project Manager and submitted to the Design/Builder which shall itemize each task element and briefly state what work has been completed and what work remains to be done. Design/Builder shall also be paid for reasonable costs for the orderly filing and closing of the project.

00700-41 TERMINATION FOR CONVENIENCE - PAYMENT LIMITATIONS

Except for normal spoilage, and except to the extent that the County shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to the Design/Builder the fair value, as determined by the Program Manager, of property which is destroyed, lost, stolen or damaged so as to become undeliverable to the County or to another buyer.

00700-42 COST TO CURE

If the County terminates for cause the whole or any part of the work pursuant to this agreement, then the County may procure upon such terms and in such manner as the Program Manager may deem appropriate, supplies or services similar to those so terminated, and the Design/Builder shall be liable to the County for any excess costs for such similar supplies or services. The Design/Builder shall continue the performance of this agreement to the extent not terminated hereunder.

00700-43 ATTORNEY'S FEES

Should the Design/Builder default pursuant to any of the provisions of this agreement, the Design/Builder and its surety shall pay to the County such reasonable attorney's fees as the County may expend as a result thereof and all costs, expenses, and filing fees incidental thereto.

00700-44 DESIGN/BUILDER'S RESPONSIBILITIES UPON TERMINATION

After receipt of a notice of termination from the County, and except as otherwise directed by the Program Manager/County, the Design/Builder shall:

1. Stop work under the contract on the date and to the extent specified in the notice of termination;
2. Place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portion of the work under the agreement as is not terminated;
3. Terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the notice of termination;
4. Assign to the County in the manner, at the times, and to the extent directed by the Program Manager, all of the rights, title and interest of the Design/Builder under the orders and subcontracts so terminated, in which case the County shall have the right, at its discretion, to settle or pay any and all claims arising out of the termination of such orders or subcontracts;
5. Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts with the approval or ratification of the Program Manager, to the extent the Program Manager may require, which approval or ratification shall be final for all purposes;
6. Transfer title and deliver to the entity or entities designated by the Program Manager, in the manner, at the times, and to the extent, if any, directed by the Program Manager, and to the extent specifically produced or specifically acquired by the Design/Builder for the performance of such portion of the work as has been terminated:
    a. The fabricated or un-fabricated parts, work, and progress, partially completed supplies, and equipment, materials, parts, tools, dyes, jigs, and other fixtures, completed work, supplies, and other material produced as a part of or acquired in connection with the performance of the work terminated by the notice of termination; and
    b. The completed or partially completed plans, drawings, information, and other property to the work.
7. Use its best efforts to sell in the manner, at the times, to the extent, and at the prices directed or authorized by the Program Manager, any property described in Section 6 of this paragraph, provided, however, that the Design/Builder shall not be required to extend credit to any buyer and further provided that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the County to the Design/Builder pursuant to this agreement.

8. Complete performance of such part of the work as shall not have been terminated by the notice of termination; and

9. Take such action as may be necessary, or as the Program Manager may direct, for the protection and preservation of the property related to the agreement which is in the possession of the Design/Builder and in which the County has or may acquire an interest.

00700-45 RECORDS

The Design/Builder shall preserve and make available to the Program Manager/County all of its records, books, documents and other evidence bearing on the costs and expenses of the Design/Builder and any subcontractor pursuant to this agreement upon three days advance notice to the Design/Builder.

00700-46 DEDUCTIONS

In arriving at any amount due the Design/Builder pursuant to the terms of this agreement, there shall be deducted all liquidated damages, advance payments made to the Design/Builder applicable to the termination portion of the contract, the amount of any claim which the County may have against the Design/Builder, the amount determined

By the Program Manager to be necessary to protect the County against loss due to outstanding potential liens or claims, and the agreed price of any materials acquired or sold by the Design/Builder and not otherwise recovered by or credited to the County.

00700-47 REIMBURSEMENT OF THE COUNTY

In the event of termination, the Design/Builder shall refund to the County any amount paid by the County to the Design/Builder in excess of the costs properly reimbursable to the Design/Builder.

00700-48 SUSPENSION, INTERRUPTION, DELAY, DAMAGES

The Design/Builder shall be entitled to only those damages and that relief from termination by the County as specifically set forth in this agreement. The Program Manager may issue a written order requiring the Design/Builder to suspend, delay or interrupt all or any part of the work for such period of time as the County may determine to be appropriate for the convenience of the County. If the performance of the work is interrupted for an unreasonable period of time by an act of the County or any of its officers, agents, employees, Design/Builders, or consultants in the administration of this agreement, an equitable adjustment shall be made for any increase in the Design/Builder's costs of performance and any increase in the time required for performance of the work necessarily caused by the unreasonable suspension, delay, or interruption. Any equitable adjustment shall be reduced to writing and shall constitute a modification to this agreement. In no event, however, shall an equitable adjustment be made to the extent that performance of this agreement would have been suspended, delayed or interrupted by any other cause, including the fault or negligence of the Design/Builder. No claim for an equitable adjustment pursuant to this paragraph shall be permitted before the Design/Builder shall have notified the Program Manager in writing of the act or failure to act involved, and no claim shall be allowed unless asserted in writing to the Program Manager within ten days after the termination of such suspension, delay or interruption.

00700-49 COMMENCEMENT AND DURATION OF WORK

The County may issue a Notice to Proceed at any time within thirty (30) days following execution of the contract by the County. The Design/Builder shall commence work pursuant to this agreement within ten (10) days of mailing or delivery of written notice to proceed. The Design/Builder shall diligently prosecute the work to completion within Eight Hundred (800) calendar days following receipt of the Notice to Proceed. The capacity of the Design/Builder's construction and manufacturing equipment and plan, sequence and method of operation and forces employed, including management and supervisory personnel, shall be such as to insure completion of the work within the time specified in the Agreement. The Design/Builder and County hereby agree that the contract time for completion of the work is reasonable taking into consideration the average climatic conditions prevailing in the locality of the work and anticipated work schedules of other Design/Builders whose activities are in conjunction with or may affect the work under this contract.

00700-50 TIME OF THE ESSENCE

All time limits stated in this agreement are of the essence of this contract.

00700-51 IMPACT DAMAGES

Except as specifically provided pursuant to a stop work order or change order, the Design/Builder shall not be entitled to payment or compensation of any kind from the County for direct or indirect or impact damages including, but not limited to, costs of acceleration arising because of delay, disruption, interference or hindrance from any cause whatsoever whether such delay, disruption, interference or hindrance is reasonable or unreasonable, foreseeable or unforeseeable, or avoidable, provided, however, that this provision shall not preclude the recovery of damages by the Design/Builder for hindrances or delays due solely to fraud or bad faith on the part of the County, its agents, or employees. The Design/Builder shall be entitled only to extensions in the time required for performance of the work as specifically provided in the contract.

00700-52 DELAY

The Design/Builder may be entitled to an extension of the contract time, but not an increase in the contract price or damages, for delays arising from unforeseeable causes beyond the control and without the fault or negligence of the Design/Builder or its subcontractors for labor strikes, acts of God, acts of the public enemy, acts of the state, federal or local government in its sovereign capacity, by acts of another separate Design/Builder, or by an act or neglect of the County.

00700-53 INCLEMENT WEATHER

The Design/Builder shall not be entitled to an extension of the contract time due to normal inclement weather. Unless the Design/Builder can substantiate to the satisfaction of the Program Manager that there was greater than normal inclement weather and that such greater than normal inclement weather actually delayed the work, the Design/Builder shall not be entitled to an extension of time therefore. The following shall be considered the normal inclement weather days for each month listed, and extensions of time shall be granted in increments of not less than one half day only for inclement weather in excess of the days set out.

January	10 days
February	10 days

March	7 days
April	6 days
May	4 days
June	3 days
July	4 days
August	2 days
September	2 days
October	3 days
November	6 days
December	9 days

The Design/Builder agrees to use Saturday as a make-up day for inclement weather through-out the Construction period. The Design/Builder shall not be credited with an inclement weather day if the project experiences inclement weather on a normal work day and then works a make-up day. In addition, the Design Builder shall not be credited with an inclement weather day if the design-builder opts not to work on a make-up day.

Inclement weather days will only be issued if all Saturdays are used as make-up days and the total number of inclement rain days for the project still surpasses the total number of inclement rain days shown above, pending proper substantiation to the satisfaction of the Program Manager.

00700-54 DELAY - NOTICE AND CLAIM

The Design/Builder shall not receive an extension of time unless a Notice of Delay is filed with the Program Manager within ten calendar days of the first instance of such delay, disruption, interference or hindrance and a written Statement of the Claim is filed with the Program Manager within 20 calendar days of the first such instance. In the event that the Design/Builder fails to comply with this provision, it waives any claim which it may have for an extension of time pursuant to this agreement.

00700-55 STATEMENT OF CLAIM - CONTENTS

The Statement of Claim referenced in Article 00700-54 shall include specific information concerning the nature of the delay, the date of commencement of the delay, the construction activities affected by the delay, the person or organization responsible for the delay, the anticipated extent of the delay, and any recommended action to avoid or minimize the delay.

00700-56 WORK BEHIND SCHEDULE, REMEDY BY DESIGN/BUILDER

If the work actually in place falls behind the currently updated and approved schedule, and it becomes apparent from the current schedule that work will not be completed within the contract time, the Design/Builder agrees that it will, as necessary, or as directed by the Program Manager, take action at no additional cost to the County to improve the progress of the work, including increasing manpower, increasing the number of working hours per shift or shifts per working day, increasing the amount of equipment at the site, and any other measure reasonably required to complete the work in a timely fashion.

00700-57 DILIGENCE

The Design/Builder's failure to substantially comply with the requirements of the preceding paragraph may be grounds for determination by the County that the

Design/Builder is failing to prosecute the work with such diligence as will insure its completion within the time specified. In such event, the County shall have the right to furnish, from its own forces or by contract, such additional labor and materials as may be required to comply with the schedule after 48 hours written notice to the Design/Builder, and the Design/Builder shall be liable for such costs incurred by the County.

00700-58 SET-OFFS

Any monies due to the Design/Builder pursuant to the preceding paragraph of this agreement may be deducted by the County against monies due from the County to the Design/Builder.

00700-59 REMEDIES CUMULATIVE

The remedies of the County under Articles 00700-56, 00700-57, and 00700-58 are in addition to and without prejudice to all of the rights and remedies of the County at law, in equity, or contained in this agreement.

00700-60 TITLE TO MATERIALS

No materials or supplies shall be purchased by the Design/Builder or by any Subcontractor subject to any chattel mortgage or under a conditional sales contract or other agreement by which any interest is retained by the seller. The Design/Builder hereby warrants that it has good and marketable title to all materials and supplies used by it in the work, and the Design/Builder further warrants that all materials and supplies shall be free from all liens, claims, or encumbrances at the time of incorporation in the work.

00700-61 INSPECTION OF MATERIALS

All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with accepted standards and in accordance with the requirements of the contract documents. Additional tests performed after the rejection of materials or equipment shall be at the Design/Builder's expense.

00700-62 PROGRAM MANAGER'S PRESENCE DURING TESTING

All tests performed by the Design/Builder shall be witnessed by the Program Manager unless the requirement therefore is waived in writing. The Program Manager may perform additional tests on materials previously tested by the Design/Builder, and the Design/Builder shall furnish samples for this purpose as requested.

00700-63 MATERIALS INCORPORATED IN WORK

The Design/Builder shall furnish all materials and equipment to be incorporated in the work. All such materials or equipment shall be new and of the highest quality available. Manufactured materials and equipment shall be obtained from sources which are currently manufacturing such materials, except as otherwise specifically approved by the Program Manager.

00700-64 STORAGE OF MATERIALS

Materials and equipment to be incorporated in the work shall be stored in such a manner as to preserve their quality and fitness for the work and to facilitate inspection.

00700-65 PAYROLL REPORTS

The Design/Builder may be required to furnish payroll reports to the Program Manager as required by the Owner Controlled Insurance Program.

00700-66 DESIGN/BUILDERS' REPRESENTATIVE

Before beginning work, the Design/Builder shall notify the Program Manager in writing of one person within its organization who shall have complete authority to supervise the work, receive orders from the Program Manager, and represent the Design/Builder in all matters arising pursuant to this agreement. The Design/Builder shall not remove its representative without first designating in writing a new representative. The Design/Builder's representative shall normally be present at or about the site of work while the work is in progress. When neither the Design/Builder nor its representative is present at the work site, the superintendent, foreman, or other of the Design/Builder' employee in charge of the work shall be an authorized representative of the Design/Builder.

00700-67 SPECIALTY SUB-CONTRACTORS

The Design/Builder may utilize the services of specialty subcontractors on those parts of the project which, under normal contracting practices, are performed by specialty subcontractors. The Design/Builder shall not award more than seventy-five percent of the work to subcontractors.

00700-68 INSPECTION BY THE PROGRAM MANAGER

All work pursuant to this agreement shall be subject to inspection by the Program Manager/County for conformity with contract drawings and specifications. The Design/Builder shall give the Program Manager reasonable advance notice of operations requiring special inspection of a portion of the work.

00700-69 WORK COVERED PRIOR TO PROGRAM MANAGER'S INSPECTION

In the event that work is covered or completed without the approval of the Program Manager, and such approval is required by the specifications or required in advance by the Program Manager, the Design/Builder shall bear all costs involved in inspection notwithstanding conformance of such portion of the work to the contract drawings and specifications.

00700-70 SCHEDULING OF THE WORK

The work of this contract shall be planned, scheduled, executed, and reported as required by the Contract Documents.

00700-71 PROGRESS ESTIMATES

The Design/Builder shall prepare a written report for the Program Manager's approval, on County forms, of the total value of work performed and materials and equipment obtained to the date of submission. Such a report must accompany each request for a progress payment and is subject to review and approval by the Program Manager. Approval of a progress estimate or tendering of a progress payment shall not be considered an approval or acceptance of any work performed, and all estimates and payments shall be subject to correction in subsequent estimates. Progress payments shall be made for all completed activities and for materials suitably stored on-site.

00700-72 PROGRESS PAYMENTS

Upon approval of each monthly estimate of work performed and materials furnished, the Program Manager shall approve payment to the Design/Builder for the estimated value of such work, materials, and equipment, less the amount of all prior payments and any liquidated damages. The Design/Builder will be paid 100 percent, less retainage, of the cost of materials received and properly stored on-site but not incorporated into the work.

Payments for materials or equipment stored on the site shall be conditioned upon submission by the Design/Builder of bills of sale to establish the County's title to such materials or equipment. The Design/Builder's request for payment shall provide sufficient detail as to the work completed or materials purchased for which payment is requested to permit meaningful review by the Program Manager.

00700-73 TIME OF PAYMENT

The Design/Builder will be paid within 45 days following receipt of an approved Progress Estimate. The Design/Builder expressly agrees that the payment provisions within this Contract shall supersede the rates of interest, payment periods, and contract and subcontract terms provided for under the Georgia Prompt Pay Act, O.C.G.A. §13-11-1 et seq., and that the rates of interest, payment periods, and contract and subcontract terms provided for under the Prompt Pay Act shall have no application to this Contract. The County shall not be liable for any late payment interest or penalty.

Submittal of Invoices: Invoices shall be submitted as follows:

Via Mail:
Central Library
One Margaret Mitchell Square
6th floor, Attention: Janelle Walker
Atlanta, GA 30303

OR

Via Email:
Email: janelle.walker@fultoncountyga.gov
At minimum, original invoices must reference all of the following information:

1) Firm Information
    a. Firm Name
    b. Firm Address
    c. Firm Code
    d. Firm Contact Information
    e. Remittance Address

2) Invoice Details
    a. Invoice Date
    b. Invoice Number (uniquely numbered, no duplicates)
    c. Purchase Order Reference Number
    d. Date(s) of Services Performed
    e. A written report of the total value of work performed and materials and equipment obtained to the date of submission

3) Fulton County Department Information (needed for invoice approval)
    a. Department Name
    b. Department Representative Name

00700-74 RETAINAGE

The County shall retain from each progress payment ten percent of the estimated value of the work performed until the progress payments, including retainage, total 50 percent of the contract price. If a contract includes two or more projects or assignments that

have been separately priced and have separate budgets, and the performances of such projects or assignments are not related to or dependent upon the performance of any other, the 50 per cent limit shall be based upon the price for each individual project or assignment. Thereafter, no further retainage shall be withheld so long as the Design/Builder is making satisfactory progress to insure completion of the work within the time specified therefore. The County may reinstate the ten percent retainage in the event the Program Manager determines that the Design/Builder is not making satisfactory progress to complete the work within the time specified in this agreement or in the event that the Program Manager provides a specific cause for such withholding. The County may also withhold retainage upon substantial completion of the work as provided in O.C.G.A. §13-10-81(c). Interest may be paid upon the retainage in accordance with Georgia law.

00700-75 PAYMENT OF SUBCONTRACTORS

The Design/Builder shall promptly pay each subcontractor upon the receipt of payment from the County. Such payment shall be made from the amount paid to the Design/Builder pursuant to the subcontractor's work. The Design/Builder shall also maintain the records of the percentage retained from payments to the Design/Builder pursuant to such subcontractor's work. The Design/Builder shall procure agreements from each subcontractor requiring each subcontractor to pay their subcontractors, agents and employees in a similar manner. The County reserves the right to inquire of any subcontractor, supplier, materialmen, or sub consultant, the status of any indebtedness of the Design/Builder. The County further reserves the right to require the Design/Builder to designate on each instrument of payment exceeding $400.00 to subcontractors, suppliers, materialmen, and sub consultants that such payment is on account of the work under this Contract.

00700-76 COUNTY'S RESPONSIBILITIES TO SUBCONTRACTORS

Neither the County nor the Program Manager shall have any obligation to pay any subcontractor except as otherwise required by law.

00700-77 PROGRESS PAYMENTS - ACCEPTANCE OF WORK

Certification of progress payments, as well as the actual payment thereof, shall not constitute the County's acceptance of work performed pursuant to this agreement.

00700-78 PAYMENTS IN TRUST

All sums paid to the Design/Builder pursuant to this agreement are hereby declared to constitute trust funds in the hands of the Design/Builder to be applied first to the payment of claims of subcontractors, laborers, and suppliers arising out of the work, to claims for utilities furnished and taxes imposed, and to the payment of premiums on surety and other bonds and on insurance for any other application.

00700-79 JOINT PAYMENTS

The County reserves the right to issue any progress payment or final payment by check jointly to the Design/Builder and any subcontractor or supplier.

00700-80 RIGHT TO WITHHOLD PAYMENT

The Program Manager may decline to approve payment and may withhold payment in whole or in part to the extent reasonable and necessary to protect the County against loss due to defective work, probable or actual third party claims, the Design/Builder's failure to pay subcontractors or materialmen, reasonable evidence that the work will not

be completed within the contract time or contract price or damage to the County or any other Design/Builder on the project.

00700-81 CERTIFICATE OF SUBSTANTIAL COMPLETION

Upon the Design/Builder's submission of a request for a certificate of Substantial Completion, the Program Manager shall inspect the work and determine whether the work is Substantially Complete. If the work is Substantially Complete, the Program Manager shall issue a certificate of Substantial Completion of the work which shall establish the date of Substantial Completion, shall state the responsibilities of the County and the Design/Builder for security, maintenance, heat, utilities, damage to the work and insurance, and shall fix the time within which the Design/Builder shall complete the items submitted by the Design/Builder as requiring correction or further work. The certificate of substantial completion of the work shall be submitted to the County and the Design/Builder for their written acceptance of the responsibilities assigned to them pursuant to such certificate.

If in the sole opinion of the Program Manager, the work is not substantially complete, the Program Manager shall notify the Design/Builder of such, in writing, and outline requirements to be met to achieve Substantial Completion.

00700-82 PAYMENT UPON SUBSTANTIAL COMPLETION

Upon Substantial Completion of the work and upon application by the Design/Builder and approval by the Program Manager/County, the County shall make payment reflecting 100% work completed, less value of work remaining as determined by Program Manager and any authorized retainage.

00700-83 COMMENCEMENT OF WARRANTIES

Warranties required by this agreement shall commence on the date of final completion of the project as determined under Article 00700-84 unless otherwise provided in the certificate of Substantial Completion.

00700-84 FINAL PAYMENT - WAIVER OF CLAIMS, DISPUTE OF FINAL PAYMENT

The acceptance of the Substantial Completion payment shall constitute a waiver of all claims by the Design/Builder except those previously made in writing and identified by the Design/Builder as unsettled at the time of application for payment at Substantial Completion and except for the retainage sums due at final acceptance. Following the Program Manager's issuance of the certificate of Substantial Completion and the Design/Builder's completion of the work pursuant to this agreement, the Design/Builder shall forward to the Program Manager a written notice that the work is ready for final inspection and acceptance. If after inspection the Program Manager certifies that the work is complete and issues written notification of such to the Design/Builder, the Design/Builder shall forward to the Program Manager a final application for payment. The Program Manager shall issue a certificate for payment, which shall approve final payment to the Design/Builder and shall establish the date of final completion.

In the event the Design/Builder timely disputes the amount of the final payment, the amount due the Design/Builder shall be deemed by the Design/Builder and the County to be an unliquidated sum and no interest shall accrue or be payable on the sum finally determined to be due to the Design/Builder for any period prior to final determination of such sum, whether such determination be by agreement of the Design/Builder and the County or by final judgment of the proper court in the event of litigation between the County and the Design/Builder. The Design/Builder specifically waives and renounces

any and all rights it may have under O.C.G.A. §13-6-13 and agrees that in the event suit is brought by the Design/Builder against the County for any sum claimed by the Design/Builder under the Contract or for any extra or additional work, no interest shall be awarded on any sum found to be due from the County to the Design/Builder in the final judgment entered in such suit. All final judgments shall draw interest at the legal rate, as specified by law.

00700-85 DOCUMENTATION OF COMPLETION OF WORK

Neither the final payment nor the remaining retainage shall become due until the Design/Builder submits the following documents to the Program Manager:

a. An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work have been paid other otherwise satisfied;

b. The surety's consent to final payment; and

c. Any other data reasonably required by the County or Program Manager establishing payment or satisfaction of all such obligations, including releases, waivers of liens, and documents of satisfaction of debts.

In the event that a subcontractor refuses to furnish a release or waiver as required by the County or Program Manager, the Design/Builder may furnish a bond satisfactory to the County to indemnify the County against such loss. In the event that any lien or indebtedness remains unsatisfied after all payments are made, the Design/Builder shall refund to the County all moneys that the County may become compelled to pay in discharging such lien or other indebtedness, including all costs and reasonable attorney's fees.

00700-86 GOVERNING LAW

Each and every provision of this agreement shall be construed in accordance with and governed by Georgia law. The parties acknowledge that this contract is executed in Fulton County, Georgia and that the contract is to be performed in Fulton County, Georgia. Each party hereby consents to the Fulton Superior Court's sole jurisdiction over any dispute which arises as a result of the execution or performance of this agreement, and each party hereby waives any and all objections to venue in the Fulton Superior Court.

00700-87 CHANGES IN THE WORK

A. CHANGE ORDERS

1. A Change Order is a written order to the Design/Builder signed to show the approval and the authorization of the County, issued after execution of the Contract, authorizing a change in the Work and/or an adjustment in the Contract Sum or the Contract Time. Change Orders shall be written using forms designated by the County with Design/Builder providing supporting documentation as required by the Program Manager. The Contract Sum and the Contract Time may be changed only by approved Change Order pursuant to Fulton County Procedure 800-6. The amount payable by the Change Order is payment in full for all direct and indirect costs incurred and related to the work under said Change Order, including but not limited to delays, imports, acceleration, disruption and extended overhead. A Change Order signed by the Design/Builder

indicates the Design/Builder's agreement therewith, including the adjustment in either or both of the Contract Sum or the Contract Time.

2. The County, without invalidating the Contract, may order changes in the Work within the general scope of the Contract as defined herein. The time allowed for performance of the work and the contract price to be paid to the Design/Builder may be adjusted accordingly.

3. The cost or credit to the County resulting from a change in the Work shall be determined in one or more of the following ways:

   a. By mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

   b. By unit prices stated in the Contract Documents or subsequently agreed upon;

   c. By cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

   d. By the method provided in Subparagraph A4 below.

4. If none of the methods set forth in Subparagraphs 3a, 3b, or 3c above is agreed upon, the Design/Builder, provided a written order signed by the Program Manager is received, shall promptly proceed with the Work involved. The cost of such Work shall then be determined by the Program Manager on basis of the reasonable expenditures and savings of those performing the Work attributable to the change. The cost of the change shall include only the items listed in Subparagraph 5a below, and in the case of either a decrease or an increase in the Contract Sum, an allowance for overhead and profit in accordance with the schedules set forth in Subparagraphs 5b and 6 below shall be applied to the cost or credit.

   a. In such case, and also under Subparagraph 3a above, the Design/Builder shall keep and present, in such form as the Program Manager may prescribe, an itemized accounting of all actual costs expended, together with appropriate supporting data for inclusion in a Change Order.

   b. All hourly rate charges shall be submitted to the Program Manager for prior review and approval. All hourly rate charges shall be properly supported as required by the Program Manager with certified payrolls, or their acceptable equivalent. When authorized to proceed for a given change and actual expenditures have been made prior to execution of a Change Order for the entire change, such actual expenditures may be summarized monthly, and if approved, incorporated into a Change Order. When both additions and credits covering related Work or substitutions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase or decrease, if any, with respect to that change.

5. 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 Design/Builder's subcontractors beyond that agreed upon in the Contract Documents, construction parking, any additional costs of craft supervision by the Design/Builder'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.

c. In the event that a change is issued by the County which would require the expenditure of substantial amounts of special supervision (beyond the foreman level) by the Design/Builder, the Design/Builder may, at the sole direction of the Program Manager, be allowed to incorporate these charges into the agreement cost for the change.

6. In Subparagraphs 3 and 4 above, the allowance for overhead and profit combined, included in the total cost or credit to the County, shall be based on the following schedule:

a. For the Design/Builder, for any work performed by the Design/Builder's own forces, ten (10) percent of the cost.

b. For the Design/Builder, for any work performed by a Design/Builder's subcontractor, five (5) percent of the amount due the subcontractor.

c. For each subcontractor or sub-subcontractor involved, for any work performed by that subcontractor's or sub-contractor's own forces, ten (10) percent of the cost.

d. For each subcontractor, for work performed by a sub-subcontractor, five (5) percent of the amount due to the sub-subcontractor.

e. Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 5 above unless modified otherwise.

7. In order to facilitate checking of quotations for extras or credits, all proposals or bids, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs, including labor cost, materials and subcontracts. Labor and materials shall be itemized in the manner defined in Subparagraph 4 above. Where major cost items are subcontracts, they shall be itemized also. In no case shall a change be approved without such itemization.

8. No payment shall be made for any changes to the contract that are not included in a fully executed Change Order.

B. CONCEALED, UNKNOWN AND DIFFERING CONDITIONS

1. Should concealed conditions be encountered in the performance of the Work below the surface of the ground, or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the Contract Documents, or should unknown physical conditions below the surface of the ground or concealed or unknown conditions in an existing structure of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract, be encountered, the Contract Sum and Contract Time shall be equitably adjusted by Change Order upon request by either party made **within twenty (20) calendar days after the first observance** of the conditions. No such request for equitable adjustment shall be valid unless the Design/Builder complies with this (20) calendar days notice and Subparagraph C.1. below.

2. The Design/Builder shall promptly, and before such conditions are disturbed, notify the Program Manager in writing of any claim of concealed, unknown or differing conditions pursuant to this paragraph. The Program Manager shall authorize the Engineer to investigate the conditions, and if it is found that such conditions do materially so differ and cause an increase or decrease in the Design/Builder's cost of, or the time required for, performance of any part of the Work under this Contract, whether or not changed as a result of such conditions, an equitable adjustment shall be recommended to the Program Manager.

3. No claim of the Design/Builder under this clause shall be allowed unless the Design/Builder has given the notice required in (a) above, prior to disturbing the condition.

4. No claim by the Design/Builder for an equitable adjustment shall be allowed if asserted after final payment under this Contract.

5. Any materially differing site condition as between what is shown on the Drawings and Specifications and actually found on site shall be immediately reported to the Program Manager in writing prior to the commencement of Work at the site. Failure of the Design/Builder to notify the Program Manager in writing of the differing site condition prior to performance of Work at the site shall constitute a waiver of any claim for additional monies. Any Change Order necessitated by the differing site condition shall be processed as provided under "Changes in the Contract".

C. REQUESTS FOR ADDITIONAL COST

1. If the Design/Builder wishes to request an increase in the Contract Sum, the Design/Builder shall give the Program Manager written notice thereof within twenty (20) calendar days after the occurrence of the event, or identification of the conditions, giving rise to such request. This notice shall be given by the Design/Builder before proceeding to execute the Work, except in an emergency endangering life or property in which case the Design/Builder shall proceed in accordance with Article 00700-87 and Subparagraph A.4 above. No such request shall be valid unless so made within the twenty (20) calendar days specified above. If the County and the Design/Builder cannot agree on the amount of the adjustment in the Contract Sum, it shall be determined by the Program Manager. Any change in the Contract Sum resulting from such claim shall be documented by Change Order.

2. If the Design/Builder claims that addition cost is involved because of, but not limited to (1) any written interpretation pursuant to General Condition 00700-17 of this Agreement, (2) any order by the County to stop the Work pursuant to Articles 00700-25 and 00700-37 of this Agreement where the Design/Builder was not at fault, or any such order by the Program Manager as the County's agent, or (3) any written order for a minor change in the Work issued pursuant to Paragraph D below, the Design/Builder shall submit a request for an increase in the Contract Sum as provided in Subparagraph C.1 above. No such claim shall be valid unless the Design/Builder complies with Subparagraph C.1 above and approved by the County pursuant to Change Order Policy 800-6.

D. MINOR CHANGES IN THE WORK

The Program Manager/County may order minor changes in the Work not involving an adjustment in the Contract Price, extension of the time allowed for performance of the work and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by a written Change Directive issued by the Program Manager, and shall be binding on the County and the Design/Builder. The Design/Builder shall carry out such written orders promptly.

E. BONDS

If any change order results in an increase in the contract price, the Design/Builder shall increase the penal sum of the performance and payment bonds to equal the increased price.

00700-88 DISAGREEMENT WITH ORDERS FOR CHANGE

Design/Builder's written acceptance of a Change Order or other order for changes shall constitute his final and binding agreement to the provisions thereof and a waiver of all claims in connection therewith, whether direct or consequential in nature. Should Design/Builder disagree with any order for changes, he may submit a notice of potential claim to the Program Manager, at such time as the order is set forth in the form of a Change Order. Disagreement with the provisions of an order for changes shall not relieve Design/Builder of his obligation under Article 00700-87 of this Agreement.

00700-89 NO WAIVER OF REMEDIES

Exercise by the County of any remedy is not exclusive of any other remedy available to County and shall not constitute a waiver of any such other remedies. Failure of the County to exercise any remedy, including breach of contract remedies, shall not preclude the County from exercising such remedies in similar circumstances in the future.

00700-90 LAND AND RIGHTS-OF-WAY

The owner will provide, as indicated in the Contract Documents and prior to Notice to Proceed, the lands upon which the work is to be done, right-of-way for access thereto, and such other lands which are designated for the use of the Design/Builder. The Design/Builder shall confine the Design/Builder's work and all associated activities to the easements and other areas designated for the Design/Builder's use. The Design/Builder shall comply with any limits on construction methods and practices which may be required by easement agreements. If, due to some unforeseen reason, the necessary easements are not obtained, the Design/Builder shall receive an equitable extension of contract time dependent upon the effect on the critical path of the project schedule or the County may terminate the Contract for its convenience.

00700-91 COORDINATION WITH STATE DEPARTMENT OF TRANSPORTATION

No clearing or grading shall be completed by Design/Builder within the State Department of Transportation (DOT) area under construction. The Design/Builder must coordinate his construction scheduling with DOT.

If the Design/Builder begins work before DOT's completion date, he must obtain the approval of DOT before starting work in the area. The state DOT has the right to stop the Design/Builder's work the DOT area.

The Design/Builder shall receive no additional compensation or damages resulting from delay or work stoppage from DOT actions or scheduling.

Design/Builder shall obtain DOT drawings of the DOT, project area for verification of road geometry, storm drains, etc. from Georgia Department of Transportation or Fulton County. The Design/Builder is responsible for obtaining any pertinent DOT revisions.

00700-92 SCOPE OF WORK

A. The work in this Request for Proposals includes renovations of two (2) libraries in Fulton County which are part of Phase II of the AFPLS CIP.
   1. East Point, an 11,378 s.f. library in East Point
   2. Fairburn Hobgood-Palmer, a 9,625 s.f. library in Fairburn

   In addition to the work described in Exhibit 3, the renovations will consist of new roofs, windows, necessary repairs to the building envelope, re-topping and striping the parking lots, new HVAC equipment, repairs and repainting interior walls, replacing ceiling tiles and hanging system, new carpet and floor coverings and replacing door hardware. Technology upgrades will also be done during the renovations.

B. Project / Guaranteed Maximum Price Overview:

1. The Design/Build Services Agreement (Agreement) will be executed by the Offeror deemed to have the most advantageous proposal. The Agreement will initially include fees for Design Services performance and Design/Builder Management performance for the Work

2. The Design Builder will commence Design Services, completing Facility Assessment Review, Owner interviews, Pre-Design, Schematic Design Phase and Design Development Phase Services as enumerated herein.

3. The Design/Builder shall provide to the Program Manager/Owner multiple itemized options for scope of renovations/improvements and their associated costs so that the Owner can make informed decisions on scope of renovation to occur. Should the level of detail of the itemized renovation/improvement options not be sufficient according to the Owner or Program Manager or that the Owner/Program Manager request additional scope be considered/priced for the renovations/improvements, the Design Builder agrees to revise and update the options provided to the Owner.

4. As the Design Development Documents are approved for each project, the Design/Builder will prepare Guaranteed Maximum Price (GMP) proposals utilizing the Owner-approved Design Development Documents as the basis of Design for each proposal.

5. The Design/Builder will prepare each GMP proposal based on bids or proposals for all major elements of each Project including the overhead, profit and general conditions percentages submitted with the Cost Data Form, see Agreement Article 11 and RFP Attachment F – Required Forms. These GMP proposals will be submitted to the Owner for review and approval, see Agreement Article 11.

6. The Design Builder shall prepare all Bid Packages for the project and will advertise all procurements. It is the Design/Builders responsibility to scope out all proposals and contract with the lowest responsible Bidder.

7. Upon Owner Approval of each GMP proposal, the Agreement will be amended to include the cost of construction for each Project using the approved negotiated costs.

8. Design Services will resume and the Construction Documents Phase services will be completed as enumerated herein.

9. Upon completion of the Construction Document Phase services as enumerated herein, the Construction Phase services will commence and continue until final completion.

C. Existing libraries are currently being assessed as part of a County wide facilities assessment. Included in this assessment, will be a written report that includes an on-site facility assessment of the physical condition and cost of repairs and

replacements, along with prioritization of any needed repairs or recommendation for replacements. This report is included in this RFP, See Exhibit 3.
The Design/Builder will utilize this report along with information gained from their own site visits and meetings with Atlanta-Fulton Public Library System staff in the Design.
Even though the Assessment prorates the items reported over a number of years, it is the intent of Fulton County to complete all of the renovations including the items reported in the Assessment all at once. The Design/Builder is to ignore the schedule in the Assessment.

D. Included as information only, the County intends to issue solicitations for the remaining projects in Phase II. These project will include:

1. Design/Build Services for Library CIP Renovations - Group 1
2. Design/Build Services for Library CIP Renovations - Group 2
3. Design/Build Services for Library CIP Renovations – Group 3
4. Design/Build Services for the Hapeville Library Renovation
5. Programming & Bridging Document Services for the Central Library
6. Design/Build Services for Library CIP Central Library Renovation

E. **Separate Contracts:**

The County has issued/intends to issue separate contracts for the following:

1. Low Voltage system equipment: The Owner shall provide IT, network and telephone equipment for all the projects in Phase II.
    a. The Design/Builder shall provide infrastructures (conduit, wiring, terminations, raceways, etc.) as part of their Services and Work for Closed Circuit TV Cameras, Card Reader Access Systems and Audio-Visual systems.
    b. For a scope of Technology Design/Builder responsibilities, please refer to Exhibits 4 and 5.
2. Technology Consultant – The County shall issue a contract directly with a Technology Consultant. The Design Builder agrees to cooperate with and work with the Technology Consultant. The Technology Consultant shall provide the Technology Drawings and Specifications that will be incorporated into the Design/Builders Construction Documents.
3. FF&E Consultant – The County shall issue a contract directly with a FF&E Consultant. The Design Builder agrees to cooperate with and work with the FF&E Consultant. The FF&E Consultant shall be responsible for FF&E selections and providing Drawings and Specifications that will be incorporated into the Design/Builders Construction Documents. See Exhibit 6 for a scope of the FF&E consultant's responsibilities.
4. Wayfinding – The County shall issue a contract directly a Wayfinding Consultant. The Design/Builder agrees to cooperate with and work with the Wayfinding Consultant. The Wayfinding Consultant shall provide Signage Location Drawings, Schedules, Signage Standards and

Specifications that will be incorporated into the Design/Builders design and Construction Documents.

F. **Design/Builder Responsibilities:**

1. The services performed by the Design/Builder, its employees and consultants as enumerated herein.

2. For practical purposes, the Work shall be considered to be two libraries throughout Fulton County.
   East Point Library
   Fairburn Hobgood-Palmer Library

   Each library shall be considered to be a Project. The Design/Builder shall manage each Project (library facility) individually. Financial and other records shall be maintained by Project. Project schedules including milestones, such as Substantial and Final Completion and start of warranties will be on a Project by Project basis.

   At least one library in a given area shall be open at all times. The Design/Builder will be required to provide a phasing plan indicating when each library will close and reopen. The County must approve of the Design/Builders plan/schedule for library closures/renovations prior to the Design/Builder performing work. Move management will also be part of the Design/Builders services.

3. The Design/Builder's services shall be performed as expeditiously as is consistent with professional skill and care and the orderly progression on the Project.

4. The Design/Builder shall utilize the schedule(s) submitted with its GMP Cost Proposal and approved by the Owner. The schedule(s) shall include allowances for periods of time required for the Owner's review and approval of submissions by authorities having jurisdiction over the Project. Time limits established by this schedule and approved by the Owner shall not be exceeded by the Design/Builder or Owner except for reasonable cause.

5. The Design/Builder shall designate a representative responsible for the day to day management who shall be the Owner's primary contact during design and construction phases of each Project. The designated representative shall be authorized to bind the Design/Builder in all matters related to design/build services.

   a. The Design/Builder shall designate representatives from its design professionals to act on behalf of the Design/Builder with respect to professional design services.

   b. The Owner shall at all times have reasonable access to the personnel of the Design/Builder, to include design professionals, relating to the Project throughout the duration of the Project.

6. The Design/Builder may refine the project organization, based on information submitted during the RFP process. The consultants presented by the Design/Builder as part of the selection process and approved by the Owner shall be the consultants used for the Project. The Design/Builder shall not substitute any consultant without the consent of the Owner.

7. The Design/Builder shall coordinate and cooperate with the County's Department of Real Estate and Asset Management (DREAM) to ensure that all systems (Mechanical, Electrical, Plumbing and Technological) conform to the County's current standards during the design and construction of each library.

8. The Design/Builder shall review and evaluate the information provided by the Owner and advise the Owner of any additional information required by the Design/Builder for completion of the Project.

9. The Design/Builder shall investigate existing site conditions.

10. Prior to establishment of the GMP, the Design/Builder shall provide Estimate(s) of Construction Cost where required herein and obtain the Owner's written approval of the cost estimate.

11. The Design/Builder shall provide the Owner with a set of record plans for each Project, showing any significant changes in this portion of Work made during construction, based on marked-up prints, plans and other data.

12. The Design/Builder shall prepare and submit all required applications and plans to all regulatory authorities having jurisdiction over each Project. The Design/Builder shall revise and resubmit applications and supporting documentation as required to resolve comments received from such governmental authorities. The Owner shall assist in the application process as necessary.

13. The Design/Builder, or its consultants, shall prepare and distribute conference memoranda, meeting minutes, summaries of telephone conversations, documentation of site visits and inspection reports as required to maintain a comprehensive record of each Project.

14. The Design/Builder shall provide the professional design services described herein utilizing the latest CSI format. Required design disciplines include, but are not limited to, Civil, Landscape Architecture, Structural, Architectural, Mechanical, Plumbing, Electrical, Fire Protection and Interior Design.

    a. Design/Build team members must be appropriately licensed in the State of Georgia. All studies, reports, drawings and specifications must be prepared, signed and sealed by a Georgia registered professional architect, professional engineer or appropriate

qualified professional in accordance with applicable laws of the State of Georgia.

15. The Design/Builder shall manage the Design/Build services so as to ensure that each Project and the Work can be constructed for an amount that is within the Design/Build fees and Guaranteed Maximum Price (GMP).

G. Pre-Design and Schematic Design Phase Services:

1. The Design/Builder shall review the Manual, schedule and other Owner provided information to ascertain the requirements of each Project.

2. The Design/Builder shall provide a preliminary evaluation of Owner provided information and shall discuss with the Owner alternative approaches to design and construction of the Project. The Design/Builder shall provide cost and constructability input to the Owner to help with the evaluation of these items. These alternate approaches shall include the feasibility of incorporating:

    a. Environmentally responsible design approaches

    b. Incorporation of LEED program

    c. Other potential alternatives that may come from the Owner of Design/Build team.

    The Design/Builder shall arrive at a mutual understanding regarding incorporation of the alternative approaches with the Owner.

3. The Design/Builder shall utilize the Owner provided assessments

4. It is anticipated that the Design/Builder will conduct multiple meetings with the Owner and stakeholders on each Project as part of the schematic design process.

5. The Design/Builder shall prepare Schematic Design Documents for each Project suitable for presentation based on information provided by the Owner and incorporation of Owner approved alternative design approaches. The Schematic Design Documents shall include drawings and other documents including, but not limited to site plans, floor plans, sections, elevations and shall include some combination of study models, perspective sketches, or digital modeling. Schematic Design narratives and outline specifications illustrating and describing the architectural, electrical, mechanical, structural and building and support systems.

    a. The Design/Builder shall prepare an estimate of construction cost based on schematic design phase documents and submit to the Owner for approval.

6. The Schematic Design Documents and the schematic estimate of construction cost, shall be submitted for review, comment and approval by the Owner.

7. The Design/Builder shall make presentations to review/approval boards (Board of Architectural Review, Technical Review, etc.) and other agencies as required.

H. Design Development Phase:

1. Based on the approved schematic design documents, any adjustments authorized by the Owner in the program, schedule or construction budget, the Design/Builder shall prepare Design Development Documents. The Design Development Documents shall consist of drawings and other documents including site plans, floor plans, sections, elevations, finish schedules, typical construction details, and diagrammatic layouts of building systems to fix and describe the size and character of the Project including civil, architectural, structural, mechanical, electrical, fire protection, low voltage systems, materials and such other elements as may be appropriate, and shall also include some combination of study models, perspective sketches, or digital modeling. The Design Development Documents shall also include specifications, developed to a point where major materials and systems are identified and their quality levels are established, and furniture and finishes color and materials presentation board(s).

    a. The Design Development Documents shall incorporate the accepted resolution of all Owner comments on the Schematic Design Document submittal.

2. The Design Development Documents shall be submitted for review, comment and approval by the Owner. The Design Development Documents shall be revised to incorporate Owner review comments.

3. The Design/Builder shall make presentations to review/approval boards (Board of Architectural Review, Technical Review, etc.) and other agencies as required.

I. **Construction Document Phase:**

1. Based on the approved Design Development (Basis of Design) Documents and any further adjustments authorized by the Owner in the scope of quality of the Project the Design/Builder shall prepare Construction Documents consisting of drawings and specifications setting forth in detail the requirements for the construction of the Project.

    a. The Construction Documents shall incorporate the accepted resolution of all review comments from the Owner and other authorities having jurisdiction on the Design Development Documents. The Construction Documents shall include the application of all professional seals as required by Georgia laws

and regulations and be ready for bidding without further modification.

b. The construction documents shall include drawings and specifications from all required disciplines.

c. Should the Design/Builder elect to "fast track" elements of the Work within a Project, the Design/Builder shall submit these fast track permit sets separately as they occur as interim submittals for Owner review and approval.

2. Provide intermediate (75%) and one hundred (100%) construction document submittals for Owner review, comment and approval. Provide a final construction document submittal of documents sealed signed and dated, ready for permitting. Submittals shall include construction documents, drawings and specifications, developed to a level consistent with submittal

   a. The 75% submittal shall also include FF&E cut sheets, updated furniture and finishes color and materials presentation boards.

   b. The Design/Builder shall incorporate the 75% review comments into the 100% submittal. The 100% submittal shall also include the statement of special inspections.

   c. The Design/Builder shall incorporate the 100% comments into the final submittal.

3. Make presentations to review/approval boards (Board of Architectural Review, Technical Review, etc.) and other agencies as required. Obtain approvals from review and permitting authorities (local planning & building department, etc.)

J. Guaranteed Maximum Price:

1. The approved 50% Construction Documents including any adjustments authorized by the Owner will become the basis of design for the Guaranteed Maximum Price (GMP).

2. The Design/Builder will prepare its GMP Proposal and submit the Proposal to the Owner for approval.

   a. The GMP Proposal shall include a written description of how it was derived and what is included, such as approved alternative design approaches and assumptions made by the Design/Builder in the GMP Proposal.

   b. To be included in the GMP is an Owner's Controlled Contingency (see Exhibit 2 "Cost Data Form" and Section 0700-111 of the General Conditions), Construction Contingency and FF&E

Allowance (see Section 3 Proposal Requirements, A. Part 1 – Design/Builder's Design Responsibilities, paragraph 2).

c. The Contract for full description of requirements regarding the GMP.

3. Concurrently with the GMP Proposal, the Design/Builder shall prepare and submit a Critical Path Method (CPM) milestone schedule.

K. Construction Phase Services:

1. The Design/Builder, and its design consultants, shall provide administration of Construction Phase Services as enumerated herein.

2. The Design/Builder, and its design consultants, shall continue to advise and consult with the Owner during the Construction Phase Services.

3. The Design Builder, and its design consultants, shall attend pre-construction and pre-installation conferences, preparatory meetings for major components and systems, and progress meetings as required.

4. The Design/Builder, and its design consultants, shall review, comment, and recommend approval of shop drawings and submittals.

5. The Design/Builder, and its design consultants, shall conduct periodic site walkthroughs and provide site observations and/or inspections as further described in Section L below or as required by the "Statement of Special Inspections".

6. The Design/Build design consultants shall answer RFI's, resolve design issues that arise in the field, and prepare supplemental instructions and sketches as required.

7. The Design/Build design consultants shall provide substantial and final completion inspections and prepare punch lists.

8. The Design/Build design consultant shall review and approve the "Final Report of Special Inspections".

9. The Design/Builder shall provide full time Superintendents for each Project.

L. Evaluation of the Work:

1. The Design/Build design consultant shall visit the site weekly, or as otherwise agreed, to become generally familiar with the progress and quality of the portion of the Work completed, to endeavor to guard against defects and deficiencies in the Work, and to determine, in general, if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the construction documents.

a. The Design/Builder, and its design consultants, shall keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the construction documents and from the most recent construction schedule submitted by the Design/Builder, (2) defects and deficiencies observed in the Work, and (3) the Design/Builder's plan to correct said defects and deficiencies.

b. Site visits shall be made by representatives of the Design/Build design consultants who are knowledgeable of the Project requirements, competent in design and construction in each discipline having work in current progress.

c. The Design/Builder shall submit to the Owner, no later than seven (7) calendar days after each visit, a written report of its and its consultants' periodic visits, its findings and the status of the Project.

2. The Owner has the right to reject Work that does not conform to the construction documents. Whenever the Owner considers it necessary or advisable, the Owner shall have the authority to require inspection or testing of the Work in accordance with provisions of the construction documents, whether or not such Work is fabricated, installed of completed.

3. Interpretation and decisions of the Design/Builder design consultants shall be consistent with the intent of and reasonably inferable from the construction documents and shall be in writing or in a form of drawings.

M. Certificates for Payment:

1. The Design/Builder shall submit applications for payment. The Design/Build design consultants shall certify the application for payment, and said certification shall constitute a representation to the Owner, based on the Design/Build design consultant's evaluation of the Work and on the data compromising the Contractor's Application for Payment, that to the best of the Design/Build design professional's knowledge, information and belief, the portion of the Work for that Project has progressed to the point indicated and that the quality of the Work is in accordance with the construction documents.

2. The Design/Builder shall maintain a record of the Application and Certificate of Payment.

N. Submittals:

1. The County requires the Design/Build firm to utilize the Contract Management and Scheduling software that will be purchased and managed by the County. The software will be web based. The Design/Build firm shall be responsible for all seats on Contract

Management and Scheduling software that they require. The County will provide general training to one member of the Design/Build firm, any further training required by the Design/Build firm will be the responsibility of the Design/Build firm. It will be required that the Contract Management software contain all project correspondence, including but not limited to, transmittals, submittals, Request for Information (RFI's), RFP's, document control, change orders, letters, memorandums, meeting minutes, phone logs, emails, etc. The Scheduling software shall contain all schedules during the design, pre-construction, construction and closeout phases of the project.

2. The Design/Builder's submittal schedule for each Project shall be available for review, within ten (10) days of start of construction.

3. The Design/Builder, its design consultants, contractors, subcontractors and other project stakeholders shall take action in review of submittals in accordance with the approved submittal process.

4. The Design/Build design consultants shall review and recommend approval to the Owner or take other appropriate action upon the Design/Builder's submittals such as shop drawings, product data and samples. The Owner shall have final approval authority on submittals to release them for construction. Review of such submittals is not for the purpose of determining the accuracy and completeness of other information such as dimensions, qualities, and installation or performance of equipment or systems, which are the responsibility or the Design/Builder.

5. The Design/Build design consultants shall review and respond to requests for information about the construction documents. If appropriate, the Design/Build design consultant shall prepare and issue supplemental Drawings and Specifications in response to requests for information.

6. The Design/Builder shall account for a 3-week submittal review and approval process which may include review by the Fulton County representatives.

O. Changes in the Work:

1. The Design/Builder may recommend to the Owner, for its approval, minor changes in the Work that are consistent with the intent of the construction documents and do not involve an adjustment in the Construction Contract Sum or an extension of the Contract Time.

2. In the event of Owner directed changes or weather-related time extensions, the Owner's staff shall prepare Change Orders and Construction Change Directives, as appropriate, for the Design/Builder and Owner approval and execution in accordance with the construction documents.

3. The Design/Builder shall maintain records relative to changes in the Work.

P. Project Completion:

1. When the Design/Builder believes a Project to be substantially complete, it shall notify the Owner in writing. The notification shall be accompanied by a deficiencies list, enumerating all outstanding or incomplete items.

2. The Owner shall conduct inspections to determine the date or dates of Substantial Completion and the date of Final Completion of each Project and of the Work; and issue Certificates of Substantial Completion.

    a. The Design/Builder's Design Professionals shall cooperate in inspections conducted by the Owner to check conformance of the Work with the requirements of the construction documents and to verify the accuracy and completeness of the deficiencies list submitted by the Design/Builder to be completed or corrected.

    b. When the Owner finds a Project to be substantially complete, the balance of its Construction Contract Sum shall be paid to the Design/Builder, excluding the amount to be retained from the Construction Contract Sum, if any, for Final Completion or correction of the Project.

3. Once Substantial Completion of a Project is achieved, the Design/Builder shall submit, for the Owner's review and records, the following information: (1) written warranties; (2) consent of surety or sureties; (3) affidavits, receipts, releases and waivers of liens or bonds indemnifying the Owner against liens; and (4) any other documentation required of the Contractor by the construction documents.

4. When the Owner agrees that a Project is complete and all required documentation has been received, it will be deemed to have achieved Final Completion, and the balance of its Construction Contract Sum shall be paid the Design/Builder, including the amount to be retained from the Construction Contract Sum, if any for final completion or correction of the Project. When the final Project has achieved Final Completion, the Work is considered to be complete.

Q. Drawing Requirements:

1. All Drawings provided to the County shall be as follows:

    a. Drawings must be prepared on standard sheet size (E-Size 30" x 42").

    b. Provide sufficient paper and/or electronic sets of sealed final contract documents to meet the authority having jurisdiction's permitting requirements. Provide one (1) each paper and electronic set to County for record set purposes. Permit and

record sets shall be sealed with original A/E signatures and dates applied across seal.

c. Provide computer files on CD's (or other approved media) utilizing both Revit 2016 and AutoCAD 2016, or higher as approved. Project Drawings will be produced in Revit and converted to AutoCAD. Revit files must utilize the ".rvt", ".rfa", ".rft" or other standard Revit file designations. Drawings must utilize the ".dwg" file designation. Electronic file submission must include the following:

   i. All downloaded content must be provided. All blocks must be provided or exploded. All external references must be provided.

   ii. Custom line types and fonts must be provided. Drawings should be produced utilizing standard fonts available with Revit and AutoCAD 2016 for all non-title block text. The minimum font size shall be 1/8" when printed full size.

   iii. Drawing layout and layering system may be your firm's standard, however, all unused layers must be purged from the drawings, and a list of layers and pen assignments must be provided on disk with accompanying hard copy. Provide all plot files used to plot contract documents.

   iv. Conversion to AutoCAD 2016 will be the responsibility of the successful firm, ".dxf" or other file types are not acceptable.

   v. Provide project name, sheet title and sheet number on all sheets.

d. Provide the County with Adobe Acrobat 11.0, or newer files of the Contract Documents.

R. Specification Requirements:

1. All specifications provided to the County shall be as follows:

   a. Specifications must be developed using the Construction Specification Institute (CSI) format in Microsoft Word 2013, or as approved by the Owner.

   b. Provide sufficient paper and electronic sets of sealed final specifications to meet the authority having jurisdiction's permitting requirements. Provide one (1) each paper and electronic set to the County for record set purposes. Permit sets shall be with original A/E signatures and dates applied across the seal.

   c. Provide the County with Microsoft Word 2013 and Adobe Acrobat 11.0 files of the specifications, or as approved by the Owner.

DESIGN/BUILD CONTRACT MANAGEMENT

Part 1. Administrative Requirements:

A. General Requirements:

1. Related Documents: Provisions of the RFP and the Contract apply to this Design/Build Contract Management Section.

2. Summary of Work:

    a. The Design Builder is responsible for design and construction of the Work comprised of the nine (9) Projects described in the RFP. See Design/Build Scope of Services in the RFP for summary of Work.

        i. Design Phase services shall include full architectural and engineering services to design and detail complete and functioning Projects as described in the RFP and herein. Design services shall include preparation of construction documents, consisting of drawings and specifications adequate for permitting and regulatory approvals.

        ii. Construction Phase services shall provide all materials, supplies, equipment, furnishings, labor, and supervision necessary to construct complete and functioning Projects as described in the RFP and herein.

    b. The Design Builder shall be responsible for verifying existing site conditions as necessary for the design and construction of each Project.

B. Coordination of Projects:

1. General: Coordinate design activities and construction operation to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Specification Sections that depend on each other for proper installation, connection and operation.

2. Design/Builder's Use of Premises: Limit use of premise to allow:

    a. Work by Owners Forces.

    b. Work performed under Separate Contracts.

3. Work by Owner: Separate contracts are anticipated; see Scope of Work – Section in RFP.

4. Work Hours:

    a. Normal work hours for projects shall fit within the municipal regulations governing the site location. Owner preferred work hours are between 6:00 AM and 5:00 PM. Monday through Friday.

    b. Evening and weekend hours shall be approved in advance.

5. Owner's Representative(s) will be designated to act as the point(s) of contact for the Design/Builder. Required coordination with the Atlanta-Fulton Public Library System staff and other Project stakeholders will be directed through the Owner's Representatives(s).

    a. The Owner's Representative(s) will visit the site periodically to review progress of the work.

    b. Coordinate all Owner provided testing with the Owner's Representative(s) and the Owner's designated testing firm as required.

6. Coordination of Work:

    a. Coordinate scheduling, submittals and Work to ensure efficient and orderly sequence of installation of interdependent construction elements.

    b. Coordinate space requirements and installation of mechanical and electrical work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit as closely as practicable.

    c. In finished areas, conceal pipes, ducts and wiring within construction.

C. Project Meetings:

1. General Requirements: Design/Builder shall schedule and conduct all meetings and conferences. Schedule meetings with all participants. Prepare and distribute the meeting agendas, two (2) days prior to meeting, and minutes within three (3) days of the meeting.

    a. Exception: For Owner called meetings, the Owner will schedule and conduct meetings as detailed above.

    b. All construction phase meetings and conferences shall be held at the Project site.

2. Design Conferences: Design/Builder shall schedule and conduct design conferences at regular intervals to discuss the progress of the project and the design. Initial conference shall be scheduled prior to

commencement of design phase of the Work, but no later than fifteen (15) days after execution of the Agreement.

a. Attendees shall include representatives of the Owner; Design/Builder; Design/Builder's Design Consultant providing services in the current design phase; and other parties as appropriate.

b. Preliminary Consultation/Pre-Design Project Analysis topics should include, but not be limited to, review of Design/Builder's analysis of Owner provided information included in the RFP, see Article 4 of Agreement, additional information needed and Design/Builder recommendations.

c. Schematic Design – Construction Document Phase topics should include, but not be limited to, project design and detailing (see Scope of Services – Sections G – K), alternate approaches, design submissions, coordination of Work under separate contracts, equipment, construction sequencing, separate "permit packages", value engineering and Guaranteed Maximum Price (GMP) proposals, and other topics appropriate to the stage of the design and contract documents.

d. Meeting minutes shall include a log of design issues to be resolved.

3. Preconstruction Conference: Owner shall schedule and conduit a preconstruction conference before the Design/Builder commences construction for the major permitted portions of each Project of the Work.

a. Attendees shall include representatives of the Owner, Design/Builder, Design/Builder's Design Consultants as appropriate, major Subcontractors, and other parties as appropriate.

4. Construction Phase Pre-installation Meetings: Schedule and conduct pre-installation meetings to be held prior to beginning each segment of work, and prior to any significant activity within each segment of work. Prepare a "checklist" type agenda, record meeting minutes and distribute minutes to all attendees.

a. Attendees shall include the Superintendent, Owner Representative(s), affected Subcontractors and the onsite foreman who will actually be performing the work.

b. Agenda: Shall include a review of the contract requirements, approved shop drawings, submittal data and testing requirements, a physical examination of the materials and equipment to be installed to verify that they conform to the approved submittals, verification that prerequisite work has been

completed, and a discussion regarding coordination with other work.

5. Construction Phase Progress Meetings: Schedule and conduct progress meetings at the same time and day of the week to be held at weekly or other agreed upon intervals as appropriate to the stage of construction.

    a. Attendees shall include Owner's Representative(s), Design/Builder's Representative(s), subcontractor(s), and other parties as appropriate.

    b. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project including, but not limited to, items requiring action, the submittal list, requests for information (RFI's), Work accomplished, coordination of Work planned and the schedule.

    c. Minutes shall include a list of action items, listing issues and responsible party to resolve issue, and deficiencies log.

D. Payment Procedures and Price Considerations:

1. General: See Design/Build Services Agreement (Agreement), Article 40 – Invoicing and Payment:

    a. Prior to the first Application for Payment and after a GMP is established, and within ten (10) calendar days after the commencement of construction, the Schedule of Values (SOV) for each Project shall be submitted for Owner review and approval. Submit six (6) copies of the typed SOV on AIA form G703. In the event that the schedule is not accepted, revise and resubmit as required. Design/Builder's standard form will be considered. The Owner will not review any application for payment until the SOV is approved.

    b. Schedule of Values (SOV) Content: The initial SOV will contain design services and Design/Build management fees broken down with line items related to each Design and Construction Phase. Once a GMP is established for a Project the SOV will be updated to include Construction Costs.

    c. SOV Format: Utilize the specification headings developed by the Design/Build Design Consultants as part of each project. Identify each line item with the number and title of the specification section. Project overhead, insurance, mobilization, demobilization, profit, etc. shall not be identified in the SOV as line items. The value of these shall be equally distributed over all the elements of the Schedule. Show at a minimum, a labor line and a materials line for each specifications section. Include

separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, project record documents and demonstration and training.

i. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

ii. Provide a separate line item in the SOV for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

d. Payment Procedures for Design Services: On the SOV, provide a breakdown of the Design Services portion of Contract Price. Include a minimum of one line item for each design milestone (Post Award Design Submittals) listed herein for each discipline. Design Services shall be paid monthly, based on percentage of completion of design per discipline of work package.

e. Payment Procedures for Construction Phase: Construction Phase payments shall be paid monthly, based on percentage of Work in place minus retainage, as applicable, for each Project.

f. Schedule Updating: Update the SOV to add a line item for each fully executed Change Order that results in a change in the Contract Sum before the next Application for Payment.

2. Application for Payment:

a. Submit three (3) typed copies of AIA G702 – Application and Certificate for Payment including continuation sheets when required, each with original signatures for each Project. Use data from approved SOV. Provide dollar value in each column for each line item for portion of work performed. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as an original item of work. When Owner requires substantiating information, submit requested data justifying dollar amounts in question.

i. Payment for material stored off site shall be at the discretion of the Owner, per Article 12 of the Agreement.

b. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment for each Project, include the following:

i. List of Subcontractors

ii. Schedule of Values (SOV)

iii. Design/Builder's design and construction schedule

c. Subsequent Applications for Payment: An updated schedule, an updated submittal log and construction photographs must precede or coincide with payment applications subsequent to first Application for Payment.

d. Application for Payment at Substantial Completion: See Article 13C of the Agreement.

e. Final Payment Application: Submit final Application for Payment with supporting documentation listed in Article 13H of the Agreement.

f. Change Order Procedures: See Article 17 of the Agreement.

E. Design/Builder's Schedule:

1. All work on the Branch Libraries Renovations (Group 4) must be completed and the closed out by **June 28, 2019.**

2. Some of the projects may require vacating the library under renovation. In these cases, the Design/Build firm will be required to provide Move Management and staging (as necessary) and storage services, including but not limited to, box, collection, artwork, and surplus moves.

3. The County requires the Design/Build firm to utilize the Contract Management and Scheduling software that will be purchased and managed by the County. The software will be web based. The Design/Build firm shall be responsible for all seats on Contract Management and Scheduling software that they require. The County will provide general training to one member of the Design/Build firm, any further training required by the Design/Build firm will be the responsibility of the Design/Build firm. It will be required that the Contract Management software contain all project correspondence, including but not limited to, transmittals, submittals, Request for Information (RFI's), RFP's, document control, change orders, letters, memorandums, meeting minutes, phone logs, emails, etc. The Scheduling software shall contain all schedules during the design, pre-construction, construction and closeout phases of the project.

4. General: Design/Builder shall provide and maintain a separate schedule for each project. Make the initial schedule available on the document management service prior to submittal of first application for payment. Revise and update schedule monthly and submit with each application for payment. The Owner will not review any payment request until the schedule has been submitted and accepted as information.
Prepare Design/Builder's Schedule using a computerized, time-scaled Critical Path Method (CPM) network analysis diagram for the Work. All key activities and milestones shall be listed, including but not limited to, the following:

a. Permit submittals

b. LEED submittal for both design and construction phases

c. Agency review and approval of permits

d. Preparation and processing of submittals

e. Mobilization and demobilization

f. Purchase of materials

g. Deliveries

h. Fabrication

i. Utility interruptions

j. Installation

k. Testing

Identify Any Float: The measure of leeway in starting and completing an activity. Float time is not for the exclusive use or benefit of either the Owner or the Design/Builder, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

F. Submittals:

1. The Design/Builder will use the County's web-based project management system during each phase of work. The use of this system may include communication through project standard documents, review of schedule and cost information. Training required to use the project management system will be provided locally by the County. The Design/Builder's time and expenses for participating in this training will not be reimbursed.

2. Submittal Procedures:

    a. Design/Builder shall utilize the County's web-based system for each library renovation. Design/Builder shall populate the system with listings to include, but not be limited to, contact information for all project team members, submittal log, Application for Payment, schedule, RFI's, supplemental instructions, proposal requests, meeting minutes, consultant reports, testing, modifications, photos, drawings and specifications.

b. Design/Builder shall create submittal log by inserting required submittals listed in individual specification sections. The initial submittal log shall be available for review and approval within ten (10) calendar days prior to start of construction of each Project. Design/Build Design Consultants and the Owner shall review and approve the information as being complete. Thereafter, submittal log shall be maintained and updated throughout the Project.

c. Each submittal shall be accompanied by a cover sheet which identifies the Project, Design/Builder, Subcontractor or Supplier, Specification Section, submittal number and pertinent Contract Document references.

d. Submittal originator or Design/Builder shall upload submittal to the service. Design/Builder shall review document first, and apply Design/Builder's electronic stamp and signature certifying that review, verification of Products required, field dimensions, quantities, adjacent construction work and coordination of information is in accordance with requirements of the Work and Contract Documents. Submittals not bearing Design/Builder's stamp and original signature will not be reviewed further.

e. Design/Builder shall identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed work.

f. Revise and resubmit submittals as required, identify changes made since previous submittal.

g. Product data, shop drawings and samples are submitted to Owner for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

h. After Design/Builder review and review by Design/Build Design Consultant(s) as appropriate, Owner will review and approve submittal and release for construction.

i. Design/Builder shall maintain one (1) copy of each approved submittal at each Project site.

3. Post Award Design Submittals General: The Owner desires an informal and interactive process with the Design/Builder during design and development of the Contract Documents described in the RFP. The Owner expects to be involved on a regular basis with the design and drawing process, reviewing documents for scope compliance and progress, to help facilitate the Design/Builder's development of the Contract Documents. The Owner believes this process will prove beneficial to all parties, helping to keep production of design documents on track, following a concise path and avoiding potential backtracking, and help expedite Owner approval of design and permitting submittals.

The Design/Builder should help develop and maintain this interactive process and foster good communications with the Owner Representative throughout the project.

4. Project Design Submittal milestones are characterized by the percentage of completion of design for discipline or work packages. Design Submittals are required at completion of the Schematic Design phase, the Design Development phase, at seventy-five percent (75%) Contract Document completion, at one-hundred percent (100%) Contract Document completion and at Final Contract Document completion.

    a. Correction, resubmittal and Owner approval of the seventy-five percent (75%) Contract Document submittal is required prior to its use as the basis of design for the GMP.

    b. On the other submittals, the Design/Build team shall respond to such review comments in writing within fifteen (15) calendar days of receipt and the Owner comments shall be incorporated into the subsequent submittal.

    c. The Final Contract Document submittal shall have all previous Owner comments addressed and documents shall be sealed, signed and dated and be ready for permitting.

5. Post Award Interim Submittals and Permit Submittals: The Design/Builder and/or the Owner may elect to "fast track" elements of the Work to facilitate permitting and construction of the project. Submit partial permit and "fast track" documents separately as they occur as interim submittals for the Owner's review and approval.

6. Schematic Design (SD) Phase Submittal: See Scope of Work – Section G for documents to be included.

    a. Number of Copies:

        i. Six (6) sets of all drawings, bond copies, bound, full size

        ii. Six (6) copies of printed materials and specifications, three hole punched and bound

        iii. Six (6) copies of Design/Builder's estimate of construction cost

        iv. Access to digital Revit model

        v. Two (2) sets of PDF's of drawings, full size and 11x17

        vi. PDF files of printed materials and specifications

7. Design Development (DD) Phase Submittal: See Scope of Work – Section H for documents to be included.

    a. Number of Copies:

i. Six (6) sets of all drawings, bond copies, bound full size

ii. Six (6) copies of printed materials and specifications, three hole punched and bound.

iii. One (1) each of furniture and finishes color and materials presentation boards

iv. Access to digital Revit model

v. Two (2) sets of PDF's of drawings, full size and 11x17

vi. PDF files of printed materials and specifications.

8. Seventy-Five Percent (75%) Construction Documents (CD) Submittal: See Scope of Work – Section I for documents to be included.

a. Number of Copies:

i. Six (6) sets of all drawings, bond copies, bound, full size

ii. Six (6) sets of printed materials and specifications, three hole punched and bound.

iii. One (1) copy each of updated furniture and finishes color and materials presentation boards, if required.

iv. Two (2) sets of PDF's of drawings, full size and 11x17

v. PDF files of printed materials and specifications

9. One-Hundred Percent (100%) Construction Documents (CD) Submittal See Scope of Work – Section I for documents to be included.

a. Number of Copies:

i. One (1) set of all drawings, bond copies, bound, full size; six (6) sets of all drawings, bond copies, bound, half size.

ii. Four (4) copies of printed materials and specifications, three hole punched and bound

iii. Two (2) sets of PDF's of drawings, full size and 11x17

iv. PDF file of printed materials and specifications

10. Final Construction Document Submittal: These documents shall include:

    a. Permit Construction Documents: Partial permit drawing sets and other supporting documents for "fast tracked" portions of the Work as required for permit submittal.

    b. Final Construction Documents. Submittal shall include:

        i. One (1) set of all drawings on bond paper, bound, full size wet sealed with original signatures.

        ii. One (1) copy of specifications, three hole punched, bound in binders with screwed sleeve holders.

        iii. One electronic copy of final drawings in AutoCAD and Revit formats current edition, of as approved by the Owner.

        iv. Two (2) sets of PDF's of drawings, full size and 11x17.

        iv. PDF files of printed materials and specifications

    c. Calculations used to support partial drawing sets and the final Construction Documents for the Owner's records.

11. Construction Submittals: Submittals that are required during construction for portions of the Work are as follows:

    a. Action Submittals: Action submittals require the Owner's review and approval, and shall be available for the Owner's review concurrently with the Design/Build Design Consultants.

        i. Submittals for products, systems, equipment and materials indicated in the final approved Design/Build Construction Documents of partial permit drawing sets.

        ii. Shop Drawings: Prepare Project specific information drawn accurately to scale.

            Preparation: Fully illustrate requirements in the Design/Build Construction Documents.

            Sheet Size: At least 81/2 x 11 inches but no larger than 24 x 26 inches.

        iii. Samples: Submit samples for approval of kind, color, pattern and texture. Maintain sets of approved samples at Project site for comparison of these characteristics between submittals and actual component as delivered and installed.

    b. Information Submittals: These submittals are for information and do not require Owner approval.

i. Submittals are to demonstrate a flow-of-work for the project and to confirm products, systems and equipment being used in the project are in accord with approved Design/Build Contract Documents and will not be reviewed and returned.

ii. Welding Certificates: Qualify welding procedures and personnel according to American Welding Society (AWS) D1.1, Structural Welding Code – Steel.

iii. Manufacturer's Instructions and Field Reports

iv. Maintenance Data

v. Design Data: Written and graphic information including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions, other performance and design criteria, and a summary of loads. Include load diagrams if applicable. Provide name and version of software used for calculations.

vi. Manufacturer Instructions: Provide published information that documents manufacturer's recommendations, guidelines and procedures for installing or operating products or equipment. Include name of the product along with the name, address and telephone number of the manufacturer.

v. Manufacturer's Field Reports: Provide written documentation of all factory authorized service representative's tests and inspections.

c. Construction Photographs: Submit sets of digital image electronic files. Identify date, location and subject of each photograph.

i. Periodic Construction Photographs: Upload/make available photos taken each month with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

ii. Final Completion Construction Photographs: Take photographs after date of Substantial Completion for individual portions of the Work for submission with Project Record Documents.

Part 2 Code and Quality Requirements:

G. Code Requirements:

1. The Design/Builder shall have access to, and be familiar with all codes and requirements that are applicable to the project and shall document compliance as part of each design phase as described in this Scope of Work.

2. The Design/Builder shall meet with authorities having jurisdiction over the project to review the proposed design(s), submit required documents and secure documented approvals of governmental authorities as required to proceed with each phase of design. The Design/Builder shall continually inform the County of the projects status relative to code requirements.
3. Revisions required by the County or other governmental authorities shall be incorporated into the documents with cost estimate adjustments provided for the revisions where scope, quantity and/or unit costs are affected.
4. Fulton County Building Standard Design Guidelines dated October 28, 2011: The design, engineering and specifications shall comply with the requirements of this document.

H. Building Permits and Inspection:

1. Projects included in the Work are located within jurisdictions that include Atlanta, College Park, East Point, Fairburn and Hapeville. The Authority Having Jurisdiction (AHJ) will issue permits and perform the building inspections according to its procedures on each Project. The Design/Builder shall work with each AHJ as required to provide an approved, code compliant project. The Design/Builder and its Subcontractors shall obtain all required permits from the AJH. The AJH will conduct all inspections that they typically require for commercial construction. The Design/Builder is responsible for requesting all inspections. The Design/Builder shall cooperate and abide by the decisions of the inspector.

I. Agency Approvals and Permits;

1. The Design/Builder shall obtain all required agency approvals and permits:

J. Quality Control Testing and Special Inspections:

1. The Owner will employ, at its expense, an independent testing firm to conduit all quality control testing and special inspections required in Chapter 17 of the International Building Code (IBC). The Owner may employ, at its expense, an independent firm to conduct full time roof inspection and water testing of the exterior building envelope. Retesting of materials or work because of previously identified deficiencies will be at the Design/Builder's expense. Tests, inspections and related actions do not limit the Design/Builder's other quality assurance and quality control procedures that facilitate compliance with the Design/Build Contract Documents.

a. Design/Builder's Associated Services: Cooperate with agencies performing required tests, inspections and similar quality assurance services and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel.

b. Testing Agency Responsibilities: Submit a certified written report of each test, inspection and similar quality assurance services to Owner's Representative with a copy to the Design/Builder. Interpret tests and inspections and state in each report whether tested and inspected work complies with of or deviates from the Design/Build Contract Documents.

c. Testing and inspections requested by the Design/Builder and not required by the codes, the AHJ, or the RFP documents are the Design/Builder's responsibility.

K. Quality Assurance and Control:

1. General: The Design/Build Construction Documents and Specifications shall include specific quality assurance and quality control requirements for individual construction activities as required by codes and jurisdiction having authority and as indicated in the Request for Proposal (RFP) or the Program Guide Manual (Manual). Requirements may also cover production of standard products.

2. Definitions:

   a. Quality Assurance Services: Activity, actions and procedures performed before and during execution of the Work to guard against defects and deficiencies and to substantiate that proposed construction will comply with requirements.

   b. Quality Control Services: Tests, inspections, procedures and related actions during and after execution of the Work to evaluate that the actual products incorporated into the Work comply with requirements.

   c. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

   d. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project, being familiar with special requirements indicated, and having complied with requirements of authorities having jurisdiction.

3. Conflicting Requirements:

    a. General: If compliance with two or more standards is indicated and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement.

    b. Minimum Quantity or Quality Levels: The quantity or quality level required or indicated shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits.

4. Submittals: Submit copies of permits, licenses, certifications, inspection reports and similar documents established for compliance with standards and regulations bearing on performance of the Work.

5. Quality Assurance:

    a. Installer Qualifications: A firm or individual experienced in installing, erecting or assembling work similar in material, design and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

    b. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in service performance as well as sufficient production capacity to produce required units.

    c. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in Georgia and who is experienced in providing engineering services of the kind indicated.

L. Design/Builder Quality Control:

1. Design/Builder shall either employ personnel or engage a Quality Control Agency experienced in performing quality control services with a background in construction practices and broad knowledge of construction methods. Quality Control personnel or agency shall not report directly to, or work under supervision of the on site Design/Builder staff. Submit qualifications for Owner approval. Unless otherwise indicated, provide quality control services specified in RFP documents, Design/Build Construction Documents and those required by the AHJ's.

2. Construction Supervision: The Design/Builder shall assign a single person as Superintendent during the Construction Phase of each Project.

The Superintendent shall be on site at all times when Work is being performed.

3. Field Engineering:

    a. Employ a land surveyor or civil engineer registered in Georgia to locate reference datum, to locate the building and to protect survey control and reference points.

    b. Establish elevations, lines and levels of the Work that conform to the Contract Documents.

    c. Verify field measurements are as indicated on shop drawings or as instructed by manufacturer.

4. Mock Ups: Design/Builder shall provide exterior and interior mock-ups at each Project for Design/Build Design Consultant and Owner to review and approve.

    a. General: Building Mock-Ups are to demonstrate that materials and systems forming the exterior shell and interior finishes of each Project meet or exceed performance requirements specified in the Construction Documents and that the craftsmanship of material construction and installation are of the highest quality to produce lasting quality and low maintenance.

        i. Submit design and shop drawings for fabrication and installation prior to construction of building mock-up. Include site location drawing showing Building Mock-Up on site plan, elevations and wall sections showing complete system with structural requirements.

        ii. Comply with the technical specifications section for each material included in Building Mock-Ups and for administration and coordination requirements specified. Personnel constructing the mock-up assemblies shall be the same as working the projects.

        iii. Defective materials and workmanship will be revised until correct workmanship and quality are achieved.

        iv. Mock-up is to demonstrate successful integration of materials and systems and to meet the technical and aesthetic intent of the documents. Materials and systems that fail to contribute to the formation of a water and air-tight exterior shell or that will show excessive stress, weathering, discoloration or other weaknesses shall be re-evaluated for use in Project.

        v. Mock—up Size and Configuration: As indicated by the Owner

vi. Location: On site at locations selected by Design/Builder with approval from the Owner.

vii. Mock-ups shall remain available for inspection throughout construction period. Exterior Mock-up may not remain as part of the Work and shall be removed when directed or at project completion. Interior Mock-ups may remain as part of the work, if accepted by the Owner.

b. Exterior mock-ups: Exterior mock-up(s) shall include all significant materials present in the building envelope. Including all exterior wall finish and substrate materials, roof finish and substrate materials, windows, doors, flashings and moisture and air barrier materials. Mock-up(s) shall be constructed free standing, at a smaller scale, and as shown on the approved drawings. The mock-up shall duplicate the Design/Builder's planned construction methods and techniques, shall be complete in all respects and available for water testing by the Owner.

c. Interior Mock-ups: Interior mock-ups shall include all significant finish materials and substrates and shall illustrate how primary transitions between these materials are handled. The Mock-up should also demonstrate the quality of the finish and workmanship to be utilized to achieve the desired results.

5. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at each Project site. List of trades on site, number of workman for each trade, specific tasks the workman for each trade performed, date, general weather conditions, start and finish of each significant activity. Provide copy of reports to Owner's Representative the next day.

6. Deficiencies Log: Design/Builder shall maintain a log of deficiencies discovered on the Project and corrective measures taken. Deficiencies log shall be updated and reviewed at progress meetings.

M. Repair and Protection:

1. General: Upon completion of testing, inspecting, sample taking and similar services, repair damaged construction and restore substrates and finishes.

a. Provide materials and comply with installation requirements in Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

b. Comply with the Contract Document requirements for Design/Builder's specifications regarding "Cutting and Patching."

2. Protect construction exposed by or for quality control service activities.

3. Repair and protection are the Design/Builder's responsibility regardless or the assignment of responsibility for quality control services.

N. Watertight / Weathertight:

1. Content of the RFP and the Design/Build Contract Documents notwithstanding, the Design/Builder shall provide a watertight and weather tight project.

Part 3 Temporary Facilities:

O. Temporary Facilities:

1. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses.
    a. Prohibit smoking in construction area.
    b. Supervise welding operations, combustion-type temporary heating units and other sources of fire ignition in accordance with the requirements of the AHJ.
2. Operation, Termination and Removal:
    a. Maintain temporary facilities in good operating condition until removal. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour basis where required for installation of finish materials and Work to obtain desired results and to avoid possibility damage.
    b. Termination and Removal: Remove each temporary facility when the need for its service has ended, when it has been replaced by an approved permanent facility or no later than Substantial Completion.
        i. Materials and facilities that constitute temporary facilities are property of the Design/Builder.
        ii. Remove temporary paving not intended for or acceptable for integration into permanent paving.
        iii. Final Cleaning: see Part 4-Project Closeout

P. Temporary Utilities:

1. Use Charges: The Design/Builder shall provide and pay for the temporary utilities required for execution of the contract through Substantial Completion including the facilities listed below. Allow other entities to use temporary services and facilities without cost. Coordinate installation and disruption in utility service with the utility and Owner's Representative. After Substantial Completion is achieved the utilities shall be transferred to the Owner.

a. Temporary Power: Provide temporary power as required for construction operations and inspections.

b. Temporary Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections and traffic conditions.

c. Temporary Heating, Ventilation and Cooling: Provide temporary heating, ventilation and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity.

d. Temporary Water: Meter and pay water service use charges for water used by all entities for duration of construction.

e. Temporary/Portable Toilet Facilities: Provide temporary/portable toilet facilities for construction personnel, including sewer service.

f. Drinking water for construction personnel.

g. Voice/Data Service: Provide and pay for voice and data services capable of telephone, fax and high speed data at a minimum rate of one T-1 circuit.

i. Provide computer and e-mail accounts for use by the Design/Builder during construction. In addition, provide separate computer connection and e-mail accounts for use by the Owner's Representative during construction.

ii. Provide Superintendent with cellular telephone of portable two-way radio for use when away from field office.

2. Use of Permanent Facilities: The Design/Builder shall be responsible for operation, maintenance and protection of each permanent service during its use as a construction facility before Owner's acceptance.

Q Construction Facilities:

1. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip office as follows:

a. Furniture required for Project site documents including file cabinets, plan tables, plan racks and bookcases.

b. Conference room of sufficient size to accommodate meetings of twelve (12) individuals minimum. Provide electrical power service and duplex receptacles with not less than one (1) receptacle on each wall. Furnish room with conference table, chairs, and 4' x 6' tack board.

c. Drinking water and private toilet

d. Coffee machine and supplies

e. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 degrees F (20 to 22 degrees C).

f. Lighting fixtures capable of maintaining average illumination of 20 foot candles at desk height.

g. Wired data and power connections of sufficient quantity for use by Design/Builder, Design/Builder's Design Consultants and the Owner, supporting electronic communication service indicated.

h. Project computers should be capable of supporting the most current software versions of Microsoft Office, Adobe Acrobat, AutoCAD and Revit.

i. Combination printer/copier linked to computer network.

j. Provide one (1) separate Owner's Representative office, furnished with one (1) desk, one (1) lay-out table, two (2) chairs, one (1) filing cabinet, one (1) data connection and one (1) dedicated High Speed Internets access line.

2. Storage and Fabrication Sheds: At the Design/Builder's option it may provide sheds sized, furnished and equipped to accommodate materials and equipment for construction operations. Store combustible materials apart from the building.

R. Temporary Controls:

1. Security and Safety Procedures: The Design/Builder shall establish security and safety procedures for each Project.

2. Protection of Services: Repair, replace and maintain in service any existing utilities, facilities or services that have been damaged of otherwise rendered inoperative during the performance of the Work. The Owner's Representative shall approve the methods of repair, except during and emergency situation.

3. Progress Cleaning: Design/Builder shall maintain a neat and orderly site, free of materials, debris and rubbish at each Project throughout the construction period. Conduct cleaning and waste removal operations to comply with local laws, ordinances and regulations. Perform clean-ups daily or when so ordered by the Owner's Representative.

   a. Flammable, toxic and caustic materials are to be used safely and removed from the site prior to occupancy.

S. Temporary Site Access and Parking:

1. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated in RFP. Provide temporary parking areas for construction personnel.
2. Traffic Controls: Comply with requirements of AHJ. Protect existing site improvements to remain including curbs, pavements and utilities. Maintain access for firefighting equipment and access to fire hydrants.

T. Temporary Barriers and Enclosures:

1. Temporary Perimeter Fencing: At Design/Builder's option, it may provide temporary fencing of the site a portion thereof.
2. Site Security: The Design/Builder shall be responsible for maintaining security of the construction site sufficient to maintain a secure environment for construction activities. Provide temporary construction barricades and construction fencing to prevent unauthorized entry, vandalism and theft within the construction areas and to protect adjacent areas open to the public.
3. Barricades, Warning Signs and Lights: Comply with requirements of AHJ for erecting structurally adequate barricades including warning signs and lighting.
4. Temporary Enclosures: Provide temporary enclosures for protection of construction in progress and completed from exposure, foul weather, other construction operations and similar activities. Provide temporary weather tight enclosure(s) for building exterior.

U. Construction Waste Management:

1. The Design/Builder shall be responsible for, and shall bear the cost of, disposal of all construction debris.

V. Protection and Restoration of Property:

1. The Design/Builder shall protect private or public property on or in the vicinity of the Work site.
2. The Design/Builder shall call a locator service for location of utilities. Utilities shall be protected from damage resulting from the Work. All costs required to protect public or private utilities shall be provided at the Design/Builder's expense.
3. If the Design/Builder damages, destroys or interferes with the use of such property, the Design/Builder shall restore it to the original condition.

Part 4 Project Closeout:

W. Substantial and Final Completion:

1. Preliminary Procedures for Substantial Completion:
    a. Prepare a list of incomplete items (exception list).
    b. Submit to Owner warranties, workmanship bonds, maintenance service agreements, final certifications and similar documents.
    c. Obtain and submit releases permitting Owner unrestricted use of the Work, including certificates of occupancy, release(s) of liens, operating certificates and similar.
    d. Prepare and submit Project Record Documents, draft operations and maintenance (O&M) manuals, and similar record information for review and approval.
    e. Deliver tools, spare parts and extra materials to location designated by the Owner.
    f. Make final changeover of permanent locks and deliver keys to the Owner.
    g. Complete startup testing of systems including fire alarm systems.
    h. Submit test/balance reports for approval
    i. Complete operation, adjustment and maintenance training as outlined in the Specifications and herein.
2. Substantial Completion: When the Design/Builder considers each Project substantially complete and upon completion of requirements listed in Preliminary Procedures above, he shall submit the exceptions list for the Owner's review and notify the Owner in writing. When the Owner concurs that the work is substantially complete they will make an inspection and give the Design/Builder a Certificate of Substantial Completion and a list of outstanding or incomplete Work (Punch List). The Design/Builder shall have 30 days to complete the Work on the Punch List.
3. Final Completion: When the Design/Builder has completed the Work on the Punch List, the Owner will re-inspect the Work. When the Owner concurs that all Work on a Project is complete, the Project will be deemed to be finally complete. When the last Project has achieved Final Completion, the Work will have achieved Final Completion. Before requesting re-inspection for determining date of Final Completion on Each Project:
    a. Submit a final Application for Payment
    b. Submit final O&M manuals

X. Closeout Submittals – Maintenance Manuals:

1. Initial Submittal: Submit two (2) hard copies of each manual. Include a complete operation and maintenance directory. The Owner will return one (1) original copy of the draft, marked with review comments.
2. Final Submittal: Submit four (4) hard copies together with four (4) flash drives or other form of electronic copy of each manual in final form.
3. Organization: Unless otherwise indicated, organize each manual into a separate section for system and subsystem, and for each piece of equipment. Each manual shall contain the following materials, in the order listed:
    a. Title Page, include the Design/Builder's point of contact information for warranty work.
    b. Table of Contents
    c. Manual Contents
4. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume.
5. Manual Components: Organize into sets of manageable size. Arrange contents by specification division and section. If possible, assemble instructions for subsystems, equipment and components of one system into a single binder.
    a. Binders: Heavy-duty, 3-ring, vinyl covered, loose leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 by 11 inch paper, with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets. Provide heavy-paper dividers with plastic-covered tabs for each section.
    b. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
6. Content: For each system, subsystem and piece of equipment, list name, address and telephone number of installer or supplier and maintenance service agent. Include source information, manufacturer's maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts and warranty information.
7. Product Information: Include the following as applicable.
    a. Product name and model number. Include equipment tag or other identification of the equipment.
    b. Manufacturer's name

c. Reordering information and special instructions.

8. Manufacturer's Maintenance Documentation and Procedures: Include the following information for each component part or piece of equipment:
    a. Standard printed maintenance instructions and bulletins.
    b. Drawings, diagrams and instructions required for maintenance including disassembly and component removal, replacement and assembly.
    c. Identification and nomenclature of parts and components
    d. List of items recommended to be stocked as spare parts
9. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
    a. Routine maintenance, test and inspection instructions
    b. Troubleshooting guide
    c. Precautions against improper maintenance
    d. Disassembly, component removal, repair, replacement and reassembly instructions
    e. Aligning, adjusting and checking instructions
    f. Demonstration and training DVD
10. Maintenance Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment and separate schedules for preventive and routine maintenance and service with standard time elements.
    a. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual and annual frequencies.
    b. Maintenance and Service Records: Include manufacturer's forms for recording maintenance.
11. Spare Parts List and Source Information: Include lists of replacement and repair parts with parts identified and cross-referenced to manufacturer's maintenance documentation and local sources of maintenance materials and related services.
12. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
13. Warranties: Include copies of warranties and lists of circumstances and conditions that would affect validity of warranties of bonds.
    a. Include procedures to follow and required notifications for warranty claims.

14. Drawings: Include drawings supplementing manufacturer's printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with the information contained in Record Drawings to ensure correct illustration of completed installation.

Y. Closeout Submittals – Project Record Documents:

1. Record Drawings: Submit to the Owner one (1) set, on bond paper, bond, record Drawings, plus one (1) CD-R containing electronic Revit and AutoCAD drawing files of same, annotate all contract modifications.
    a. Format: Revit and AutoCAD 2016 (or most current) operating in Microsoft Windows system.
    b. Incorporate addenda, changes made during construction issued as revised drawings or supplemental sketches.
    c. Identify and date each Record Drawing, include the designation "PROJECT RECORD DRAWING" in a prominent location.
    d. Record Revit and AutoCAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file, plot style file and legend for layers.
2. Record Specifications: Submit to the Owner two (2) paper copies and one (1) CD-R containing electronic files of the Project Manual. Include Specifications and addenda. Annotate all contract modifications.
3. Record Prints: During Construction maintain one (1) set of black-line white prints, with color mark-ups of the Contract Drawings and Shop Drawings. Mark record prints to show the actual installation where installation varies from that shown originally. Require individual of entity who obtained record data, whether individual or entity is the installer, subcontractor or similar entity, to prepare the mark-up Record Prints.
    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Record data as soon as possible after obtaining it. Record and check the mark-up before enclosing installations.
    c. The Owner's Representative may check for completeness of record documents at any time as condition of acceptance of Pay Application.
    d. Note Construction Change Directive numbers, alternate numbers, Change Order numbers and similar identification, where applicable.

Z. Final Cleaning:

1. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
    a. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for the entire Project.
        i. Clean Project site, yard and grounds, sweep paved areas broom clean
        ii. Remove tools, construction equipment, machinery and surplus material
        iii. Clean exposed exterior and interior hard-surfaced finishes to a dirt free condition, free of stains and foreign substances
        iv. Remove debris and surface dust from roofs, plenums, shafts, trenches and similar spaces
        v. Sweep concrete floors clean
        vi. Clean transparent materials including mirrors and glass in doors and windows
        vii. Remove labels that are not permanent. Do not remove or paint over "UL" and similar labels including mechanical and electrical nameplates.
        viii. Replace disposable air filters and clean permanent air filters. Clean ducts, blowers and coils if units were operated during construction.
        ix. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned –out bulbs and those noticeably dimmed by hours of use.
    b. Remove waste materials from Project site and dispose of lawfully

AA. Training:

1. Instruction Program: Develop an instruction program that includes training for each system, subsystem and piece of equipment as required by individual Specification Sections. Include the following:
    a. Basis of System Design, Operational Requirements and Criteria
    b. Emergencies including warnings, trouble indications and error messages

c. Startup, routine operations, inspection and maintenance, shutdown procedures

d. Adjustments, troubleshooting, diagnosis and repair

2. Instruction: Engage qualified instructors to provide instruction and training. Provide instruction at mutually agreed on times. Provide training video on high-quality color DVD.

00700-93 RELATIONSHIP OF PARTIES

A. DESIGN/BUILDER accepts the relationship of trust and confidence established by this Agreement. DESIGN/BUILDER covenants with Owner to cooperate with Design Professional Team; to utilize DESIGN/BUILDER's best skill, efforts, and judgment in furthering the interest of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in the best way and the most expeditious and economical manner, consistent with the interests of the Owner. Further, the DESIGN/BUILDER acknowledges that (i) it has represented to Owner that it has specific expertise in the planning, management and construction of library facilities and (ii) that such representation is a material inducement to Owner to enter into this Agreement.

B. Wherever the terms of this Agreement refer to some action, consent, or approval (excluding approvals of Change Orders, Construction Change Directive or amendments to the Contract/Agreement) to be provided by Owner or some notice, report or document is to be provided to Owner, such reference to "Owner" shall mean Owner, Owner's staff, Owner's designee, Fulton County, County, County's staff, County's designee (to the extent such designee has been expressly authorized by Owner in writing, unless otherwise stated herein.

00700-94 CONTRACT AMOUNT

In consideration of the full and faithful performance by the DESIGN/BUILDER of the covenants in the Contract/Agreement, Owner agrees to pay, or cause to be paid, to DESIGN/BUILDER the following amounts (herein "Contract Amount"), in accordance with the terms of this Contract/Agreement:

A. Pre-Construction Services. For all Pre-Construction Phase Services, including but not limited to, providing value engineering services, reviewing design phase documents for constructability, assisting and meeting with Design Professionals during the various design phases, Review Reports, Site Logistic and Material Handling Plans, Phased Construction Planning and Recommendation reports, developing and maintaining schedule, assisting and participating in LEED charrettes and preparing cost estimates, printing, office supplies, transportation, and Owner Transition Team Meetings, DESIGN/BUILDER shall receive a fixed amount for pre-construction services as approved by the County, as the total lump sum compensation for its services. Monthly installment payment of the total lump sum compensation shall be based upon the percent completion of the designated portion of the Pre-Construction Services for each particular month and Owner's receipt of DESIGN/BUILDER's written invoice for such payment, said invoice to be in a form reasonably acceptable to Owner. The final invoice shall not be submitted until either (i) the GMP Amendment is executed for the

entire Work, or (ii) the parties fail to reach agreement on the GMP Amendment and Owner elects to terminate this Contract as provided in Section 00700-94, B hereafter, whichever occurs first.

B. Construction Phase. With respect to the Construction Phase Services to be provided by DESIGN/BUILDER hereunder, Owner shall reimburse DESIGN/BUILDER for the Cost of the Work (as that term is defined hereafter), and pay DESIGN/BUILDER a fixed Construction Management Fee for Cost of the Work. The Construction Management Fee shall be the DESIGN/BUILDER's total compensation for all overhead not reimbursable as Cost of the Work under Section 00700-95, as well as DESIGN/BUILDER's total profit for Construction Phase Services. DESIGN/BUILDER agrees to provide Owner with a guaranteed maximum price (GMP) proposal for the total sum of the Construction Management Fee plus the Cost of the Work within seven (7) calendar days after the issuance of 50% complete Construction Documents. The GMP proposal shall be based upon the previous cost estimates provided by DESIGN/BUILDER as required hereunder. Further, the GMP proposal shall be broken down into categories and level of detail required by Owner. DESIGN/BUILDER agrees that all of its books, records, files, quotes and reports with respect with respect to its development of the GMP proposal shall be open to Owner for review and copying. The final GMP shall be mutually agreed upon by Owner and DESIGN/BUILDER and shall be set forth in the GMP Amendment – the form for the GMP Amendment is attached hereto in Volume 3 of the Request for Proposal. DESIGN/BUILDER shall provide a detailed breakdown acceptable to Owner of this GMP price proposal as well as for GMP. For each line item in the GMP, DESIGN/BUILDER shall develop and maintain a written report which identifies and explains all variances and deviations from the bid amount originally submitted for that line item, to the final line item price incorporated into the GMP – DESIGN/BUILDER shall submit with a minimum of five (5) quotes of qualified subcontractors for each line item and their recommendation on trade contractor to utilize, Owner shall review and comment on decision of trade contractor to use recommended by DESIGN/BUILDER. DESIGN/BUILDER guarantees that in no event shall the Construction Management Fee and the total Cost of the Work exceed the GMP, as the GMP may be adjusted pursuant to the terms herein for Change Orders and Construction Change Directives. In the event the DESIGN/BUILDER and Owner fail to reach an agreement on the GMP, Owner may elect to terminate this Contract/Agreement. In the event of any such termination, DESIGN/BUILDER shall be entitled to receive that portion of the Contract/Agreement Amount attributable to the Pre-Construction Phase Services earned through the date of termination plus that portion of any earned compensation associated with any Construction Phase Services provided, to the extent such services were expressly approved in advance and in writing by Owner; but DESIGN/BUILDER shall not be entitled to any further or additional compensation from Owner, including but not limited to damages or lost profits on portions of the Work not performed.

00700-95 COST OF THE WORK

A. Costs to be Reimbursed. The term Cost of the Work shall mean all costs necessarily and reasonably incurred by DESIGN/BUILDER in the proper performance of the Construction Phase Services portion of the Work. Such costs shall be at rates not higher than the standard paid at the place of the Project

except with the prior written consent of Owner only after DESIGN/BUILDER has provided sufficient support in writing that exceptional circumstances exist, which justify the payment of rates higher than the standard. The Cost of the Work shall include only those items set forth below in this subsection A:

i. Labor Costs.

1. Wages of construction workers directly employed by DESIGN/BUILDER to perform the construction of the Work at the Project site or, with Owner's written agreement, at off-site workshops. Costs to be reimbursed will be the actual wages paid to the individuals performing the work.

2. Wages or a salary of DESIGN/BUILDER's supervisory and administrative personnel who are stationed at the Project site with Owner's written agreement.

3. Wages and salaries of DESIGN/BUILDER's supervisory and administrative personnel engaged at factories, workshops or on the road in expediting the production or transportation of materials or equipment required for the Work, but only for that portion of their time required for the Work and only with Owner's written agreement as in subsection A.i.2 above.

4. The parties hereby establish the fixed mark-up rate of thirty-five percent (35%) for all labor burden, including all taxes, insurance (except workers compensation and general liability), contributions, assessments and benefits required by law and collective bargaining agreements and, for personnel not covered by such agreements, customary benefits such as sick leave, medical and health benefits, holidays, vacations and pensions, provided such markup is to apply only upon those wages and salaries included in the Cost of the Work under subsections A.i.1 through A.i.3, above.

ii. Subcontract Costs.

1. Payments made by DESIGN/BUILDER to subcontractors in accordance with the requirements of the applicable written subcontracts.

iii. Cost of Materials and Equipment Incorporated into the Completed Construction.

1. Costs, including transportation, of materials and equipment incorporated or to be incorporated in the completed construction.

2. Costs of materials described in subsection A.iii.1 above, in excess of those actually installed but required to provide reasonable allowance for waste and for spoilage. Unused excess materials, if any, shall be handed over to Owner at the completion of the Work or, at Owners' option, shall be sold by DESIGN/BUILDER; amounts realized, if any, from

such sales, shall be credited to Owner as a deduction from the Costs of the Work.

iv. Cost of other Materials and Equipment, Temporary Facilities and Related Items.

1. Costs, including transportation, installation, maintenance, dismantling and removal, of materials, supplies, temporary facilities (including project field offices, furniture, and fixtures), temporary utilities, machinery, equipment, and hand tools not customarily owned by the construction workers, which are provided by DESIGN/BUILDER at the project site and fully consumed in the performance of the Work; and costs less salvage value on such items if not fully consumed, whether sold to others or retained by DESIGN/BUILDER.

2. Rental charges, at standard industry rates for the area, for temporary facilities, machinery, equipment and hand tools not customarily owned by the construction workers, which are provided by the DESIGN/BUILDER at the project site, whether rented from DESIGN/BUILDER or others, and costs of transportation, installation, minor repairs and replacements, dismantling and removal thereof. Rates and quantities of all equipment rented, whether from DESIGN/BUILDER or others, shall be subject to Owner's prior written approval.

3. Cost of removal and proper disposal of debris from the Project site.

4. Costs of telegrams, long distance telephone calls, postage, internet and parcel delivery charges and telephone service at the Project site and reasonable petty cash expenses (with Owner's prior written approval) of the Project site office.

5. The portion of reasonable travel and sustenance expenses of DESIGN/BUILDER's personnel, assigned to the Project site, incurred while traveling outside of Fulton County, Georgia in discharge of duties connected with the Work, provided all of such expenses and charges shall be subject to the prior written approval of Owner.

v. Miscellaneous Costs

1. That portion of any separate premiums for (i) bonds directly attributable to this Contract/Agreement and (ii) any additional insurance coverage's which are purchased by the DESIGN/BUILDER, with Owner's prior written approval, beyond the level of coverage specified herein.

2. Sales, use or similar taxes imposed by a governmental authority which are related to the Work and for which DESIGN/BUILDER is liable.

3. Fees and assessments for the building permit and for other permits, licenses, inspections for which DESIGN/BUILDER is required by the Contract Documents to pay.
4. Fees of testing laboratories for tests required by the Contract Documents, except those related to defective or nonconforming Work for which reimbursement is excluded pursuant to the terms of the Contract/Agreement.
5. Royalties and license fees paid for the use of a particular design, process or product required by the Contract Documents.
6. Deposits lost for causes other than the DESIGN/BUILDER's fault or negligence.
7. Legal, mediation and arbitration costs, other than those arising from disputes between Owner and DESIGN/BUILDER, reasonably incurred by DESIGN/BUILDER in the performance of the Work and with Owner's prior consent, said consent to be given or denied in Owner's sole discretion.
8. Costs reasonably incurred in repairing or correcting damage or nonconforming Work executed by DESIGN/BUILDER, or its subcontractors or suppliers, provided that such damage or nonconforming Work was not caused by (i) the negligence or failure to fulfill a specific responsibility of DESIGN/BUILDER to Owner set forth in the Contract Documents, or (ii) DESIGN/BUILDER's foremen, engineers, superintendents or other supervisory, administrative or managerial personnel, or (iii) the failure of DESIGN/BUILDER's personnel to supervise adequately those portions of the Work to be performed by DESIGN/BUILDER's subcontractors or suppliers, and only to the extent that the cost of repair of correction is not recoverable by DESIGN/BUILDER from (i) insurance or bonds, (ii) any of the subcontractors or suppliers, or (iii) some other appropriate source.

vi. Other Costs

1. Other costs incurred in the performance of the Work if and to the extent approved in advance in writing by Owner.

B. Costs Not To Be Reimbursed. The Cost of the Work shall not include the following items:

i. Salaries and other compensation of DESIGN/BUILDER's personnel stationed at DESIGN/BUILDER's principal office or offices other than the Project site office.

ii. Expenses of DESIGN/BUILDER's principal office and offices other than the Project site office.

iii. Overhead and general expenses, except as may be expressly included in subsection A above.

iv. DESIGN/BUILDER's capital expenses, including interest on DESIGN/BUILDER's capital employed for the Work.

v. Rental costs of machinery and equipment, except as specifically provided in subsection A.iv.2 above.

vi. Except as expressly provided in subsection A.v.8 above, costs due to the fault or negligence of DESIGN/BUILDER, subcontractors, anyone directly or indirectly employed by any of them, or for those acts any of them may be liable, including, but not limited to, costs for the correction of damaged, defective, or nonconforming Work, disposal and replacement of materials and equipment incorrectly ordered or supplied, and making good damage to the property not forming part of the Work.

vii. Any costs not specifically and expressly described in subsection A above.

viii. Costs which would cause the GMP to be exceeded (as the GMP may be adjusted pursuant to the terms herein for Change Order and Construction Change Directive).

C. Discounts, Rebates and Refunds

i. Cash discounts obtained on payments made by DESIGN/BUILDER shall accrue to Owner if (i) before making payment, DESIGN/BUILDER included them in an application for payment and received payment therefore from Owner, or (ii) Owner has deposited funds with DESIGN/BUILDER with which to make payments; otherwise cash discounts shall accrue to DESIGN/BUILDER. Trade discounts, rebates, refunds, and amounts received from sales of surplus materials and equipment shall accrue to Owner, and DESIGN/BUILDER shall make provisions so that they can be secured.

ii. Amounts which accrued to the Owner in accordance with the provisions of subsection C, i above shall be credited to the Owner as a deduction from the Cost of Work.

iii. Any savings realized from the construction of project shall be credited to the Owner as a deduction from the Cost of Work.

00700-96 CONTRACT TIME AND LIQUIDATED DAMAGES

a) Time is of the essence in the performance of the Work under this Contract. The "Pre-Construction Commencement Date" shall be established in a Notice to Proceed to be issued by Owner. DESIGN/BUILDER shall commence Pre-Construction Phase Services portion of the Work within ten (10) calendar days after the Pre-Construction Phase Commencement date. Any work performed by the DESIGN/BUILDER prior to the Pre-Construction Phase Commencement Date shall be at the sole risk of the DESIGN/BUILDER. The "Construction Phase Commencement Date" shall be established in the GMP amendment and a separate Notice to Proceed. DESIGN/BUILDER shall commence the Construction Phase Services portion of the Work within ten (10) calendar days after the Construction Phase Commencement Date. No portion of the Work, with respect to the Construction Phase Services to be

provided hereunder, shall be performed prior to the Construction Phase Commencement Date, unless expressly approved in advance by Owner in writing. The total period of time beginning with the Construction Phase Commencement Date and ending on the date of Substantial Completion of the Work is referred to hereafter as the "Contract Time". The Contract Time is set forth with more specificity in Paragraphs below.

b) Subject to the other provisions of the Agreement Documents, DESIGN/BUILDER shall furnish such manpower, Materials, facilities, and Equipment and shall work such hours, including night shifts, overtime operations and Sunday and holidays, as may be necessary to ensure the prosecution and completion of the Work in accordance with the approved and currently-updated Critical Path Method (CPM) Schedule. If Work actually in place falls behind the currently updated and approved CPM Schedule, and it becomes apparent from the current approved CPM Schedule that the Work will not be completed within the Agreement Time, DESIGN/BUILDER agrees that it will, as necessary or as directed by the County, take some or all of the following actions at no additional cost to the County to improve its progress:

   (1) Increase manpower in such quantities and crafts as will eliminate, in the judgment of the County, the delay and backlog of Work;

   (2) Increase the number of working hours per shift, shifts per working day, working days per week, the amount of equipment or any combination of the foregoing, sufficiently to eliminate in the judgment of the County, the delay and backlog of Work;

   (3) Reschedule activities as necessary to eliminate in the judgment of the County the delay and backlog of Work; and

   (4) Any other measure required by the schedule requirements of the Special Conditions.

c) In addition, the County may require DESIGN/BUILDER to submit a proposed revised CPM Schedule Recovery Plan demonstrating its program and proposed plan to make up lag in scheduled progress and to ensure completion of the Work within the Agreement Time. If the County finds the proposed plan not acceptable, the County may require Contractor to submit a new and/or revised plan with direction and other input from the County and Engineer.

d) Because the Work is to be completed in two phases (pre-construction and construction phases), the timely completion of the first phase is critical to the timely completion of the second phase and, therefore, completion of the entire Project. Accordingly, DESIGN/BUILDER agrees to provide the Pre-Construction Phase Services in accordance with the design schedule established pursuant to the terms of the Design Agreement. With respect to the Construction Phase Services, the GMP Amendment shall include the date that the portion of the Work associated with the Construction Phase Services must be substantially completed by DESIGN/BUILDER. The Substantial

Completion date shall establish in terms of calendar days after the Construction Phase Commencement Date. In the event the DESIGN/BUILDER and Owner fail to reach an agreement on the Contract Time and the Substantial Completion Date, Owner may elect to terminate this Contract/Agreement. In the event of such termination, DESIGN/BUILDER shall be entitled to receive that portion of the Contract Amount attributable to the Pre-Construction Phase Services earned to date of termination plus that portion of any earned compensation associated with any Construction Phase Services provided, to the extent such services were expressly approved in advance and in writing by Owner; but DESIGN/BUILDER shall not be entitled to any further or additional compensation from Owner, including but not limited to damages, lost profits on portions of the Work not performed. Substantial Completion of the Work shall be achieved when the Work has been completed to the point where Owner can occupy or utilize the Work for its intended purpose. Design Professional shall certify the date as to when Substantial Completion of such designated portions of the Work have been achieved. The entire Work shall be fully completed and ready for final acceptance by Owner within 30 calendar days after the Substantial Completion date, or within 30 calendar days after DESIGN/BUILDER's receipt of the punch list, whichever date occurs last.

e) It is understood and agreed that the County will sustain substantial monetary and other injury and damages, including, but not limited to, increased costs, expenses and liabilities in the event of failure by Contractor to perform its Work in accordance with the Completion and any Interim Milestone Date(s) set forth in the CPM Schedule prepared in accordance with the Special Conditions. Accordingly, should Contractor not complete the Work, or any such portion thereof, within the date(s) required by the CPM Schedule initially approved by the Owner or Owners Agent, as they may be adjusted pursuant to the Agreement Documents, then charges shall be assessed against any money due or that may become due Contractor in accordance with the following schedule:

   For Each day of delay in Substantial Completion of the entire Work: $500.00/day

   For Each day of delay in Final completion of the entire Work: $500.00/ day

The amount of such charges is hereby agreed upon as fixed liquidated damages due the County after the expiration of the Agreement Date(s) for completion specified in the CPM Schedule for the Work or portions thereof. Contractor and its surety shall be liable for any liquidated damages in excess of the amount due Contractor on the Final Payment.

a) If the CPM Schedule projects any untimely completion with unexcused delay and the County in good faith believes that retainage will be insufficient to cover the County's damages, Contractor agrees that the County may withhold additional funds to assure the payment of the liquidated damages owed by Contractor.

b) When any period of time is referenced by days herein, it shall be computed to exclude the first day and include the last day of such period. If the last day of any such period falls on a Saturday or a Sunday or on a day made a legal holiday by the laws of Georgia, such day shall be omitted from the

computation, and the last day shall become the next succeeding day which is not a Saturday, Sunday or legal holiday. The term "business day" as used herein shall mean all days of the week excluding Saturdays, Sundays and all legal holidays observed by Owner.

c) The fixed liquidated damages are not established as a penalty but are calculated and agreed upon in advance by the County and Contractor due to the uncertainty and impossibility of making a determination as to the actual direct, incidental and consequential damages which are incurred by the County as a result of the failure on the part of Contractor to complete the Work within the Agreement Time and completion date(s) specified in the Agreement Documents. Liquidated damages shall start in accordance with the above schedule upon notification to Contractor in writing that all apparent Agreement Time allowed to achieve the relevant completion date has been consumed. Liquidated Damages as they accrue will be deducted from periodic partial payments to the extent they are sufficient to cover the liquidated damages owing; provided that any excess liquidated damages owing over the periodic partial payment amount may be deducted from retainage. Such deduction shall be in addition to the retainage provided for in the Agreement Documents. The remaining amount of liquidated damages owing upon completion will be deducted from any amounts owing as Final Payment to Contractor or his surety. Any excess amount owing as liquidated damages shall be paid upon demand.

d) The liquidated damages do not have a cap.

00700-97 OTHER WORK

1. Owner may perform other work related to the Project at the site by Owner's own forces, have other work performed by utility contractors or let other direct contracts. If the fact that such other work is to be performed is not noted in the Contract Documents, written notice thereof will be given to DESIGN/BUILDER prior to starting any such other work. If DESIGN/BUILDER believes that such performance will involve additional expense to DESIGN/BUILDER or require additional time, DESIGN/BUILDER shall send written notice of that fact to Owner and Design Professional within seven (7) calendar days of being notified of other work. If DESIGN/BUILDER fails to send the above required seven (7) days' calendar notice, DESIGN/BUILDER will be deemed to have waived any rights it otherwise may have had to seek an extension to the Contract Time or adjustment to the Contract Amount.
2. DESIGN/BUILDER shall afford each utility owner and other contractor who is party to such a direct contract (or Owner, if Owner if performing the additional work with Owner's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such Work and shall properly connect and coordinate its Work with theirs. DESIGN/BUILDER shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. DESIGN/BUILDER shall be responsible for all damage to the work of others caused by the performance of its Work. Further, DESIGN/BUILDER shall not in any way cut or alter the work of

others without first receiving the written consent of that other person and Design Professional.

3. If any part of DESIGN/BUILDER's work depends for proper execution or results upon the work of any other contractor or utility owner (or Owner), DESIGN/BUILDER shall inspect and promptly report to Design Professional and Owner in writing any delays, defects or deficiencies in such work that render it unavailable or unsuitable for such proper execution and results. Such report must be made within seven (7) calendar days of the time the DESIGN/BUILDER first became aware of the delay, defect or deficiency or by the scheduled commencement of DESIGN/BUILDER's dependent Work, whichever occurs first. DESIGN/BUILDER's failure to report within the allotted time will constitute an acceptance of the other work as fit and proper for integration with DESIGN/BUILDER's Work.

00700-98 INSURANCE

Please refer to Section 7, Insurance and Risk Management Provisions of the RFP.

00700-99 WAIVER OF SUBROGATION

1. Waiver of Subrogation in favor of Fulton County Government.

00700-100 COMPLETION

1. When the entire Work (or any portion thereof designated in writing by Owner) is ready for its intended use, DESIGN/BUILDER shall notify Owner and Design Professional in writing that the entire Work (or such designated portion) is substantially complete and request that Design Professional issue a Certificate of Substantial Completion. Said written notice from DESIGN/BUILDER shall include a proposed punch list of all items of Work to be completed or corrected by DESIGN/BUILDER. Within a reasonable time thereafter, Owner, DESIGN/BUILDER and Design Professional shall make and inspection of the Work to determine the status of completion. If Owner and Design Professional do not consider the Work substantially complete, Design Professional shall notify DESIGN/BUILDER in writing giving the reasons there for. In such case, DESIGN/BUILDER shall pay the costs of all additional Substantial Completion inspections. If Owner and Design Professional consider the Work (or designated portion) substantially complete, Design Professional shall prepare and deliver to DESIGN/BUILDER a Certificate of Substantial Completion for the entire Work is actually achieved by DESIGN/BUILDER and include a final punch list of items to be completed or corrected by DESIGN/BUILDER before final payment. Such final punch list shall be in compliance with the Contract Documents and all applicable laws. Accordingly, Design Professional shall provide the final punch list to DESIGN/BUILDER within seven (7) calendar days after DESIGN/BUILDER has achieved Substantial Completion. DESIGN/BUILDER acknowledges and agrees that the failure to include any corrective work or pending items not yet completed on the punch list does not alter the responsibility of the DESIGN/BUILDER to complete all the Work required under this Contract/Agreement and does not waive Owner's right to demand completion of the item pursuant to the Contract Documents prior to or after final payment. Additionally, if this Agreement involves Work on more than one building or structure, or involves a multi-phase project, a punch list shall be developed in

accordance with the timelines set forth in this paragraph for each building, structure, or phase of the Project. Owner shall have the right to exclude DESIGN/BUILDER from the Work and Project site (or designated portion thereof) after date of Substantial Completion (or Partial Substantial Completion), but Owner shall allow DESIGN/BUILDER reasonable access to complete or correct items on the final punch list.

2. When DESIGN/BUILDER believes that it has fully performed all of the Work, including all punch list items, DESIGN/BUILDER shall deliver to Owner a written affidavit from DESIGN/BUILDER certifying that all Work has been completed in accordance with the requirements of the Contract Documents. That written affidavit shall be delivered to Owner by DESIGN/BUILDER at the same time it submits its final Application for Payment. After receipt of such affidavit, the final Application for Payment and all other documents required for Project close-out, Design Professional and Owner shall promptly inspect the Work to determine if all of the Work has been completed and is ready for final acceptance by Owner. If Owner and Design Professional determine DESIGN/BUILDER has completed the entire Work, Design Professional shall promptly issue a final Certificate for Payment, stating that, to the best of its knowledge, information and belief, and on the basis of its observations and inspections: (i) all of the Work has been completed in accordance with the requirements of the Contract Documents; (ii) the final balance due Design/Builder, as noted in the final Certificate for Payment, is due and payable; and (iii) all conditions precedent to DESIGN/BUILDER's entitlement to final payment have been satisfied. Neither the final payment nor the retainage shall become due and payable until DESIGN/BUILDER submits: (1) the Final Release and Affidavit in the form attached to the Agreement as Exhibit A; (2) consent of surety to final payment; and (3) if required by Owner, other data establishing payment or satisfaction of all obligations, such as receipts, releases and waivers of liens, warranties, guarantees, Operations & Maintenance Manuals, As-Built documents, arising out of Contract Documents, to the extent and in such form as may be designated by Owner. Owner reserves the right to inspect the Work and make an independent determination as to the Work's acceptability, even though Design Professional may have issued its recommendations. Unless and until Owner is completely satisfied, neither the final payment nor retainage shall become due and payable.

00700-101 USE OF PREMISES

1. At all times during the performance of the Work, DESIGN/BUILDER shall keep all of its operations, (including, but not limited to, the use and storage of all equipment and materials), within the Project site or such other areas as may be permitted by the Contract Documents. DESIGN/BUILDER shall not use the Project site in any manner that is unreasonably burdensome or otherwise inconsistent with Owner's interest. DESIGN/BUILDER is responsible for any damage to any such area or to the occupant or owner thereof, or any areas contiguous thereto, resulting from the performance of the Work.

2. Except as required by the Contract Documents or otherwise required in order form DESIGN/BUILDER to satisfy its safety and security obligations under the Contract Documents, DESIGN/BUILDER shall not erect or install, nor shall it permit any of its subcontractors, suppliers, sub consultants or any other party for whim it is legally responsible to erect or install, any signage upon the Project site or any other property of Owner, unless such signage has been expressly

approved in writing by Owner, which approval may be withheld by Owner in its sole discretion.

3. DESIGN/BUILDER acknowledges that Work may be performed at a particular Project Site where Owner simultaneously is conducting and continuing it operations upon the same site. In such event, DESIGN/BUILDER shall coordinate its Work so as to cause no unreasonable interference with or disruption to Owner's operations.

4. Owner may take early occupancy of all or any portions of the Work, at Owner's election, by designating in writing to DESIGN/BUILDER the specific portions of the Work to be occupied and the date such occupancy shall commence. If any such specific early occupancy was not expressly identified at the time the GMP was established and such early occupancy negatively impacts DESIGN/BUILDER's cost or time of performance, DESIGN/BUILDER shall be entitled to an equitable adjustment to the Contract Amount and Contract Time, all in accordance with the other terms and conditions of the Contract Documents.

00700-102 PROJECT MEETINGS

1. Prior to the commencement of Work, DESIGN/BUILDER shall attend a preconstruction conference with Owner and Design Professional and others as appropriate to discuss the Master Project Schedule, procedures for handling shop drawings and other submittals, and for processing Applications for Payment, and to establish a working understanding among the parties as to the Work. During the prosecution of the Work, DESIGN/BUILDER shall attend any and all meetings convened by Owner or Design Professional with respect to the project, when directed to do so by Owner or Design Professional. DESIGN/BUILDER shall have it subcontractors and suppliers attend all such meetings (including preconstruction conference) as may be directed by Owner or Design Professional.

00700-103 AUDITING RIGHTS

1. DESIGN/BUILDER shall keep all records and supporting documentation which concern or relate to the Work hereunder for a minimum of five (5) years from the date of termination of this Contract or the date the Project is completed, whichever is later or such longer period of time as may be required by law. DESIGN/BUILDER shall require all of its subcontractors to likewise retain all of their Project Records and supporting documentation. Owner, and duly authorized agents or representatives of Owner, shall be provided access to all such records and supporting documentation at any and all times during normal business hours upon request by Owner, Further, Owner, and any duly authorized agents or representatives of Owner, shall have the right to audit, inspect and copy all of DESIGN/BUILDER's and any subcontractor's project records and documentation as often as they deem necessary and DESIGN/BUILDER shall cooperate in any audit, inspection, or copying of the documents. These access, inspection, copying and auditing rights shall survive the termination of this Contract.

2. If at any time, Owner conducts such an audit of DESIGN/BUILDER's records and documentation and finds that DESIGN/BUILDER overcharged Owner, DESIGN/BUILDER shall pay to Owner the Overcharged Amount which is defined as the total aggregate overcharged amount together with interest thereon (such

interest to be established at a rate of 12% annum). If the overcharged amount is equal to or greater than $10,000.00, DESIGN/BUILDER shall pay to Owner the Overcharged Amount and the Audit Amount which is defined as the total aggregate of Owner's reasonable audit costs incurred as a result of its audit of DESIGN/BUILDER. Owner may recover the Overcharged Amount and the Audit Amount, as applicable, from any amount die or owing DESIGN/BUILDER with regard to the Project or under any other agreement between DESIGN/BUILDER and Owner. If such amounts owed DESIGN/BUILDER are insufficient to cover the Overcharged Amount and Audit Amount, as applicable, then DESIGN/BUILDER hereby acknowledges and agrees that it shall pay such remaining amounts. In no event shall the Overcharged Amount or the Audit Amount be deemed a reimbursable Cost of the Work.

3. This article (00700-103), including all access, inspection, copying, auditing, reimbursement and repayment rights shall survive the termination of this Contract.

00700-104 SUBCONTRACTS

1. DESIGN/BUILDER shall review the design and shall determine how it desires to divide the sequence of construction activities. DESIGN/BUILDER will determine the breakdown and composition of bid packages for award of subcontracts, based on the current Master Project Schedule, and shall supply a copy of that breakdown and composition to Owner and Design Professional for their review. DESIGN/BUILDER shall take into consideration such factors as natural and practical lines of severability, sequencing, effectiveness, access and availability constraints, total time for completion, construction market conditions, availability of labor and materials, community relations and any other factors pertinent to saving time and costs.

2. A subcontractor is any person or entity who is performing, furnishing, supplying, or providing any portion of the Work pursuant to a contract with DESIGN/BUILDER. DESIGN/BUILDER shall be solely responsible for and have control over the subcontractors. DESIGN/BUILDER shall negotiate all Change Orders, Construction Change Directive, Field Orders and Request for Proposals, with all affected subcontracts and shall review the costs of those proposals and advise Owner and Design Professional of their validity and reasonableness, acting in Owner's best interest, prior to requesting approval of each Change Order from Owner.

3. DESIGN/BUILDER shall submit to Owner, at Owner's request, a copy of all quotes (minimum of five (5)), proposals, etc. received for a particular trade or scope of work along with a comparison of prices compared to budget, narration on completeness of scope and recommendation from DESIGN/BUILDER and reason for selection by DESIGN/BUILDER. DESIGN/BUILDER shall provide Owner with at least 72 hour prior written notice to any scope/cost meetings with prospective subcontractors that DESIGN/BUILDER is planning on conducting and shall allow Owner or Owners designated representative's access to all scope/cost/buyout meetings with prospective subcontractors.

4. Any and all work to be self-performed by DESIGN/BUILDER must be approved in writing by Owner in its sole discretion prior to commencement of such work. DESIGN/BUILDER shall not enter into a subcontract with any subcontractor, if Owner reasonably objects to that subcontractor. DESIGN/BUILDER shall not be

required to contract with anyone it reasonably objects to. As part of the Project document file to be maintained by DESIGN/BUILDER at the Project site, DESIGN/BUILDER shall keep on file a copy of the license for every subcontractor and sub-subcontractor performing any portion of the Work, as well as maintain a log of all such licenses. All subcontracts between DESIGN/BUILDER and its subcontractors shall be in writing. Further, all subcontracts shall (1) require each subcontractor to be bound to DESIGN/BUILDER to the same extent DESIGN/BUILDER is bound to Owner by the terms of the Contract Documents, as those terms may apply to the portion of the Work to be performed by the subcontractor, (2) provide for the assignment of the subcontracts from DESIGN/BUILDER to Owner at the election of Owner upon termination of DESIGN/BUILDER, (3) provide that Owner will be an additional indemnified party of the subcontract, (4) provide that Owner will be an additional insured on all insurance policies required to be provided by the subcontractor except workman's' compensation, (5) assign all warranties directly to Owner, (6) identify Owner as an intended third-party beneficiary of the subcontract, (7) incorporate all insurance requirements (including the OCIP and safety manuals referenced therein) into all of its subcontract that are to be covered under the OCIP (and require similar incorporation into all sub-subcontracts that are so covered under the OCIP). DESIGN/BUILDER shall make available to each proposed subcontractor, prior to the execution of the subcontract, copies of the Contract Documents to which the subcontractor will be bound by this paragraph 00700-104,4, and identify to the subcontractor any terms and conditions of the proposed subcontract which may be at variance with the Contract documents. Each subcontractor shall make similar copies of such documents available to its sub-subcontractors.

5. The subcontractor must agree to provide field (on-site) supervision through a named superintendent for each trade (e.g. general concrete forming and placement, masonry, mechanical, plumbing ...) included in the subcontract. In addition, the subcontractor shall assign and name a qualified employee for scheduling direction for its work. The supervisory employees of the subcontractor (Including field superintendent, foreman, and schedulers at all levels) must have been employed in a supervisory (leadership) capacity of substantially equivalent level on a similar project for at least two years within the last five years. The subcontractor shall include a resume of experience for each employee identified to supervise and schedule its work.

6. Unless otherwise expressly agreed to by Owner in writing, all subcontracts shall provide:

    a. LIMITATION OF REMEDIES – NO DAMAGES FOR DELAY

    That the subcontractor's exclusive remedy for delays in performance of the contract caused by events beyond its control, including delays claimed to be caused by Owner or Design Professional or attributable to Owner or Design Professional and including claims based on breach of contract or negligence, shall be an extension of its contract time.

    In the event of a change in its work, the subcontractor's claim for adjustments in the contract sum are limited to exclusively to its actual

costs for such damages plus no more than 10% for overhead and profit (combined 10% total for OH&P).

The subcontract shall require the subcontractor expressly agree that the foregoing constitute its sole and exclusive remedies for claim for increase in the subcontract price, damages, losses or additional compensation. Further, DESIGN/BUILDER shall incorporate section 00700-54 in all of its subcontracts and require all subcontractors to similarly incorporate such terms into their sub-subcontracts.

b. Each subcontract shall require that any claims by subcontractor for delay or additional cost must be submitted to DESIGN/BUILDER within the time and in the manner in which the DESIGN/BUILDER must submit such claims to Owner, and that failure to comply with such conditions for giving notice and submitting claims shall result in the waiver of such claims.

00700-105 MARKET ANALYSIS AND SOLICITATION OF BIDS

1. The purpose of this paragraph is to insure the DESIGN/BUILDER makes a genuine effort to stimulate subcontractor interest in the Project and to maximize participation of potential qualified subcontractors in the bidding process. At all times Owner shall have access to and the right to require copies of all correspondence, records, files and other bid documents (including all bid responses) with respect to the bidding process. All bid packages shall be advertised on the Fulton County Bid Board and all bid openings shall be conducted in Fulton County Department of Purchasing and Contract Compliance. DESIGN/BUILDER is responsible for coordinating with Fulton County Purchasing Department for the advertisement and openings of bids as described above.

   Finally, DESIGN/BUILDER shall develop in writing subcontract bidding procedures for Owner's review and approval. Once those procedures have been approved by Owner, DESIGN/BUILDER shall not deviate from such procedures without obtaining Owner's written consent.

   a. DESIGN/BUILDER shall monitor conditions in the construction market to identify factors that will or may affect costs and time for completing the Work; DESIGN/BUILDER shall make and analysis as necessary to (i) determine and report on availability of labor, materials, equipment, potential bidders, and possible impact of any shortages or surpluses of labor and material, and (ii) in light of such determination, make recommendations and take action as may be appropriate with respect to long lead procurement, separation of construction into bid packages, sequencing of Work, use of alternative materials, equipment or methods, other economics in design or construction, and other matters that will promote cost savings and completion within the Contract Time.

   b. Within thirty (30) days after execution of this Contract, DESIGN/BUILDER shall submit a written "Construction Market Analysis and Prospective Bidders Report" setting out recommendations and providing information as to prospective bidders. As various bid packages are prepared for bidding, DESIGN/BUILDER shall submit to Owner and Design

Professional a list of potential bidders for their review. DESIGN/BUILDER shall be responsible for promoting and encouraging bid competition.

c. DESIGN/BUILDER shall carry out an active program of stimulating interest in qualified subcontractors in bidding on the Work and familiarizing those bidders with the requirements of this Project.

2. DESIGN/BUILDER shall prepare invitations for bids and all other appropriate bid documents for all procurement of long lead items, materials and services, for subcontractor contracts and for site utilities. All such invitations for bids and bid packages shall be submitted to Design Professional, Owner, and Owner's Agent for their review and comment prior to distribution to bidders. All Invitations to bid and all other appropriate bid documents shall be advertised on the Fulton County Bid board. DESIGN/BUILDER shall be responsible for coordination of postings with Fulton County Department of Purchasing and Contract Compliance.

   a. Except as hereafter provided in paragraph 00700-106, 2, e, all subcontractors are to be awarded to the lowest responsive and responsible bidder. See also 00700-105, 3.

   b. All bids received by DESIGN/BUILDER shall be entered into a bid tabulation sheet and a copy of both the bids and the tabulation sheet shall be sent to Owner for their review prior to DESIGN/BUILDER awarding the subcontract. See also 00700-105, 3.

   c. As part of its bid preparation, DESIGN/BUILDER shall review the specifications and drawings prepared by the Design Professional. Ambiguities, conflicts or lack of clarity of language, use of illegally restrictive requirements, or any other defects in the specifications or in the drawings noted by DESIGN/BUILDER shall be brought to the attention of Owner and Design Professional in written form.

   d. For each subcontract that exceeds $75,000.00, DESIGN/BUILDER shall, unless waived in writing by Owner, conduct a pre-bid conference with prospective bidders and a pre-award conference with the apparent successful bidder. Design Professional and Owner shall be invited to all such meetings. In the event questions are raised which require an interpretation of the bidding documents or otherwise indicate a need for clarification or correction of the invitation, DESIGN/BUILDER shall transmit these to Design Professional in writing and upon receiving clarification or correction in writing from Owner or Design Professional shall issue and addendum to the bidding documents to all of the prospective bidders.

00700-106 CHANGED CONDITIONS

Notwithstanding anything in the Contract Documents to the contrary, if conditions are encountered at the Project site which are (i) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (ii) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, an which reasonably should not have been discovered by DESIGN/BUILDER as part of its scope of site investigative services required

pursuant to the terms of the Contract Documents, then DESIGN/BUILDER shall provide Owner with prompt written notice thereof before conditions are disturbed and in no event later than seven (7) calendar days after the first observance of such conditions. Owner and Design Professional shall promptly investigate such conditions and, if they differ materially and cause an increase or decrease in DESIGN/BUILDER cost of, or time required for, performance of any part of the Work, Owner will acknowledge and agree to an equitable adjustment to the Contract Amount or Contract Time, or both for such Work. If Owner determines that the conditions at the site are not materially different from those indicated in the Contract Documents or not of unusual nature or should have been discovered by DESIGN/BUILDER as part of its investigative services, and that no change in the terms of the Contract/Agreement is justified, Owner shall so notify DESIGN/BUILDER in writing, stating its reasons. Claims by DESIGN/BUILDER in opposition to such determination by Owner must be made within seven (7) calendar days after DESIGN/BUILDER's receipt of Owner's written determination notice. If Owner and DESIGN/BUILDER cannot agree on an adjustment to the Contract Amount or Contract Time, the dispute resolution procedure set for in the contract documents shall be complied with by the parties.

00700-107 SAVINGS

Savings shall be defined as amount of dollars under GMP of the actual costs of the conclusion of Project (excluding Owner Contingency included within the GMP – Reference GMP Amendment in Volume 3 of RFP, item 2.6). At the completion of the Project, Owner shall conduct a full and complete audit of DESIGN/BUILDER's records, invoices, etc. and shall identify any savings realized in the GMP. All savings identified shall be shared between the Owner and DESIGN/BUILDER in the following percentages of savings: 60% of savings the property of the Owner; 40% of savings the property of the DESIGN/BUILDER.

00700-108 ESCROW DOCUMENTS

Scope 00700-108.1:

All Proposers shall submit within ten (10) calendar days after Fulton County receives Proposals, one copy of all documentary information generated in preparation of Proposal prices for this project. This material hereinafter referred to as "Escrow Documents". The Escrow Documents of the successful proposer will be held in escrow for the duration of the Contract.

The successful Proposer agrees, as a condition of award of the Contract, that the Escrow Documents constitute all of the information used in the preparation of their Proposal, and that no other Proposal preparation information shall be considered in resolving disputes.

Nothing in the Escrow Documents shall change or modify the terms or conditions of the Contract Documents.

Ownership 00700-108.2:

The Escrow Documents are, and shall always remain, the property of the Design/Builder, subject only to joint review by the County and the Design/Builder, as provided herein.

The County acknowledges that the Escrow Documents, as defined herein, may constitute trade secrets. This acknowledgement is based on the County's understanding that the information contained in the Escrow Documents may not be known outside the Proposer's business, may be known only to a limited extent and only by a limited number of employees of the Proposer is safeguarded while in Proposers possession, may be extremely valuable to Proposer and could be extremely valuable to Proposer's competitors by virtue of it reflecting Proposer's contemplated techniques of construction. The County acknowledges that the Proposer may have expended substantial sums of money in developing the information included in the Escrow Documents and further acknowledges that it would be difficult for a competitor to replicate the information contained therein. The County further acknowledges that the Escrow Documents and the information contained therein are made available to the County only because such action is an express prerequisite to award of the Contract. The County acknowledges that the Escrow Documents include a compilation of information used in the Proposer's business, intended to give Proposer an opportunity to obtain an advantage over competitors who do not know of or use the contents of the documentation. The County agrees to safeguard the Escrow Documents, and all information contained therein, against disclosure to the fullest extent permitted by law.

Purpose 00700-108.3:

Escrow Documents will be used to assist in the negotiation of price adjustments, change orders, settlement of disputes, claims and litigation against the County related to the Contract. They will not be used for pre-award evaluation of the Design/Builder's anticipated methods of construction of to assess the Design/Builder's qualifications for performing the work.

Format and Contents 00700-108.4:

Proposers may submit Escrow Documents in their usual cost estimating format. It is not the intention of this specification to cause the Proposer extra work during the preparation of the proposal, but to ensure that the Escrow Documents will be adequate to enable complete understanding and proper interpretation for their intended use. The Escrow Documents shall be in the language (e.g., English) of the Specifications.

Proposal items should be separated into sub-items as required to present a complete and detailed cost estimate and allow a detailed cost review. The Escrow Documents shall include all copies of quotations, memoranda, narratives, and all other information used by the Proposer to arrive at the prices contained in

the Proposal. Estimated costs should be broken down into the Proposer's usual estimate categories such as direct labor, hours, indirect costs, firm/consultant/subcontractor costs as appropriate. The Contractor's allocation of indirect costs, contingencies, mark-up and all other items to each Proposal item should be included.

All costs shall be identified. For scheduled items amounting to less than ten thousand dollars ($10,000), estimated unit costs are acceptable without a detailed cost estimate, providing that labor, equipment, materials and subcontracts, as applicable, are included and provided that indirect costs, contingencies, and markup, as applicable, are allocated.

Proposal documents provided by the County should not be included in the Escrow Documents unless needed to comply with the requirements of this specification.

Submittal 00700-108.5:

The Escrow Documents shall be submitted for all Proposals by all Proposers in a sealed container within ten (10) calendar days after the time of receipt of Proposals. The container shall be clearly marked on the outside with the Proposer's name, date of submittal, project name, RFP #, and the words "Escrow Documents".

The Escrow Documents shall be accompanied with and Escrow Documentation Certification, on company letterhead, signed by an individual authorized by the Proposer to execute the Proposal, stating that the material in the Escrow Documentation constitutes all the documentary information used in preparation of the Proposal and that he/she has personally examined the contents of the Escrow Documents container and has found that the documents in the container are complete. Prior to award, Escrow Documents of the apparent successful Proposer will be examined, organized and inventoried by representatives of the County, as defined in 00700-108.7 Examination, together with members of the Design/Builder's staff who are knowledgeable in how the Proposal was prepared. This examination is to ensure that the Escrow Documents are authentic, legible and complete. It will not include review of, and will not constitute approval of, proposed construction methods, estimating assumptions, or interpretations of Contract Documents. Examination will not alter any condition(s) or term(s) of the Contract.

If the Contract is not awarded to the apparent successful Proposer, the Escrow Documents of the Proposer next to be considered for award shall be processed as described.

Timely submission of complete Escrow Documents is an essential element of the Proposer's responsibility and a prerequisite to contract award. Failure to provide the necessary Escrow Documents, at the required time, may be sufficient cause of the County to reject the Proposal.

If the Proposer's proposal is based on subcontracting any part of the work, each subcontractor, whose total subcontract price exceeds five (5%) percent of the total contract price proposed by the Proposer, shall provide separate Escrow Documents to be included with those of the Proposer. These documents will be opened and examined in the same manner and at the same time as the examination described above for the apparent successful Proponent.

If the Design/Builder wishes to subcontract any portion of the work after award, the County retains the right to require the Design/Builder to submit Escrow Documents from the subcontractor before the subcontract is approved.

Escrow Documents submitted by unsuccessful Proposers will be returned unopened, unless opened as provided above, following award of the Contract.

Storage 00700-108.6:

One full original set of the Escrow Documents will be placed in escrow for the life of the Contract, in the County's secured vault located within the Fulton County Purchasing and Contract Compliance Office, until final close-out and settlement of all disputes. If at any time either party wishes to exercise their right to review the escrowed materials, notice will be given to the other parties.

Examination 00700-108.7:

The Escrow Documents shall be examined by both the County and the Design/Builder, at any time deemed necessary by either the County or the Design/Builder, to assist in the negotiation of price adjustments and change orders, or the settlement of disputes, claims and litigation against the County related to this Contract.

Examination of the Escrow Documents is subject to the following conditions:

a. As trade secrets, the Escrow Documents are proprietary and confidential.
b. The County and the Design/Builder shall each designate, in writing to the other party and a minimum of ten (10) days prior to examination, representatives who are authorized to examine Escrow Documents. Said representation shall be employed by the County's Purchasing and Contract Compliance Department. With the consent of both the County and Design/Builder, may examine the Escrow Documents if required to assist in the settlement of a dispute. No other person shall have access to the Escrow Documents.
c. Access to the Escrow Documents will take place only in the presence of duly designated representatives of both the County and Design/Builder.

Final Disposition 00700-108.8:

The Escrow Documents will be returned to the Design/Builder at such time as the Contract has been completed and final settlement has been achieved.

00700-109 PHOTOGRAPHIC CONSTRUCTION DOCUMENTATION

The DESIGN/BUILDER shall be required to provide detailed photographic documentation to meet the following requirements:

1. Aerial Photographic Documentation. The DESIGN/BUILDER shall provide aerial photographic documentation on a monthly basis. Aerial photographic documentation shall include at least two different views of the entire site and building structure and shall be submitted with the DESIGN/BUILDER's Monthly Pay-Application. The Aerial photographic documentation shall commence prior to DESIGN/BUILDER's mobilization to the site (showing existing site conditions) and shall continue on a monthly basis until Final Completion of the project. The aerial photographic documentation shall be submitted in hard copy (3 sets of glossy 8.5" x 11" photographs) and electronic file (JPEG format or format acceptable to Owner). Both hard and electronic versions of aerial photographic documentation shall show date that photograph was taken, and project site name.
2. Video Documentation of Existing Site. Prior to DESIGN/BUILDER mobilizing on the project site, The DESIGN/BUILDER shall prepare a video document, detailing existing conditions of the site and boundaries. The video shall be all encompassing of the entire existing site, however special detail shall be made to: site utilities; existing sidewalk and drives; property lines; curb and gutter; sidewalks; manholes; existing ponds; existing streams; existing creeks; existing bodies of water; existing structures, etc. The DESIGN/BUILDER shall provide to the Owner or Owners Agent three (3) copies of the video documentation of existing site, prior to DESIGN/BUILDER's mobilization to the project site. Format of the video documentation shall be in a format approved by the Owner. The DESIGN/BUILDER shall notify the Owner in writing, with the submission of the video documentation, of any anomalies found on site that may impact schedule or cost of the project. This video documentation shall be in addition to the other existing photographic documentation required for the existing site.
3. Construction Progression Photographic Documentation (CPPD). CPPD shall cover the following areas:
    a. Site – performed on a weekly basis, monitoring existing conditions, site utilities, building pads, trenching, conduit installation, detention ponds, storm and sewer piping, etc. Site CPPD shall be performed starting prior to DESIGN/BUILDER mobilization until substantial completion. This shall be provided to Owner and designated Owner's Representative in an electronic format.
    b. Exterior Building – performed on a bi-weekly basis and track building envelope construction (including roofing). Exterior Building CPPD shall start at the commencement of exterior envelope and complete when exterior envelope is completed.
    c. Interior – performed on a bi-weekly basis showing progressions of all points of views in all rooms. Interior CPPD shall commence when framing commences and complete at substantial completion.
4. Detailed Construction Sets (DCS). DCS shall cover the following areas:
    a. Pre-Slab – Overlapping images of MEP in slabs (prior to concrete pours).

b. Exterior – Window flashing details; special exterior details (rotundas, etc.); roof flashing details; masonry flashing details; stucco/EIFS details, etc.).
c. Interior – Performed prior to installation of insulation capturing as-built conditions in walls and ceilings. Photographed in detail to show connections, electrical, HVAC, plumbing, fire protection, etc. to show as-built location.
d. Finished – Complete documentation of all walls, ceilings, floors at final completion of the project.

CPPD and DCS photographs shall be linked to approximate location on site and floor plans electronically. CPPD and DCS photographs shall be on-line web-hosted for the duration of the construction period through final completion. Owner and Owners Designated Representatives shall have password protected access to documentation throughout the construction process. CPPD and DCS photographs shall be uploaded to on-line access for Owner and Owners Designated Representative within 48 hours of photograph. All photographs to be date stamped. Within one week of final completion, the Owner shall receive four (4) sets of all CPPD and DCS photographs in electronic format (CD, DVD, thumb drive or external hard drive – in form as directed by Owner).

00700-110 BUILDING ENVELOPE CONSULTANT SERVICES

The DESIGN/BUILDER shall be responsible for and include in their costs a Building Envelope Consultant during pre-construction and construction phase services (if GMP Package approved by County).

The building envelope for purposes of these services is defined as including the following (as applicable): foundation waterproofing, exterior glazing, above grade wall assemblies, horizontal waterproofing and roofing, roof penetrations, wall penetrations and the interfaces between these assemblies.

The Building Envelope Consultant (BEC) will review the proposed building envelope systems provided by the Design Team (A/E Team) for water penetration, vapor diffusion, air leakage, and thermal performance with emphasis on water tightness. Review of the envelope for thermal performance is limited to review of potential thermal bridges / potential condensation problems.

BEC consultation with respect to below grade waterproofing will be based on the information provided by the Architect and the Geotechnical Engineer concerning the necessity of a waterproofing material, the groundwater level and the drainage available. If waterproofing of below grade walls is required, the BEC will provide consultation with respect to waterproofing materials, performance and installation requirements. Design of below grade drainage remains the responsibility of the Civil Engineer Consultant.

Final approval over building envelope details and coordination of envelope issues with other code requirements, such as fireproofing, remains with the Architect of Record.

Deliverables per Phase:

1) Design Development (DD)

   a. Meetings.

      Attend Design Development Kick-off meeting with Design team, County, County's Authorized Representatives, and DESIGN/BUILDER to discuss project, appropriate envelope systems and design criteria. The BEC will become familiar with the project and team, discuss key aspects of the building envelope design approach and identify potential envelope system issues.

      Attend bi-weekly meetings during Design Development phase to work interactively with the Design team, County, County's Authorized Representative, and DESIGN/BUILDER to develop building envelope performance criteria and assist in selection of wall assemblies, roof assemblies, cladding, glazing and coordinate recommendations with DESIGN/BUILDER for evaluation of cost implications information that will be submitted to Owner for review and approval.

   b. Drawing Review.

      Review the drawings prepared by the design team to identify potentially problematic details locations with respect to water penetration, vapor diffusion, air leakage, and thermal performance. BEC will provide recommendations through marked-up details from the design drawings. Drawing review by BEC shall be incorporated into DESIGN/BUILDER's review report for DD documents and shall contain detailed cost information for any details, systems, materials, etc. that the BEC recommends by not contained within DD documents.

   c. Specification Review.

      Review the outline specifications prepared by the Design Team and provide recommendations with respect to performance requirements, relevant standards, testing requirements and acceptable materials and/or systems. BEC will review sections of the specifications related to the building envelope. A memorandum will be issued outlining the recommendations. Specification review by BEC shall be incorporated into DESIGN/BUILDER's review report for DD documents and shall contain detailed cost information for any details, systems,

materials, etc. that the BEC recommends by not contained within DD documents.

d. On-going Consultation

Provide on-going consultation to assist the design team in the implementation of the recommendations BEC/DESIGN/BUILDER is required to ensure that County is aware of any requests from Design Team for additional consultation.

2) Construction Documents (CD's) – 25% & 50%

a. Drawing Reviews

In the Construction Document (CD) phase, the BEC will work with the Design Team to finalize the required building envelope detail drawings and specifications in the two phases listed above. The following are deliverables for this stage of the project:

25% & 50% Drawing Review

Review the CD's prepared by the Design Team to identify potential problematic building envelope details. BEC will provide recommendations through marked up details from the CD's.

25% & 50% Specifications Review

Review the specifications prepared by the Design Team and provide recommendations with respect to performance requirements, relevant standards, testing requirement and acceptable materials and/or systems. BEC's review will cover sections of the specifications related to the building envelope. A memorandum shall be issued outlining recommendations.

b. Meetings

Meet with the Design Team, County, County's Authorized Representative, and DESIGN/BUILDER bi-weekly during all construction document stages.

c. On-Going Consultation

Provide on-going consultation to assist the design team in the implementation of the recommendations. BEC/DESIGN/BUILDER is required to ensure that County is aware of any requests from Design Team for additional consultation.

3) Bidding Phase – DESIGN/BUILDER has been directed by County to commence work

a. Meetings

BEC will attend meetings, as requested by County or DESIGN/BUILDER, to discuss bid strategies and provide input with respect to subcontractor bid evaluation.

b. Bid Package Evaluation

BEC will review the bid packages to ensure that the envelope criteria set out by the specifications and construction documents have been met. BEC will provide written recommendations.

4) Construction Phase

a. Pre-Installation Meetings

BEC will attend exterior pre-installation meetings prior to the commencement of building envelope work. The purpose of these meetings will be to discuss the design intent and the assemblies to be constructed with the trades prior to the commencement of their work.

b. Trade Submittals / Shop Drawing Reviews

BEC will review submittals of shop drawings and submittals for each of the building envelope trades prior to the Architect's review. BEC will review the submittals / shop drawings for good building practice, and for general compliance with the technical building envelope aspects of the specifications and contract drawings. In addition, the BEC will review the shop drawings and coordinate intersections between trades to identify areas where the design intent for the wall system is not carried through the interfaces between envelope systems. BEC will indicate recommendations for improvements to areas where additions information is required on the shop drawings. The BEC will issue a written memorandum for each submittal package outlining findings of the review and resulting recommendations. Upon completion of the submittals / shop drawings review, the BEC shall review with Design Team who will then combine BEC's comments onto one set of submittals/shop drawings.

c. Initial Assemblies / Mock-Up Reviews

BEC will perform site observations and Field-Performance testing of selected building envelope assemblies/mock-ups. This will be used to confirm that the construction of the building envelope components is in general conformance with the contract documents and the assemblies/mock-ups will serve to define the acceptable standard for the project. The assemblies will also be used to resolve any issues related to standard details, which have been created by site conditions. All significant design issues related to the standard details, which have been created by site conditions. All significant design issues identified through this observation process will be referred to the Architect's design team for resolution and BEC will work closely with the Architect to determine appropriate solution. Minor issues can be resolved

between the BEC field representative, the sub-trades and on-site personnel. BEC will provide a memorandum for each initial assembly/mock-up reviewed outlining the observations and recommendations.

d. Periodic Site Visits

Monthly site visits will be conducted in conjunction with the Architect to help confirm that the construction of the building envelope components is in general conformance with the standard established through the pre-installation meetings, initial site observations, mock-ups, and the contract documents.

The BEC will provide the DESIGN/BUILDER with a written report documenting each visit. The report will be copied to the County, County's Authorized Representative(s), and Architect. In addition, an action item list will be maintained for each trade consisting of items identified through the site visits for confirmation/correction/completion by the trade subcontractor. The Action Item List will be issued once a month. This will allow efficient follow-up with the individual trades as well as documentation of the issues as they arise and are completed.

e. Field Performance Testing

Based upon the specifications and approved by the Architect, BEC and Owner, the following tests are to be performed during construction.

- ASTM E1105: Water penetration chamber test (mock-up and one test per each type of window system)
- AAMA 502.1: Spray nozzle testing. Used to water test interface conditions (Locations determined by Architect, Owner and BEC).
- Any other test as determined by Architect, Owner, and BEC.

BEC will conduct field-performance testing and shall issue a report outlining findings of the testing, including recommendations for remedial work (if necessary).

5) Post Construction Phase

a. Building Envelope Maintenance Manual

Upon completion of project, and BEC will review Operations and Maintenance Manuals for the building envelope system. The manuals will include descriptions of the building envelope systems and materials used. The manuals will define appropriate operating parameters, such as temperature and relative humidity, for the building envelope and describe the life expectancy and required maintenance frequency for each of the systems and

materials used. This manual shall also include material cut-sheets and manufacturer's warranties for all building envelope components as applicable and as provided to BEC for inclusion.

00700-111 OWNER CONTROLLED CONTINGENCY

In order to efficiently and timely address any unknown or unanticipated conditions that are within the scope of the required Work, but excluding all items that are not to be reimbursable without duplication as a Cost of the Work, an Owner Controlled Contingency will be established in the amount indicated on Exhibit 2 "Cost Data Form". Owner Controlled Contingency funds shall be used to cover costs that arise during construction that are not identified in the Construction Documents. The Design/Builder shall not proceed with any portion of the Work which it intends to charge against this contingency without first obtaining the Owner's expressly written authorization in an "Owner Controlled Contingency Authorization Form" (fully executed). The Design/Builder acknowledges and agrees that any work which is to be charged against the contingency that does not receive such prior written approval from the Owner shall be deemed to part of the Design/Builder's basic Work compensated within the contract amount and not chargeable against the Owner's Contingency. The Owner reserves the right, at its sole discretion, to withhold its consent on contingency expenditures. Further, any contingency expenditures become part of the Contract Documents and are incorporated by reference herein. Unused contingency remaining at the end of the project will be credited from the contract amount. The Design/Builder has no entitlement to any portion of any unused contingency.

INDEX TO GENERAL CONDITIONS SECTION 00700

END OF SECTION

EXHIBIT A

FINAL AFFIDAVIT

TO FULTON COUNTY, GEORGIA

I, _____, hereby certify that all suppliers of materials, equipment and service, subcontractors, mechanic, and laborers employed by _____ or any of his subcontractors in connection with the design and/or construction of _____ at Fulton County have been paid and satisfied in full as of _____, 20___, and that there are no outstanding obligations or claims of any kind for the payment of which Fulton County on the above-named project might be liable, or subject to, in any lawful proceeding at law or in equity.

_____
Signature

_____
Title

Personally appeared before me this _____ day of _____, 20_____. _____, who under Oath deposes and says that he is _____of the firm of _____, that he has read the above statement and that to the best of his knowledge and belief same is an exact true statement.

_____
Notary Public

_____
My Commission expires

END OF SECTION

EXHIBIT B

SPECIAL CONDITIONS

SPECIAL CONDITIONS

The following Supplemental Terms & Conditions hereby amend, modify and supersede in the event of a conflict the terms of the Agreement and the General Terms and Conditions attached thereto as Section 00700.

00800-1 Project Management Information System (PMIS)

The Contractor shall utilize the Owner provided PMIS (Constructware), for Contract / Project Management and Contractor provided scheduling software pursuant to this Contract/Agreement:

1. Commencing immediately after the Notice to Proceed (for construction services) is issued to Contractor by Owner, Contractor shall utilize the PMIS provided by the Owner. The Owner shall provide one seat to Contractor, CM is responsible for purchasing any additional required seats on PMIS. Owner shall provide one CM representative with training on PMIS.
2. The Contractor is expected to utilize the PMIS forms and modules for Construction Forms/communication including but not limited to Request for Information (RFI's), Submittal Packages, Submittals, Meeting Minutes, Correspondence, Daily Reports, Transmittals, Pay-Applications and a depository of all project related information/correspondence.
3. The reports, documents and data provided shall represent an accurate assessment of the current status of the Project and of the Work remaining to be accomplished and it shall provide a sound basis for indentifying variances and problems for making management decisions.
4. The PMIS shall be described in terms of the following major subsystems:
    a. Narrative Reporting
    b. Schedule Control

    The above reports shall be submitted at least on a bi-weekly basis and shall accompany each monthly Application for Payment.

    a. Narrative Reporting Subsystem
        I. CM shall prepare written reports as described hereunder. All reports to be in 8.5"x11" format. Construction schedules can be submitted in 11"x17" format for ease of reading.
        II. The Narrative reporting subsystem shall include the following reports:
            i. Monthly Executive Summary which provides an overview of current issues and pending decisions, future developments and expected achievements, and any problems or delays, including code violations found by permitting authority, defect reports issued by A/E Team / BEC Consultant / Material Testing / Special Inspections firm or Authorized County Representative.
            ii. Monthly Cost Narrative describing the current construction cost estimate status of the Project; Potential Change Order Logs, Construction Change Directive Logs and Change Order Logs.

iii. Monthly Scheduling Narrative summarizing the current status of the overall Project Schedule and an explanation of all variances from the plan. This report shall include an analysis of the various Project sub schedules, a description of the critical path, and other analyses as necessary to compare planned performance with actual performance.

iv. Monthly Accounting Narrative describing the current cost and payment status for the entire Project. This report shall relate to the budget / allowance allocations. An explanation for all variances shall be provided.

v. A Monthly Construction Progress Report, during the Construction Phase summarizing the Work of the various subcontractors. This report shall include information from weekly job site meetings as applicable such as general conditions, long lead items, current deliveries, safety and labor relations, programs, permits, construction problems and recommendations, and plans for the succeeding month.

vi. Daily Construction Log describing daily events and conditions of the site. Included are the Contractor's daily field reports.

vii. Request For Information and Submittal Logs

viii. The reports in i through vii above shall be bound with applicable computer reports and submitted monthly during Construction Phase and shall be current through the end of the preceding month. Copies shall be delivered to Owner (4 copies) and Design Team. A bound copy of the complete diary shall be submitted to Owner at the conclusion of the Project.

b. Schedule Control Subsystem

I. Project Schedule: Included with the Bid, Contactor is to provide a detailed construction schedule. The schedule shall conform to the format outlined in Paragraph b, IV below. The schedule shall serve as the framework for the subsequent development of all detailed schedules and shall be updated monthly by CM throughout the Project and turned in with CM's Monthly payment-application. Within fifteen (15) calendar days of CM's submittal, Owner and Design Professional shall review the schedule and provide the CM a written list of corrections needed to approve the schedule. CM must make all corrections and resolve all comments within thirty (30) calendar days after its receipt of the Owner's and Design Professional's comments. If the schedule is not approved within said thirty (30) calendar days, Owner and Design Professional will withhold all Contract payments until the schedule is approved. The acceptance of the schedule by Owner and Design Professional in no way attests to the validity of the assumptions, logic constraints, dependency relationships, resource allocations, manpower and equipment, and any other aspect of the proposed schedule. CM is and shall remain solely

responsible for the planning and the execution of all Work in order to meet Project milestones or Contract Completion dates.

II. Construction Schedule: CM shall prepare and submit to Owner and Design Professional, for their review and approval, a Construction Schedule. This schedule shall conform to the format outlined in Paragraph b, IV below. The approved Construction Schedule shall be included in the Owner / Contractor Agreement/contract (Baseline Schedule). The Construction Schedule shall be cost-loaded.

i. The Construction Schedule: Contractor shall, at the end of each calendar month occurring thereafter during the period of time required to finally complete the Project, or at such earlier intervals as circumstances may require, update and/or revise the Construction Schedule which shall be submitted to the Owner in duplicate with their monthly payment-application. No additional compensation will be due Contractor for making such updates. Failure of the Contractor to update, revise, and submit the Construction Schedule as aforesaid shall be sufficient grounds for Owner to find Contractor in substantial default hereunder and that sufficient cause exists to terminate the Contract or to withhold payment to Contractor until a schedule or schedule update acceptable to Owner is submitted.

ii. The Contractor shall prepare and provide a two week construction schedule look-ahead at all Owner, Architect and Contractor (OAC) meetings. Two week look ahead construction schedules shall correlate to construction schedule. Contractor shall submit to Owner, for approval, a two week look ahead at the first OAC Meeting. Owner shall review for format and level of detail. Contractor shall make adjustments per Owner's review and incorporate into two week look ahead schedules at OAC Meeting following Owner's review.

III. Contractor shall prepare and incorporate into the Scheduling software, at the required intervals, the following schedules:

iii. Subcontractor Construction Schedules: Contractor shall work jointly with the subcontractor, develop a schedule which is more detailed that the Owner/Contractor Agreement schedule, taking into account the work schedule of the other subcontractors. The subcontractor's construction schedule shall include as many activities as necessary to make the schedule an effective tool for the construction planning and for monitoring the performance of the subcontractor. The subcontractor's construction schedule also shall show pertinent activities for material purchase orders, manpower supply, shop drawing schedules, and material delivery schedules.

iv. Occupancy Schedules: Contractor shall jointly develop with the Design Team and Owner a detailed plan, inclusive of punch lists, final inspections, FF&E delivery, book / collection delivery, maintenance training, and turn-over procedures, etc., to be used for ensuring accomplishment of a smooth and phased transition from construction to Owner occupancy. The Occupancy Schedule shall be produced and updated monthly from its inception through final Owner occupancy and shall be integrated into Contractors Construction Schedule.

IV. Schedule Format: The Master Project Schedule and the Construction Schedule shall be planned and recorded with a Critical Path Method (CPM) schedule in the form of activity-on-node diagram. All activity-on-node diagrams shall include the Activity Description, and the type of relationship between activities, including any lead or lag time, as well as being cost loaded. Further, both the Master Project Schedule and the Construction Schedule shall incorporate and be based upon the Project milestone dates set forth in this Agreement and by the Owner.

i. No activity shall have a duration greater than fifteen (15) work days or less that one (1) work day. If requested by Owner or Design Team, Contractor shall furnish any information needed to justify the reasonableness of activity duration. Such information shall include, but not be limited to, estimated activity manpower, anticipated quantities, and production rates.

ii. Procurement shall be identified with at least two (2) activities: fabrication and delivery. Contractor shall insure that all work activities that require a submittal are preceded by the appropriate submittal and approval activities.

iii. Only contractual constraints shall be shown in the schedule logic. No other restraints are allowed unless approved in writing by Owner or Design Team. This disallowance of constraints includes the use of any mandatory start or finish dates selected by Contractor.

iv. Activities shall be identified by codes to reflect the responsible party for the accomplishment of each activity (only one party per activity), the Phase/Stage of the Project for each activity, and the Area/Location of each activity.

v. The construction time frame for the Work, or any milestone, shall not exceed the specified Contract Time. Logic or activity durations shall be revised in the event that any milestone or Contract completion date is exceeded in the schedule.

vi. Float is defined as the amount of time between when an activity "can start" (the early start) and when an activity "must start" (late start). It is understood by Owner and Contractor that float is a shared commodity, not for the exclusive use or financial benefit of either party. Either party has the full use of the float until it is depleted.

vii. All versions of the CPM schedules and their updates (i.e. construction schedules, two-week look aheads, recovery schedules, etc.) must be stored on the Owner's PMIS (Constructware). The Design/Builder shall upload to Constructware .pdf files as well as the Primavera .xer files or Microsoft Project .mpp files. The Design/Builder shall provide the County the .xer or .mpp files for all schedule updates. It is the Contractor's responsibility for the scheduling software costs, seat licenses and any other training required to fulfill the scheduling requirements.

viii. Initial Schedule Submittal Requirements:
   1. Predecessor/Successor Sort
   2. Total Float/Early Start Sort
   3. Responsibility/Early Start Sort
   4. Area/Early Start Sort
   5. Logic Diagram: Produce diagram with not more than 100 activities per ANSI D (24" x 36") size sheet. Insure each sheet includes title, match data or diagram correlation, and key to identify all components used in the diagram.
   6. Narrative discussing general approach to completion of the Work.
   7. Cost Loading of schedule

ix. Schedule Update Requirements: CM shall update schedules monthly to show actual, current progress and submitted with monthly pay-applications. The schedule updates shall be submitted within seven (7) calendar days of the data dates. These updates shall include:
   1. Dates of activities actual starts and completions.
   2. Percent of Work remaining for activities started by not completed as of the update date.
   3. Narrative report including a listing of monthly progress, the activities that define the critical path and any changes to the path of critical activities from the previous update, sources of delay, any potential problems, requested logic changes, and Work planned for the next month.
   4. Predecessor/Successor Sort
   5. Total Float/Early Start Sort
   6. Responsibility/Early Start Sort
   7. Area/Early Start Sort
   8. Fragnet of logic diagram for all requested logic changes.
   9. Updated logic diagram as required by Owner. At a minimum, Owner shall require a final logic diagram at the end of the Work showing the planned and actual starts and completions.
   10. A bar chart comparison of the updated schedule to the initial (baseline) schedule this diagram shall show actual and planned performance dates for all completed activities. The Contractor shall provide

a baseline comparison for each monthly update compared to baseline schedule.

11. All update information shall be an accurate representation of the actual Work progress.

V. Recovery Schedule: If the initial schedule or any current updates fail to reflect the Work's actual plan or method of operation, or a contractual milestone date is more than fifteen (15) days behind, Owner may require a recovery schedule for completion of the remaining Work by the required Contract milestone date. The Recovery Schedule submitted shall meet the requirements as the original Construction Schedule. The narrative submitted with the Recovery Schedule should describe in detail all changes that have been made to meet the Contract milestone dates.

VI. Change Orders: When a Change Order is proposed, Contractor must identify all logic changes as a result of the Change Order. Contractor shall include, as part of each Change Order proposal, a sketch showing all schedule logic, revisions, duration changes, and the relationships to other activities in the approved Construction Schedule. This sketch shall be known as the fragnet for the change. Upon acceptance of the fragnet, Contractor will revise the Construction Schedule or current update. The logic changes required by the Change Order will be considered incidental to Contractor's work. No separate payment will be made.

END OF SUPPLEMENTAL TERMS AND CONDITIONS

EXHIBIT C

ADDENDA

ACKNOWLEDGEMENT OF ADDENDUM NO. 1

The undersigned Bidder acknowledges receipt of this Addendum by returning one (1) copy of this form with the proposal submittal package to the Department of Purchasing & Contract Compliance, Fulton County Public Safety Building, 130 Peachtree Street, S.W., Suite 1168, Atlanta, Georgia 30303 by the RFP due date and time Monday, April 24, 2017 at 11:00 a.m.

This is to acknowledge receipt of Addendum No. 1, 21ST day of MARCH, 2017.

BUILDSMART/TEBARCO, A JOINT VENTURE LLC
Legal Name of Bidder

Signature of Authorized Representative

VICE CHAIRMAN
Title

ACKNOWLEDGEMENT OF ADDENDUM NO. 2

The undersigned Proponent acknowledges receipt of this Addendum by returning one (1) copy of this form with the proposal submittal package to the Department of Purchasing & Contract Compliance, Fulton County Public Safety Building, 130 Peachtree Street, S.W., Suite 1168, Atlanta, Georgia 30303 by the RFP due date and time Monday, April 24, 2017 at 11:00 a.m.

This is to acknowledge receipt of Addendum No. 2, 7TH day of APRIL, 2017.

BUILDSMART/TEBARCO, A JOINT VENTURE LLC
Legal Name of Proponent

Darrell K. Hallman
Signature of Authorized Representative

VICE CHAIRMAN
Title

ACKNOWLEDGEMENT OF ADDENDUM NO. 3

The undersigned Proponent acknowledges receipt of this Addendum by returning one (1) copy of this form with the proposal submittal package to the Department of Purchasing & Contract Compliance, Fulton County Public Safety Building, 130 Peachtree Street, S.W., Suite 1168, Atlanta, Georgia 30303 by the RFP due date and time Monday, April 24, 2017 at 11:00 a.m.

This is to acknowledge receipt of Addendum No. 3, 20TH day of APRIL, 2017.

BUILDSMART/TEBARCO, A JOINT VENTURE LLC
Legal Name of Proponent

Darrell F. Walling
Signature of Authorized Representative

VICE CHAIRMAN
Title

EXHIBIT D

COST PROPOSAL FORM

COST PROPOSAL FORM

Submitted To: Fulton County Government

Submitted By: BUILDSMART/TEBARCO, A JOINT VENTURE LLC

For: DESIGN/BUILD SERVICES FOR LIBARY CIP RENOVATIONS - GROUP 4

Submitted on APRIL 24, 2017

In response to the Request for Proposal, the undersigned, hereby proposes to furnish all design and construction services, labor, technical and professional services, materials, supplies, equipment, Design-Builder Fees, Architectural and Engineering Fees, and General Conditions Fees for the satisfactory completion of the Project for a cost not to exceed **Two Million Six Hundred Seventy-Five Thousand Three Hundred and Sixty-Eight Dollars ($2,675,368)**, which amount is hereinafter called the Owner's Available Funds.

We propose to furnish all design, architecture, engineering and construction services called for by the Proposal Documents for the following lump sum fees:

Design/Build - Design & Pre-Construction Fees (A):

☐	East Point Library	$ 89,975
☐	Fairburn Hobgood-Palmer Library	$ 120,455
	TOTAL (A)	**$ 210,430**

Design/Build Construction Management Fees (B):

East Point Library	$ 48,157
Fairburn Hobgood-Palmer Library	$ 72,235
TOTAL (B)	**$ 120,392**

Design/Builder Construction General Conditions (C):

☐	East Point Library	$ 76,649
☐	Fairburn Hobgood-Palmer Library	$ 114,974
	TOTAL (C)	**$ 191,623**
	TOTAL (A+B+C)	**$ 522,445**

Design/Build Construction Costs (D):

☐ East Point Library	$	720,958
☐ Fairburn Hobgood-Palmer Library	$	1,068,507
CONSTRUCTION COST TOTAL (D)	$	1,789,465 **(Not to Exceed Amount)**

OWNER CONTROLLED CONTINGENCY (E): $ 363,458

GMP AWARD (A+B+C+D+E) $ 2,675,368 **(Not to Exceed Amount)**

TWO MILLION SIX HUNDRED SEVENTY FIVE THOUSAND THREE HUNDRED SIXTY EIGHT +00/100 DOLLARS

(GMP Award In Words of lines A+B+C+D+E)

EXHIBIT E

BONDS

(PROPOSAL, PAYMENT AND PERFORMANCE BOND)

PROPOSAL BOND

#17RFP020717K-EC
DESIGN/BUILD SERVICES FOR LIBRARY CIP RENOVATIONS – GROUP 4

FULTON COUNTY GOVERNMENT

KNOW ALL MEN BY THESE PRESENTS, THAT WE BuildSmart/Tebarco, a Joint Venture, LLC

hereinafter called the PRINCIPAL, and Travelers Casualty and Surety Company of America

hereinafter called the SURETY, a corporation chartered and existing under the laws of the State of Connecticut, and duly authorized to transact Surety business in the State of Georgia, are held and firmly bound unto the Fulton County Government, in the penal sum of Five Percent of Bid Amount--- Dollars and Cents ($ 5%) good and lawful money of the United States of America, to be paid upon demand of the Fulton County Government, to which payment well and truly to be made we bind ourselves, our heirs, executors, administrators and assigns, jointly and severally and firmly by these presents.

WHEREAS the PRINCIPAL has submitted to the Fulton County Government, for **#17RFP020717K-EC, Design/Build Services for Library CIP Renovations – Group 4** a Proposal;

WHEREAS the PRINCIPAL desires to file this Bond in accordance with law;

NOW THEREFORE: The conditions of this obligation are such that if the Proposal be accepted, the PRINCIPAL shall within ten (10) calendar days after receipt of written notification from the COUNTY of the award of the Contract execute a Contract in accordance with the Proposal and upon the terms, conditions and prices set forth therein, in the form and manner required by the Fulton County Government, and execute sufficient and satisfactory Performance and Payment Bonds payable to the Fulton County Government, each in the amount of one hundred (100%) percent of the total contract price in form and with security satisfactory to said Fulton County Government, then this obligation to be void; otherwise, to be and remain in full force and virtue in law; and the SURETY shall upon failure of the PRINCIPAL to comply with any or all of the foregoing requirements within the time specified above immediately pay to the Fulton County Government, upon demand the amount hereof in good and lawful money of the United States of America, not as a penalty but as liquidated damages.

In the event suit is brought upon this Bond by the COUNTY and judgement is recovered, the SURETY shall pay all costs incurred by the COUNTY in such suit, including attorney's fees to be fixed by the Court.

Enclosed is a Proposal Bond in the approved form, in the amount of

Five Percent of Bid Amount--- Dollars

($ 5%) being in the amount of five (5%) percent of the CONTRACT Sum. The money payable on this bond shall be paid to the Fulton County Government, for the failure of the Offer to execute a CONTRACT within ten (10) days after receipt of the Contract form and at the same time furnish a Payment Bond and Performance Bond.

IN TESTIMONY THEREOF, the PRINCIPAL and SURETY have caused these presents to be duly signed and sealed this 21st day of April, 2017.

ATTEST:

BuildSmart/Tebarco, a Joint Venture, LLC
PRINCIPAL

BUILDSMART/TEBARCO, A JOINT VENTURE, LLC BY _____ (SEAL)

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the Corporation named as principal in the within bond; that _____, who signed the said bond of said corporation; that I know this signature, and his/her signature thereto is genuine; and that said bond was duly signed, sealed and attested for in behalf of said Corporation by authority of its governing body.

_____
SECRETARY

(CORPORATE SEAL)

Travelers Casualty and Surety Company of America
SURETY

Margaret S. Meyers, Attorney-in-fact BY _____
(SEAL)

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, Kevin E. Hughes, the undersigned, Assistant Secretary, of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 21st day of April, 20 17.

Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, call 1-800-421-3880 or contact us at www.travelersbond.com. Please refer to the Attorney-In-Fact number, the above-named individuals and the details of the bond to which the power is attached.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

TRAVELERS

POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 231819

Certificate No. 007118080

KNOW ALL MEN BY THESE PRESENTS: That Farmington Casualty Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company are corporations duly organized under the laws of the State of Connecticut, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

Douglas L. Rieder, Debra Johnson, Brian Perry, Carl R. Wise, John W. Miller, II, F. Anderson Philips, Richard W. Naylor, John Earl, Wm. John Graham, W. Wesley Hamilton, Jr., Margaret S. Meyers, S. Lynn Sghiatti, and Misty Haig

of the City of Atlanta, State of Georgia, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 8th day of February, 2017.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut
City of Hartford ss.

By: _____
Robert L. Raney, Senior Vice President

On this the 8th day of February, 2017, before me personally appeared Robert L. Raney, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.
My Commission expires the 30th day of June, 2021.

MARIE C. TETREAULT NOTARY PUBLIC CONNECTICUT

Marie C. Tetreault
Marie C. Tetreault, Notary Public

58440-5-16 Printed in U.S.A.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

Bond No. 106750038

PAYMENT BOND

No Contract with Fulton County for work to be done shall be valid for any purpose unless the Contractor provides a Payment Bond with good and sufficient surety payable to Fulton County for the use and protection of all sub-contractors and all persons supplying labor, materials, machinery, and equipment in the prosecution of the work provided for in the Contract. The Payment Bond shall be in the amount of 100% of the total contract amount, payable by the terms of the Contract, and shall be written on the following form.

Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Georgia.

Attestation for the corporation must be by the corporate officer; for a partnership by another partner; for an individual by a notary with the corporate seal.

Bond No. 106750038

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that ***[BuildSmart/Tebarco, a Joint Venture, LLC]*** (hereinafter called the "Principal") and ***[Travelers Casualty and Surety Company of America]*** (hereinafter called the "Surety"), are held and firmly bound unto **FULTON COUNTY**, a political subdivision of the State of Georgia (hereinafter called the "Owner"), its successors and assigns as obligee, in the penal sum of [$2,675,368.00], lawful money of the United States of America, for the payment of which the Principal and the Surety bind themselves, their administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered, or is about to enter, into a certain written contract with the Owner, dated _____, which is incorporated herein by reference in its entirety (hereinafter called the "Contract"), for construction-type services of a project known as [insert name of project], as more particularly described in the Contract (hereinafter called the "Project").

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall promptly make payment to all persons working on or supplying labor or materials under the Contract, and any amendments thereto, with regard to labor or materials furnished and used in the Project, and with regard to labor or materials furnished but not so used, then this obligation shall be void; but otherwise it shall remain in full force and effect.

1. A "Claimant' shall be defined herein as any subcontractor, person, party, partnership, corporation or the entity furnishing labor, services or materials used, or reasonably required for use, in the performance of the Contract, without regard to whether such labor, services or materials were sold, leased or rented, and without regard to whether such Claimant is or is not in privity of contract with the Principal or any subcontractor performing work on the Project, including, but not limited to, the following labor, services, or materials: water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Contract.

2. In the event a Claimant files a lien against the property of the Owner, and the Principal fails or refuses to satisfy or remove it promptly, the Surety shall satisfy or remove the lien promptly upon written notice from the Owner, either by bond or as otherwise provided in the Contract.

3. The Surety hereby waives notice of any and all modifications, omissions, additions, changes, alterations, extensions of time, changes in the payment terms, and any other amendments in or about the Contract and agrees that the obligations undertaken by this Bond shall not be impaired in any manner by reason of any such modifications, omissions, additions, changes, alterations, extensions of time, changes in payment terms, and amendments.

4. The Surety hereby agrees that this Bond shall be deemed amended automatically and immediately, without formal or separate amendments hereto, upon any amendment or modifications to the Contract, so as to bind the Principal and Surety, jointly and severally, to the full payment of any Claimant under the Contract, as amended or modified, provided only that the Surety shall not be liable for more than the penal sum of the Bond, as specified in the first paragraph hereof.

5. This Bond is made for the use and benefit of all persons, firms, and corporations who or which may furnish any materials or perform any labor for or on account of the construction-type services to be performed or supplied under the Contract, and any amendments thereto, and they and each of them may sue hereon.

6. No action may be maintained on this Bond after one (1) year from the date the last services, labor, or materials were provided under the Contract by the Claimant prosecuting said action.

7. This Bond is intended to comply with O.C.G.A. Section 13-10-1, and shall be interpreted so as to comply with the minimum requirements thereof. However, in the event the express language of this Bond extends protection to the Owner beyond that contemplated by O.C.G.A. Section 13-10-1, or any other statutory law applicable to this Project, then the additional protection shall be enforced in favor of the Owner, whether or not such protection is found in the applicable statutes. **IN WITNESS WHEREOF,** the Principal and Surety have hereunto affixed their corporate seals and caused this obligations to be signed by their duly authorized representatives this 28th of June, 2017.

BuildSmart/Tebarco, a Joint Venture, LLC (SEAL)
(Principal)
By: _____

Attest:
_____
Secretary

Travelers Casualty and Surety Company of America (SEAL)
(Surety)
By: _____
S. Lynn Sghiatti, Attorney-in-fact

Attest:
_____
~~Secretary~~x Margaret S. Meyers, Attorney-in-fact

One Tower Square, Hartford, CT 06183
(Address of Surety's Home Office)

_____
(Resident Agent of Surety) S. Lynn Sghiatti
GA Resident Agent

TRAVELERS

POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 231819

Certificate No. 007118276

KNOW ALL MEN BY THESE PRESENTS: That Farmington Casualty Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company are corporations duly organized under the laws of the State of Connecticut, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

Douglas L. Rieder, Debra Johnson, Brian Perry, Carl R. Wise, John W. Miller, II, F. Anderson Philips, Richard W. Naylor, John Earl, Wm. John Graham, W. Wesley Hamilton, Jr., Margaret S. Meyers, S. Lynn Sghiatti, and Misty Haig

of the City of Atlanta, State of Georgia, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 8th day of February, 2017.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut
City of Hartford ss.

By: _____
Robert L. Raney, Senior Vice President

On this the 8th day of February, 2017, before me personally appeared Robert L. Raney, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.
My Commission expires the 30th day of June, 2021.

MARIE C. TETREAULT NOTARY PUBLIC CONNECTICUT

_____
Marie C. Tetreault, Notary Public

58440-5-16 Printed in U.S.A.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, Kevin E. Hughes, the undersigned, Assistant Secretary, of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 25th day of June, 2017.

Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, call 1-800-421-3880 or contact us at www.travelersbond.com. Please refer to the Attorney-In-Fact number, the above-named individuals and the details of the bond to which the power is attached.

Bond No. 106750038

PERFORMANCE BOND

No contract with Fulton County for work to be done shall be valid for any purpose unless the Contractor provides a Performance Bond with good and sufficient surety payable to, in favor of, and for the protection of Fulton County. The Performance Bond shall be in the amount of 100% of the total contract amount, payable by the terms of the Contract, and shall be written on the following form.

Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business as a surety in Georgia.

Attestation for the corporation must be by the corporate officer; for a partnership by another partner; for an individual by a notary with the corporate seal.

Bond No. 106750038

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS that BuildSmart/Tebarco, a Joint Venture, LLC *(Insert name of Contractor)* (hereinafter called the "Principal") and Travelers Casualty and Surety Company of America *(Insert name of Surety)* (hereinafter called the "Surety"), are held and firmly bound unto **FULTON COUNTY**, a political subdivision of the State of Georgia (hereinafter called the "Owner"), its successors and assigns, in the penal sum of $2,675,368.00 *[100% of Contract amount]*, lawful money of the United States of America, for the payment of which the Principal and the Surety bind themselves, their administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered, or is about to enter, into a certain written contract with the Owner, dated _____, which is incorporated herein by reference in its entirety (hereinafter called the "Contract"), for construction-type services of a project known as **Replacement of Entrance Doors in Government Center**, as more particularly described in the Contract (hereinafter called the "Project");

NOW, THEREFORE, the conditions of this obligation are as follows, that if the Principal shall fully and completely perform all the undertakings, covenants, terms, conditions, warranties, and guarantees contained in the Contract, including all modifications, amendments, changes, deletions, additions, and alterations thereto that may hereafter be made, then this obligation shall be void; otherwise it shall remain in full force and effect.

Whenever the Principal shall be, and declared by the Owner to be, in default under the Construction-Type Contract, the Surety shall promptly remedy the default as follows:

1. Complete the Contract in accordance with its terms and conditions; or, at the sole option of the Owner,

2. Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by the Surety and the Owner of the lowest responsible bidder, arrange for a contract between such bidder and Owner and make available as the work progresses (even though there should be a default or succession of defaults under the Contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the penal sum set forth in the first paragraph hereof, as may be adjusted, and the Surety shall make available and pay to the Owner the funds required by this Paragraph prior to the payment of the Owner of the balance of the contract price, or any portion thereof. The term "balance of the contract price," as used in this paragraph, shall mean the total amount payable by the Owner to the Contractor under the Contract, and any amendments thereto, less the amount paid by the Owner to the Contractor; or, at the sole option of the Owner,

3. Allow Owner to complete the work and reimburse the Owner for all reasonable costs incurred in completing the work.

In addition to performing as required in the above paragraphs, the Surety shall indemnify and hold harmless the Owner from any and all losses, liability and damages, claims, judgments, liens, costs and fees of every description, including reasonable attorney's fees, litigation costs and expert witness fees, which the Owner may incur, sustain or suffer by reason of the failure or default on the part of the Principal in the performance of any or all of the terms, provisions, and requirements of the Contract, including any and all amendments and modifications thereto, or

incurred by the Owner in making good any such failure of performance on the part of the Principal.

The Surety shall commence performance of its obligations and undertakings under this Bond promptly and without delay, after written notice from the Owner to the Surety.

The Surety hereby waives notice of any and all modifications, omissions, additions, changes, alterations, extensions of time, changes in payment terms, and any other amendments in or about the Contract, and agrees that the obligations undertaken by this Bond shall not be impaired in any manner by reason of any such modifications, omissions, additions, changes, alterations, extensions of time, change in payment terms, and amendments.

The Surety hereby agrees that this Bond shall be deemed amended automatically and immediately, without formal or separate amendments hereto, upon any amendment to the Contract, so as to bind the Principal and the Surety to the full and faithful performance of the Contract as so amended or modified, and so as to increase the penal sum to the adjusted Contract Price of the Contract.

No right of action shall accrue on this Bond to or for the use of any person, entity or corporation other than the Owner and any other obligee named herein, or their executors, administrators, successors or assigns.

This Bond is intended to comply with O.C.G.A. Section 36-91-1 et seq., and shall be interpreted so; as to comply with; the minimum requirements thereof. However, in the event the express language of this Bond extends protection to; the Owner beyond that contemplated by O.C.G.A. Section 36-91-1 et seq. and O.C.G.A. Section 13-10-1, as amended, or any other statutory law applicable to this Project, then the additional protection shall be enforced in favor of the Owner, whether or not such protection is found in the applicable statutes.

IN WITNESS WHEREOF the undersigned have caused this instrument to be executed and their respective corporate seals to be affixed and attested by their duly authorized representatives this 28th day of June, 2017.

BuildSmart/Tebarco, a Joint Venture, LLC (SEAL)
(Principal)
By

Attest:
Secretary

Travelers Casualty and Surety Company of America (SEAL)
(Surety)

By:

S. Lynn Sghiatti, Attorney-in-fact
Attest:
Secretary Margaret S. Meyers, Attorney-in-fact

One Tower Square, Hartford, CT 06183

(Address of Surety's Home Office)

(Resident Agent of Surety) S. Lynn Sghiatti
GA Resident Agent

END OF SECTION

TRAVELERS

POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 231819

Certificate No. 007118272

KNOW ALL MEN BY THESE PRESENTS: That Farmington Casualty Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company are corporations duly organized under the laws of the State of Connecticut, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

Douglas L. Rieder, Debra Johnson, Brian Perry, Carl R. Wise, John W. Miller, II, F. Anderson Philips, Richard W. Naylor, John Earl, Wm. John Graham, W. Wesley Hamilton, Jr., Margaret S. Meyers, S. Lynn Sghiatti, and Misty Haig

of the City of Atlanta, State of Georgia, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 8th day of February, 2017.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut
City of Hartford ss.

By: _____
Robert L. Raney, Senior Vice President

On this the 8th day of February, 2017, before me personally appeared Robert L. Raney, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.
My Commission expires the 30th day of June, 2021.

MARIE C. TETREAULT NOTARY PUBLIC CONNECTICUT

_____
Marie C. Tetreault, Notary Public

58440-5-16 Printed in U.S.A.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, Kevin E. Hughes, the undersigned, Assistant Secretary, of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 28th day of June, 20 17.

Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, call 1-800-421-3880 or contact us at www.travelersbond.com. Please refer to the Attorney-In-Fact number, the above-named individuals and the details of the bond to which the power is attached.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

EXHIBIT F

SCOPE OF WORK TECHNICAL SPECIFICATIONS

SCOPE OF WORK

The scope of works includes, but is not limited to:

- Site analysis and Mobilization Plan
- Programming and Code Analysis
- Execution and Management of Design Phase, within established budget, from Programming through 100% Construction Documents
- Design & Construction Management and execution of a Safety Plan
- Prepare project schedule and monthly updates
- Provide necessary Insurance including Errors & Omissions for Design
- Provide 100% Performance and Payment Bonds prior to Construction
- Pre-Construction Services to include, but not limited to, cost estimating, constructability reviews, Building Envelope Review and Recommendations, long lead item review, schedule development.
- Management and execution of all required permits
- Management and execution of all of the Procurement Phase, in coordination with Fulton County Purchasing
- Management and execution of all Construction Phase activities
- Staging, climate controlled storage and move management for each library will be part of the Design/Build firm's scope of work. It will be the Design/Builder's responsibility to develop a staging, climate controlled storage and phasing plan in conjunction with the overall project schedule to be approved by the Owner. The Design/Builder will also be required to move, store and reinstall the existing collections for each library in coordination with library staff. The Design/Builder will also move existing furniture to County's surplus warehouse.
- Management and execution of the Post Construction Phase including Warranty Management.
- Execute fully the requirements and intent of this RFP

1. The Design/Builder will be required to assume an active role in the control of time and cost of the project. The Design/Builder shall develop a **Master Project Critical Path Method (CPM) schedule** reflecting all phases of the overall Group and each of the projects including design, procurement, construction and project closeout to the satisfaction of Fulton County. The Schedule shall reflect agreed upon milestones for evaluation of progress and show relationships between tasks, activities, shutdowns and inspection/approvals by responsibility, design, discipline, construction trades and phase of the program. Preparation and adherence to the Project Schedule shall be a contractual responsibility of the Design/Builder. In addition to the Design/Builder's work the schedule should include the timing and coordination of owner supplied/owner installed items. These items include but are not limited to reinstallation of existing artwork, IT/Data Equipment, Audio/Visual Systems, Networks, and Security Systems, etc. The Design/Builder shall remain fully

responsible for designing and constructing the project within the established budget and time constraints.

The Design/Builder shall work closely with the County and other County Design/Builders to coordinate library closures to ensure that the patrons of the library system are not left with areas that have multiple library closures leaving the patrons with no close library service. Final approval of the schedule/library closures shall be the with the County's approval.

The Design/Builder shall develop, manage and execute a safety program for all phases of the work with periodic reporting to Fulton County through its Program Manager.

2. The Design/Builder shall make bi-weekly reports to Fulton County/Owner's Program Manager indicating the status of all activities and depicting their impact on the schedule, budget and functionality of the project and impact on current operations including closings and re-openings of the affected facility.

A. PART 1 – DESIGN/BUILDER'S DESIGN RESPONSIBILITIES

1. The Design/Builder will be responsible for making all applications for building and other development permits. This includes the preparation of applications, drawings, exhibits, surveys, design computation summaries and other documents needed to file for and obtain all necessary permits and to satisfy the Owner and Jurisdiction that the intent of this RFP is being met.

   Responsibilities shall include, but not be limited to:

   - Prepare detailed existing conditions documents for use in design.
   - It is the goal of Fulton County that each library renovation receives, at a minimum, LEED Silver Certification. The D/B shall have on its team an experienced LEED Consultant to serve as the LEED Administrator with responsibility for reviewing and analyzing the options for LEED Silver Certification and submitting recommendations to the Owner regarding the potential paths and feasibility (including cost impacts) for obtaining LEED Silver Certification for each library renovation. The Design/Builder must include in their schedule the submissions for both design and construction phase LEED reviews and include all costs associated with LEED Silver Certification in their Schedule of Values including preliminary reporting, charrettes, LEED Project registration, design and construction submission. The D/B's LEED Administrator shall be responsible for organizing and conducting LEED charrettes, registering the projects in LEED On-Line; paying all registration and review costs; and developing and submitting all documentation

associated with LEED Silver Certification. The D/B's LEED Administrator shall fully cooperate and communicate with the Owners/PMT's LEED Consultant. The Design/Builder shall coordinate and cooperate with the County's Department of Real Estate and Asset Management (DREAM) to ensure that all systems (Mechanical, Electrical, Plumbing and Technological) conform to the County's current standards during the design and construction of each library.

- The Design/Builder will coordinate with the County's selected consultants for Furniture, Fixtures and Equipment (FF&E) and Technology under separate contract with the County. The Design/Builder will include documents from the FF&E and Technology Consultants in their design documents.
- Meet with Atlanta-Fulton Public Library and Fulton County staff for purposes of information gathering in the development of each libraries Program. The Design/Builder will actively participate in community outreach meetings for each library and will incorporate gathered input into their library program.
- Develop library program
- Prepare schematic design, design development and construction documents. Included with each set of design phase documents, the D/B shall provide a detailed cost estimate including quantities and unit costs to the detail and format required by the Owner; detailed schedule and Constructability Review.
- Submit drawings for review and approval by the proper local and/or state agencies and Fulton County/Owner's Program Manager and make changes as required to obtain approval.
- The Design/Builder shall also hire a qualified surveyor to produce an ALTA survey that will be included in the construction documents.
- Conduct additional surveys and perform other investigations, including hazardous materials testing/reporting, above and beyond that already performed by the County and provided as part of this document as necessary to minimize change orders. Include cost of hazmat survey & remediation allowance in the GMP.
- Perform an ADA compliance review with Fulton County's ADA Compliance Representative during Design Development.
- Coordinate all aspects of the design
- Update the project schedule at least bi-weekly
- Prepare and submit all documents necessary to obtain all required permits. All permit and other fees are the responsibility of the Design/Builder.
- Conduct, record and distribute meeting minutes of design progress meetings with the Atlanta Fulton Public Library System/Owner's Program Manager.
- Prepare and submit a detailed Preliminary Design Estimate and Construction Documents Estimate, including GMP Development, of the construction cost for the Project based on approved plans.

2. It shall be the Design/Builder's responsibility to produce a design in accordance with all applicable codes, rules, regulations and sound design practice that is functional, buildable and maintainable to the complete satisfaction of Fulton County, for a total cost (including Part 1 Design phase) within the allocated project budget of:

Two Million Six Hundred Seventy-Five Thousand Three Hundred and Sixty-Eight Dollars ($2,675,368). This Budget amount includes Owner Controlled Contingency (see Exhibit 2 "Cost Data Form" and Section 00700-111 of the General Conditions) in the amount of Three Hundred Sixty-Three Thousand Four Hundred and Fifty-Eight dollars ($363,458), a Construction Contingency of One Hundred Twenty-One Thousand One Hundred and Fifty-Three dollars ($121,153) and an allowance of Three Hundred Ninety-One Thousand Five Hundred and Fifty dollars ($391,550) for FF&E that includes shelving. The D/B shall include the FF&E Allowance & Construction Contingency amounts in their D/B construction costs.

PART 1 – DESIGN/BUILDER CONSTRUCTION RESPONSIBILITIES

1. Construction for the project will commence with the issuance of a Notice-to Proceed with Construction issued in writing by Fulton County and will terminate when final payment is made by Fulton County to the Design/Builder. Substantial Completion will occur when the project is ready for its intended use in accordance with the approved plans and specifications AND the local Authority having jurisdiction over the project authorizes and issues a Certificate of Occupancy.

2. Scope of Services during the Construction Phase includes, but is not limited to:

- Compliance with Fulton County's SBE Program
- Prepare and issue bid packages in compliance with Fulton County's Purchasing requirements
- Pre-Construction Meeting with trades
- Mock-Up construction
- Construction of the Project
- Construction management and administration
- Quality Control Inspections by the Design/Builder with monthly reports issued to Fulton County/Owner's Program Manager by the Design/Builder's designer professionals during construction
- Project/Field engineering
- Construction Supervision
- LEED Administration and documentation
- Meetings with Fulton County/Owner's Program Manager; record and distribute minutes

- Schedule updates at least bi-weekly
- Coordination of the Testing and Materials Inspections with County Contractor
- Obtain and pay for all required inspections and permits
- Minimize disruption to other trades, building occupants
- Implement MBE Utilization Plan
- Pay for all goods and services and provide releases of liens to Fulton County/Owner's Program Manager as required during execution of work
- Provide information to assist the Fulton County/Owner's Program Manager with Completion Reports
- Arrange for training Fulton County personnel in operations and maintenance procedures by manufacturers' representatives
- Obtain Certificate of Occupancy
- Issue Certificate of Substantial Completion including associated punch list that includes Owner's/Owner's Representative punch list items.

B. PART 1 - DESIGN/BUILDER'S POST CONSTRUCTION RESPONSIBILITIES

1. Items on the punch list must be completed and Final Completion must be achieved within thirty (30) days of Substantial Completion. Also within one (1) month of Substantial Completion, the Design/Builder shall provide five (5) copies of a final report. This report is to include:

   - Copies of all meeting minutes
   - Copies of all permits
   - "As-built" drawings prepared by the A/E (4 sets black line prints & five (5) digital copies)
   - Correspondence with regulatory agencies, if any
   - Final survey on Mylar and electronic form
   - Warranties and guarantees
   - Operations and Maintenance Manuals (5 hard copies & 1 digital copy on flash drive).
   - Statement certifying Project Completion
   - Final Summary of all costs
   - Complete all requirements of this RFP
   - Warranty Inspections
   - Conduct Warranty Review/Facility Inspection one month prior to the end of the general warranty period with Fulton County and facility staff to identify and repair/resolve outstanding warranty issues prior to the end of the warranty period

Please also reference General Conditions Section 00700-92, Scope of Work

C. PART 1 – PROJECT DELIVERABLES

1. The selected Design/Build firm shall evaluate each library based on site observation and an assessment provided by Fulton County, Program Interviews with Atlanta-Fulton Public Library System, and will make recommendations to the Owner.

2. Based on feedback from the Owner, the Design/Build firm will provide programming, design and preconstruction services throughout all phases of the design. Constructability reviews, long lead item review and estimates will be provided at each design phase to assure the Owner's needs are met and the project remains within the budget.

3. In order to expedite the project, early release packages for portions of the work may be released.

4. The selected Design/Build firm will provide Contract Administration and Construction Management services throughout the construction phase. The Contract Administration and Construction Management service shall continue throughout close out of the project.

5. If applicable - in order to maintain service to the libraries patrons, at least one library in an area must remain open, the selected Design/Build firm, as part of their evaluation, will create and submit a phasing plan and schedule to the Owner for approval by the Owner.

6. Some of the projects may require vacating the library under renovation. In these cases, the Design/Build firm will be required to provide Move Management and staging (as necessary) and storage services, including but not limited to, box, collection, artwork, and surplus moves.

7. The County requires the Design/Build firm to utilize the Contract Management software that will be purchased and managed by the County. The software will be web based. The Design/Build firm shall be responsible for the costs of all seats on Contract Management software that they require. The County will provide general training to three members of the Design/Build firm, any further training required by the Design/Build firm will be the responsibility of the Design/Build firm. It will be required that the Contract Management software contain all project correspondence, including but not limited to, transmittals, submittals, Request for Proposals (RFP's), Invitation to Bids (ITB's), document control, change orders, letters, memorandums, meeting minutes, phone logs, construction documents, emails, etc.

8. The Design/Builder shall provide scheduling software (Microsoft Project or Primavera P6 are acceptable) and shall contain all schedules during the design, pre-construction, construction and closeout phases of the project.

D. PART 1 - PROJECT SCHEDULE

1. All work on the Branch Libraries Renovations (Group 4) must be completed and closed-out by June 28, 2019.

2. General: Design/Builder shall provide and maintain a separate schedule for each project. Make the initial schedule available on the document management service prior to submittal of first application for payment. Revise and update schedule monthly and submit with each application for payment. The Owner will not review any payment request until the schedule has been submitted and accepted as information. Prepare Design/Builder's Schedule using a computerized, time-scaled Critical Path Method (CPM) network analysis diagram for the Work. All key activities and milestones shall be listed, including but not limited to, the following:

   a. Permit submittals

   b. LEED submittals for both design and construction phases

   c. Agency review and approval of permits

   d. Preparation and processing of submittals

   e. Mobilization and demobilization

   f. Purchase of materials

   g. Deliveries

   h. Fabrication

   i. Utility interruptions

   j. Installation

   k. Testing

   l. Provide both .pdf and scheduling software's editable (either .xer or .mpp/.mpt/.mpd.

   Identify Any Float: The measure of leeway in starting and completing an activity. Float time is not for the exclusive use or benefit of either the Owner or the Design/Builder, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

EXHIBIT G

EXHIBITS

EXHIBIT 1

BUILDING STANDARD DESIGN GUIDELINES

Building Standard Design Guidelines

atlanta-fulton public library system

Library Building Program – Phase II

September 28, 2016

HEERY / RUSSELL - *a joint venture*

Atlanta Fulton Public Library System Capital Improvement Plan - Phase II
Building Standard Design – Table of Contents

AFPLS Building Standard Design Guidelines

PURPOSE OF THE GUIDELINES:

These design guidelines are for use by design professionals to facilitate design of projects included in the AFPL Library Capital Improvement Program – Phase I. These guidelines intend to use the knowledge of problems that have occurred on past design, construction and operation of Library and/or County projects in an attempt to avoid such problems. Additionally, these guidelines are meant to define a standard for products and installation based the following priorities:

- Quality of materials and installation
- Ease of maintenance and operation
- Energy Efficiency and Water Conservation
- Safety
- Theft and vandal resistance
- Flexibility for future uses and alterations
- Cost (last but not least)

These design guidelines are not meant to be comprehensive instructions for design. Other essential references for design include the Building Program(s), Applicable Codes, as well as experience of the designers and interaction in the design process. The guidelines are meant to be complementary with other design references. If there is any conflict between the guidelines and the Code or Building Program then the Code or Program shall prevail.

This Capital Improvement Program (CIP) includes "specialty" consultants hired by the County to develop separate standards for Technology, Wayfinding and Furniture/Fixtures & Equipment (FF&E) considering the program as a whole. The process for developing these "specialty" standards will occur during architectural design of these projects as a coordinated effort.

Products and installations provided in the guidelines are to serve as an example of the County's intent and to define an acceptable level of quality. Equivalent products may be available and may be submitted to the County for approval via the "Substitution Procedures". The designer must submit documentation clearly verifying the equivalency of the alternate in comparison with the example provided in the guidelines.

Compliance with this guideline is mandatory. Deviations and substitutions will only be approved per the "Substitution Procedures" and "Substitution Request Form (SR)" included in these guidelines following this page.

SUBSTITUTION PROCEDURES

A. Where the Building Standard Design Guidelines stipulate a particular product, substitutions will be considered up to 10 calendar days before submittal of the GMP.

B. Substitutions may be considered when a product becomes unavailable through no fault of the Design/Builder.

C. Document each request with complete data substantiating compliance of proposed substitution with the Building Standard Design Guidelines.

D. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedures:
   1. Substitution requests should be submitted on the Form provided with this section.
   2. Submit one electronic copy of request for substitution for consideration. Limit each request to one proposed substitution.
   3. Submit shop drawings, product data and certified test results attesting to the proposed product equivalence. Burdon of proof is on proposer.
   4. The Owner will notify the Design/Builder in writing of decision to accept or reject request.

SUBSTITUTION REQUEST (SR)

PRODUCT:

PRE-GMP INQUIRY NO:
DATE OF INQUIRY:

TO:
TELEPHONE: FAX: EMAIL:

The Design/Builder hereby requests consideration of the following product in lieu of the specified product(s) listed in the Building Standard Design Guidelines.

A. BUILDING STANDARD DESIGN GUIDELINES REFERENCE:
(Section Name, Section & Paragraph Number)

B. SPECIFIED PRODUCT: Manufacturer:
Address:
Phone:
Product Description:

C. REASON FOR NOT GIVING PRIOITY TO SPECIFIED ITEM:

D. PROPOSED SUBSTITUTION: Manufacturer:
Address:
Phone:
Product Description:

E. The following attachments are transmitted as supplementary information essential to for evaluating the proposed substitution:

1. Effect on Construction Schedule.
2. Itemized Comparison (Proposed Product to Specified Product).
3. Data indicating investigation to determine effect on other work.
4. Manufacturer's literature.
5. Drawings indicating required changes to Contract Documents.
6. Illustrations, Samples, Certificates and Records of Tests related to quality, finish and durability.
7. Evidence of equivalent sources of service and repair.
8. Similar projects on which product was used and date.
9. Preliminary Operation and Maintenance Data.
10. Warranties.
11. Approvals from local governing authorities.

SUBMITTED BY: Design/Builder:
Address:
City/State/Zip:
Telephone: Fax:

1 - SITE IMPROVEMENTS

UTILITIES

Separate metered connections are to be provided for the following utilities:

1) Domestic Water
2) Fire Sprinkler System, including any new fire hydrants
3) Irrigation (If required)

Located and configured according to local requirements, near the road. Screen utilities connections and backflow preventers with vegetation or place in vault(s) that are acceptable to the permitting authorities, and the County.

Run all utilities crossing site below grade rather overhead.

See Electrical Section for more information about Electrical Utilities and Site Electrical.

LANDSCAPE

Intent:
The landscape environment will be designed and installed to create an attractive environment for the users of the facility. The landscape will be coordinated to complement the function of the facility, creating a safe buffer between pedestrian and automobile traffic while allowing visual contact needed to maintain safety and crime prevention through environmental design (CEPTED). Additionally, the landscape will provide places with shade and isolation from wind and noise. The plants will be selected and placed to be low maintenance, non-invasive species that promote the conservation of water.

Preferences:

- Where feasible and to reduce future landscape maintenance, reduce or eliminate organic landscape beds and grass areas and convert beds over to a type of rock mulch: river rock, slate, marble chips etc. Most of the time this will be in beds adjacent to buildings, parking lots, walkways and entrances. All beds that are converted to rock mulch should include requisite landscape/weed fabric to keep rock and dirt from mixing and to eliminate weeds and tree seedlings from sprouting.
- Where feasible and to reduce or eliminate landscape beds and grass areas, the expansion of existing concrete walkways, entrance areas and landings may be necessary. Concrete pavers (PICP) or brick pavers will be considered as an alternative to solid, poured in place concrete. Design and technical specs will be necessary to accomplish this task.
- Specify one (1) year warranty on all contractor installed plant materials, including sod. Also specify that the contractor is to include maintenance of all contractor installed plant materials, including sod, during the one (1) year warranty period.

- Utilize tree gators, Ooze tubes etc., where necessary to insure trees live till the end of the one year warranty period, starting from the substantial completion date.
- Reduce the area of site disturbance as much as practical.
- Use Native/Local, readily available species of plants that are drought tolerant and low maintenance. See Georgia Native Plant Society List for reference (available on the web).
- Specify 1 year Installer warranty for replacement of non-viable plant material.
- Avoid placing deciduous plants around the main entrance or mechanical equipment.
- Leave watering bags on trees at least 6 months beyond substantial completion. Remove bags prior to warranty inspection.
- Design to minimize need for irrigation.
- Where irrigation is to be required use high-efficiency systems.
- Irrigation system will be locally controlled (onsite).
- Irrigation controller is to be surface mounted just inside the mechanical room.
- Locate rain sensor in full exposure to rain and away from trees or anything that may drop debris (that will clog the sensor).
- The Building foot print is to be pre-treated for termites using chemicals that are in accordance with Georgia Department of Agriculture.
- Consider a Rainwater Catchment System. Locate near raised planting beds where hand watering may be practical.
- Employ a Xeriscaping program; a good reference for Georgia may be found at: http://www.marex.uga.edu/advisory/Library/CSCPpdfs/Xeriscape.pdf Reduce lawn area that requires mowing as much as possible.
- Fences, where required, shall be designed and specified in accordance with Fulton County Standard Specifications attached at the end of this section.

PAVEMENT

Intent:

Site paving shall be provided to facilitate pedestrian and vehicular access related to the use and operation of the facility. Bicycle traffic is included with pedestrian circulation. Buses and heavy trucks will be included in vehicular traffic onsite. The design of site pavements will be based on coordinated geotechnical engineering, utilities locations, storm water drainage management, traffic, and owner maintenance considerations. All paving must be designed with positive drainage with no ponding. The basic dimensions and configuration of parking shall be as follows:

Parking Space Width:	9'-0" (minimum)
Parking Space Length:	18'-0"
Parking Angle:	90 degrees
Drive Aisle:	24'-0" (two-way)
Stripe Width	0'-4"

Stripe Color:	White for general parking. Yellow for no parking, handicapped parking per accessibility code. Red curb at fire lane.
Lighting:	0.5fc minimum on pavement surface

Vehicular Paving Preferences:

- Pavement for vehicular traffic shall be asphaltic concrete in accordance with Georgia Department of Transportation " Standard Specification for the Construction of Roads and Bridges", current edition.
- Pervious or Porous asphalt pavements may be used only where approved by the County.
- Recycled Asphalt Products may be used under conditions specifically approved by the County.
- Curbing is required where pedestrian sidewalk is within 5 feet from the edge of driveway. All curbs are to be concrete, in accordance with GDOT Construction Standards and Details GA-STD 9032B. 6 inch curb with 18 inch gutter is allowed where such section provides adequate drainage volume.
- Wheel stops where required shall be concrete.
- Speed bumps and traffic tables are not preferred.
- Paver systems are strongly discouraged.
- Provide a place for an 80 gallon trash bin, and a separate recycling bin of the same size, located along vehicular pavement near the staff entrance and away from public view. These bins are to be within an enclosure that matches the appearance of the building and prohibits unauthorized dumping. There will be no dumpster located on the library site.
- Site Bollards are to be placed where vehicular traffic is within 3 feet of the building. Standard bollards will be minimum 6 inch minimum diameter hot dipped galvanized steel pipe, painted yellow. Bollards will be 4 foot tall, plumb with building and extend at least 3 feet below the pavement surface in a concrete footing.
- Bollard may be placed in additional locations where necessary to separate pedestrian and vehicular circulation. Such bollards may be retractable with integral doors, if require by location. Such bollards may be designed/manufactured items as approved by the County.

Pedestrian Paving Preferences:

- An accessible sidewalk must be provided for handicapped parking, and passenger loading zone to the main entrance and staff entrance in accordance with accessibility (ADA) requirement.
- Sidewalks are to be cast-in-place concrete. Each concrete placement shall be tested to attain a minimum compressive strength of 3000 psi at 28 days.
- Surface is to be a light broom finish. Edges and joints shall be tooled to produce a frame effect.

- Expansion joint fillers are to be installed perpendicular to the run of the sidewalk at intervals equal to twice the width of the sidewalk, and at intersections with other sidewalks. Expansion joint fillers shall be resin impregnated fiberboard.
- Clean and seal joints.
- Do NOT use color concrete admixtures or concrete stains on exterior concrete paving. Paver systems with color concrete are acceptable.

SITE FURNISHINGS:

Intent:
The Site furnishings shall be consistent in appearance for all new branches. Equivalent commercially fabricated product shall be available from at least three manufacturers. The finish colors of the site furnishings shall be selected from the manufacturer's standard and must allow for all furnishings to match. Consider products fabricated with recycled material. The standard basis of design for each type of site furnishings shall be as follows:

Outdoor Bench Preferences:

Benches are to be backless, approximately 4 to 6 foot long, constructed of steel tubing with spanning plate steel seating surface. All connections are to be shop welded. Finish is to be powder coated. Installation shall be tamper proof bolted through flange on surface of concrete or support embedded in concrete. See example below.

Benches are to be located near the main entrance to the library

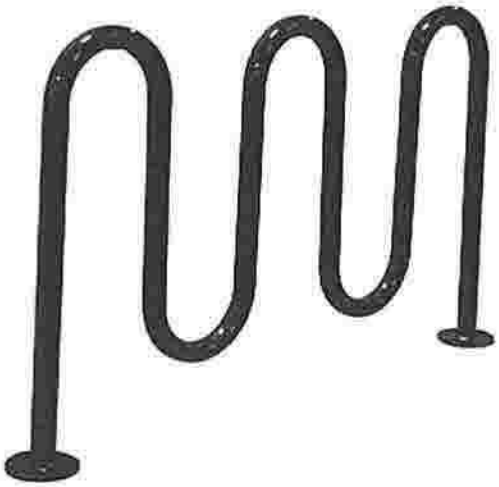
Outdoor Bench example

Bicycle Parking Rack Preferences:

Bicycle parking racks are to be "wave" type with 5 loops (parking for 7 bikes per rack). Rack(s) shall be constructed of minimum 2 inch outside diameter steel pipe with a powder coated finish. The installation is to tamper proof bolted through flange on surface of concrete or support embedded in concrete. See example below. Other designs for bike racks may be acceptable that are sturdy, practical for bike parking, and acceptable to the County.

The quantity of racks shall be sufficient as determined by specific project conditions.

Rack(s) are to be located near the main entrance, but not between the benches and the entrance.



Bicycle Parking Rack example

Outdoor Trash Receptacle Preferences:

Trash receptacles are to fabricated with ¼ inch thick by 1 ½" wide vertical plate steel strips with flared top, welded to tube steel hoops to cover a 30 gallon metal can liner finish to match plate steel. The can liner shall have a nearly flat top cover with a 10 inch diameter hole. The height and clearance around the receptacle shall meet accessibility requirements. The liner should be accessible for maintenance from the top only. Finish of all components will be powder coated polyester. The receptacle shall be bolted to concrete slab. See example product below.

A trash receptacle should be located in an unobtrusive, but convenient location for use while approaching the main entrance.

Outdoor Trash Receptacle example

Fulton County Guide Specification

ORNAMENTAL FENCES AND GATES
SECTION – 32 31 16

1.0 DESCRIPTION OF WORK: This standard covers the fabrication and furnishing of all materials and labor for installation of an ornamental iron fence. Related demolition and removal of existing fencing may be required to support work.

2.1 QUALITY

2.2 Construction Contractor is responsible to locate and avoid underground utilities. Any damages shall be promptly repaired by the Contractor at no expense to Fulton County.

2.3 The Construction Contractor shall employ an adequate number of skilled workers who are trained and experienced with the type of work they are assigned.

2.4 All completed work shall meet basic visual standards: Post shall be properly aligned, posts shall be plumb and vertical, materials shall be consistent in quality, material shall not be damaged, gates shall not sag, and finishes shall be uniform.

2.5 All completed work shall meet basic structural standards: Posts shall not wobble or move within the footings and hardware shall be appropriate for the use and be tightened secure.

2.6 The Construction Contractor shall remove all debris and unused materials from the job site at the completion of the job. Soil excavated for footing must be removed or spread evenly as may be directed by the Architect.

3.1 PRODUCT

3.2 General: Fence shall be height as noted on drawings and to top of pickets. Post shall be spaced at eight feet on center. Pickets shall be spaced 6" on center. In locations where there is a 30" drop or more, the pickets shall be 4" on center.

3.3 Posts: Shall be fabricated of 4" minimum square tubing, of appropriate gauge thickness of material to height. Steel tubing is to be hot-dipped galvanized, and painted where indicated on drawings.

3.4 Channel Rails: Shall be 1" x 2" flat iron bar stock with holes punched for pickets. The number of rails shall be appropriate to height of pickets, with a top rail within 12" from the top of each picket, and a bottom rail within 6" of the bottom of each picket.

3.5 Pickets: shall be minimum 5/8" square/diameter solid steel, or larger hollow, heavy gage tubing. Finished to match posts.

3.6 Hinges: Shall be structurally capable of supporting the gate leaf without sagging.

3.7 Concrete: Concrete for setting posts and footings shall be 3000 psi.

4.1 EXECUTION

4.2 Fabrication: Attach channel to post with solid welds. Weld pickets at underside of channel on each side of pickets (continuously) using solid welds. Spot welds are not acceptable. Grind all welds smooth.

4.3 Painting: Painting may be shop or field applied. Touch up as necessary in the field with a brush.

4.4 Installation: Set line posts as in locations and as detailed on drawings. Justify fences sections with grade as directed by Architect.

4.5 Gates: Install gates plumb, level and secure for opening without interference. Attach hardware by means which will prevent unauthorized removal. Adjust hardware for smooth operation.

< END OF ORNAMENTAL FENCES AND GATES SECTION 32 31 16 >

Fulton County Guide Specification

CHAINLINK FENCE
SECTION – 32 31 13

1.0 DESCRIPTION OF WORK: This standard covers the fabrication and furnishing of all materials and labor for installation of chain link fence. Related demolition and removal of existing fencing may be required to support work.

2.1 QUALITY

2.2 Construction Contractor is responsible to locate and avoid underground utilities. Any damages shall be promptly repaired by the Contractor at no expense to Fulton County.

2.3 The Construction Contractor shall employ an adequate number of skilled workers who are trained and experienced with the type of work they are assigned.

2.4 All completed work shall meet basic visual standards: Post shall be properly aligned, posts shall be plumb and vertical, materials shall be consistent in quality, material shall not be damaged, gates shall not sag, and finishes shall be uniform.

2.5 All completed work shall meet basic structural standards: Posts shall not wobble or move within the footings and hardware shall be appropriate for the use and be tightened secure.

2.6 The Construction Contractor shall remove all debris and unused materials from the job site at the completion of the job. Soil excavated for footing must be removed or spread evenly as may be directed by the Architect.

3.1 PRODUCT

3.2 Fencing consist of modular woven wire fabric fence panel supported by tubular steel posts and framing constructed in accordance with applicable structural criteria, and the Chain-link Manufacturer's Institute Product Manual. See drawings for special finishes and accessories to be installed with fencing.

3.3 Vinyl Coated Finish: Were vinyl coated fence is indicated on drawings, all fabric, framing and fasteners are to be PVC coated 7 mil thick thermally fused per ASTM F668. Except line posts, top rails and gates shall be PVC coated 14 mil thickness.

3.4 Posts: shall be placed at 10' maximum spacing. Post shall be sized and gauged appropriate to height and shall be hot-dipped galvanized with a minimum of 1.8 oz. per square foot coated surface area.

3.5 Fence framing members: shall be located within the plane of fencing, coordinated with gates and opening locations in fabric. All framing members are to be sized and gauged according to

structural requirements. All members are to be galvanized. Framing members that are heavy enough shall be hot dipped galvanized.

3.6 Fence Fabric: shall be 9 gage with 2 inch woven mesh. All fabric shall be hot-dipped galvanized after weaving. Wire shall have a minimum break load of 1,290 lb. Selvedge edges of fabric shall be knuckle top and bottom.

3.7 Caps & Hardware: All hollow tube framing members and post shall be capped with formed steel or alloy fittings. Standard post cap shall be domed. Top rail sleeves shall be 6 inch length and allow for expansion. Use zinc coated steel screws, nuts, bolts and washers. Fastening wire may be Stainless Steel, Aluminum, or Zinc Coated. Install 7 gauge tension wire continuous along the bottom of fence fabric. Install a 1-5/8" diameter tube steel top rail along top of fence fabric.

3.8 Barbed Wire and Supporting Arms: Where indicated on drawings, provide double strand of 12-1.2 gauge twisted galvanized steel barbed wire. Each strand is to have 4-point barb at 5 inches on center with staggered location (between two strands). Support arms shall be galvanized pressed steel with provision for supporting three strands of barbed wire. Each arm shall withstand minimum 250 lbs. downward pull at the outer end.

3.9 Gates: Framing, fasteners and fabric on gates are to match material and finish of the fence in which the gate is located. Gaps between edge of gate and edge of gate opening are to be a maximum of 2 inches. Use gate latch, hasp, cane bolt and/or locking mechanism as indicated on drawings.

3.10 Gate Hinges: Use U-bolt and tooth fitting (Bulldog type) hinges that are structurally capable of supporting the gate leaf with 250 lbs. downward force on the end of gate over the course of full swing.

3.11 Concrete: Use 3000 psi strength concrete for setting posts and fence related foundations.

4.1 EXECUTION

4.2 Fence Framing: Install in accordance with Chain-link Fence Manufacturer's Institute Product Manual and ASTM F567. Locate and detail fencing as indicated on drawings.

4.3 Gates: Install gates plumb, level and secure for full opening without interference. Attach hardware by means which will prevent unauthorized removal. Adjust hardware for smooth operation.

4.4 Fasteners: Fasten all accessories tightly. Face dome head of fastener toward fabric side of fence framing, and place nuts on the framing side of fabric.

4.5 Accessories: Fasten all accessories tightly. Install extension arms for barbed wire perpendicular to the run of fence and parallel to other arms. Run barbed wire strands parallel to one another with staggered barbs. Pull wire taught and attach clips or slots in each extension arm.

< END OF CHAINLINK FENCE SECTION 32 31 13 >

Fulton County Guide Specification

WOOD FENCE
SECTION – 32 31 29

1.0 DESCRIPTION OF WORK: This standard covers the fabrication and furnishing of all materials and labor for installation wood fence. Related demolition and removal of existing fencing may be required to support work.

2.1 QUALITY

2.2 Construction Contractor is responsible to locate and avoid underground utilities. Any damages shall be promptly repaired by the Contractor at no expense to Fulton County.

2.3 The Construction Contractor shall employ an adequate number of skilled workers who are trained and experienced with the type of work they are assigned.

2.4 All completed work shall meet basic visual standards: Post shall be properly aligned, posts hall be plumb and vertical, materials shall be consistent in quality, material shall not be damaged, gates shall not sag, and finishes shall be uniform.

2.5 All completed work shall meet basic structural standards: Posts shall not wobble or move within the footings and hardware shall be appropriate for the use and be tightened secure.

2.6 The Construction Contractor shall remove all debris and unused materials from the job site at the completion of the job. Soil excavated for footing must be removed or spread evenly as may be directed by the Architect.

3.1 PRODUCT

3.2 Fence shall be height indicated on drawings. Posts shall be spaced at a maximum distance of 8 feet apart. Vertical alternating "shadow box" 1 x 6 wood boards shall be attached to 2 x 6 wood nailers. A 2 x 6 wood cap shall be installed continuously along the top of fence with a 1 x 6 wood trim member fastened below the cap on each side of vertical boards.

3.3 Posts: Post shall be 6 x 6 Southern Yellow Pine #2 Grade, AWPA C2/C9 standard pressure treated with .40/lb./cubic foot, rated for in ground use.

3.4 Lumber: vertical boards, trim and nailers of fence are to be Southern Yellow Pine #2 Grade, AWPA C2/C9 Standards, Preservative Retention of .25 lb. / cubic foot rated for above ground use.

3.5 Fasteners: Nails shall be hot dipped galvanized ring shank nails for pressure treated wood. Any and all screw used in fence construction are to be Stainless Steel.

3.6 Gates: Construction of gates shall be of like materials to fence in which the gate is located. "Z" or "X" bracing shall be on interior side (same side as nailers), supported to posts.

3.7 Hardware: hinges and latches shall be factory finished of type and location indicated on drawing.

3.8 Concrete: Use 3000 psi strength concrete for setting posts and fence related foundations.

4.1 EXECUTION

4.2 Installation: Space line posts at 8 feet on center along a straight line. Concrete set all posts in holes with a diameter at least 4 times greater than the outside dimension of post. Slope top surface of concrete away from post. Concrete post footing is to be minimum of 42 inches deep with post set in minimum of 36 inches below grade. Post tops are to be angular cut to shed water on the framing side of fence. All wood members are to be straight and true to shape indicated on drawings.

4.3 Gates: Install gates plumb, level and secure for full opening without interference. Attach hardware by means which will prevent unauthorized removal. Adjust hardware for smooth operation

< END OF WOOD FENCE SECTION 32 31 29 >

2 - BUILDING ENVELOPE

EXTERIOR WALLS & FLOORS

Intent:
The exterior walls and floors are to provide the interior of the building thermal and moisture protection from the exterior; acoustically isolate the inside of the building from outside noise. The walls should require minimal maintenance. The building should be designed to last at least 40 years. Exterior finishes must consider graffiti and vandal resistance. The exterior walls are to reflect an aesthetic quality befitting a library.

Concrete Preferences:

- Design, transport, and place concrete and formwork according to American Concrete Institute (ACI) standards.
- Fabricate and place precast concrete according to the Precast Concrete Institute (PCI). All embeds and connectors are to be hot dipped galvanized. Welds and field cutting or drilling of exposed metal parts are to be finished and covered with cold-galv paint per PCI durability guidelines.
- See Building program for floor loading criteria.
- Floor Flatness in areas with shelving shall be 40 overall, 30 minimum.
- Vapor barrier is to be detailed for all interior floor slabs with moisture tightness of less than 0.3 perms.
- A sheet waterproofing and drainage system is to be installed for all sub-grade walls and floors enclosing occupied space. Specify Manufacturer's warranty for such system against defects in materials and workmanship for a period of 5 years.
- Bentonite clay is not acceptable as the only form of waterproofing sub-grade walls.

Masonry Wall Preferences:

- Design brick walls to be built according to Brick Industry Association Standards.
- All exposed face brick is to be FBX-SW grade.
- Specify weeps with a wick, tube, or mesh to keep the path of drainage clear.
- Show locations of all expansion joints on building elevation drawings and dimension locations on plans.
- All shelf/ledger angles are to be hot-dipped galvanized.
- All masonry accessories are to be Stainless Steel #316 or non-corrosive material.
- Width of air space shall be 2 inches or greater, and less than 4 inches.
- Use cavity mesh or other measures to ensure proper wall cavity drainage.

Stucco Wall Preferences:

- Hard coat stucco system may be applied to masonry or concrete back up or metal framing per latest version the Portland Cement Associations Stucco Manual.
- Metal framing system must be structurally designed by an engineer licensed in the State of Georgia.
- Synthetic coatings and Exterior Insulation and Finish Systems (EIFS) are strongly discouraged.
- All control joint locations are to be indicated on elevation drawings.

Panel wall systems or cladding:

- Metal, or fiber cement panel wall systems may be used on metal framing that is structurally designed by an engineer licensed in the State of Georgia to meet code required structural criteria.
- The panel wall system must either be water proof or act as a veneer /cladding on a water proof wall system.
- Wood or Plastic is not acceptable for framing or paneling in any application.
- Panels are to be designed not to deflect or show "oil canning".
- Size panels relative to manufactured dimensions to reduce waste.
- Finish of panels is to be maintenance free high performance fluoropolymer, anodized aluminum or natural finish of materials that will not decay in less than a 20 year period.

Waterproofing Preferences:

- Water proofing must be in place to protect insulation during construction from moisture that would lower that value of the insulation.
- Water proofing must prevent water from condensing on the insulation that would lower the insulation value.
- Bituminous damp proofing that is roll or brush applied (not sprayed applied) may be used on the interior wythe of cavity walls; flashing must be detailed to complete water tightness of wall.

ROOFING

Intent:

The Roof must provide a waterproof, insulated covering over the building. The roof shall be designed to drain all water off the top and away from the building, leaving no standing water for more than one dry day. The roof is a significant part of the overall appearance of the building. The design of the roof must reflect the character of the community in which the building is located, as well as that community's perception of what a library should look like. The roof must accommodate secured access and some foot traffic. The roof is expected to have a leak free service life of at least 20 years.

General Roofing Preferences:

- Adhere to design and detailing guidelines of the National Roofing Contractors Association (NRCA) Guide for Commercial Roofing, and the Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) Manual.
- Specify only nationally established roofing product manufacturers.
- Large areas of occupied roof that allows regular access are strongly discouraged.
- Roofing design to support plant life, wood shakes, or other organic roof covering over interior space will not be considered acceptable.
- Selection of roofing material shall be reviewed with the County with regard to maintenance requirements.
- Roof top equipment, piping, conduit and roof penetrations are to be kept to an absolute minimum. All such items are to be shown on roof plans.
- Mechanical, Electrical and Plumbing Designers are to attend roofing design reviews.
- Avoid situations where leaves or other debris can fall on the roof surface.
- All drainable roof edges will be provided with a gutter or rain leader and down spout that conveys drainage away from the building.
- All gutters, rain leaders and roof drains are to be covered with a solid cover that drains only water into gutter to keep debris from clogging the system.
- Gutters must be designed to be adequate for the amount or run off from the roof they serve.
- Avoid internal downspouts. Route drainage completely on the outside of the building envelope if possible.
- Overflow scuppers are preferred to be located incorporated in rain leaders rather than through parapet walls.
- Rain water collection systems are encouraged in association with some practical onsite use for the water.
- Surface roof with light color, high albedo materials.
- Pre-roofing conference to be attended by a manufacturer's representative is to be included in the specifications prior to start of any roofing construction.
- Indicate location of roof service walkways (minimum two (2) foot wide) to all roof accessories requiring maintenance on roof plan. Specify only walkways that are compatible with roof substrate.
- All metal to metal locations must have protection between metal to prevent rusting
- New Construction- All buildings to have interior ladder access to all levels of Roof
- Roof Hatch openings must not open (on the roof) toward Leading Edges of roof.
- Roof Hatch opening distance from outside edge of roof must exceed 4 feet to allow safe ingress and egress.

Roofing Warranty Preferences:

- Specify roofing system with a minimum 20 year manufacturer's warranty.

The warranty shall have No dollar limit, and no exclusions for hail events with stones less than 3 inches in diameter.

- Specify 2 year materials and workmanship warranty from contractor.
- In addition to warranties specified, the roofing contractor must enter into an agreement with the County to maintain the roof in watertight condition for a period of 5 years from the date of final acceptance of the roof. Repairs made subject to this agreement will be of no cost to the County.
- Asphalt Shingles must be specified with a 50 year manufacturer's warranty.

Built-up Roof Preferences:

- Single ply is generally preferred to Built-up roofing.
- Hot applied, 4-ply built-up roofing with glass-fiber/inorganic felt plies, and a ceramic granular impregnated (white) cap sheet is the most preferred built up roof system.
- Extend cap sheet under coping at parapet walls rather than terminate below.
- Avoid use of loose laid ballast or aggregate roof surface.
- Minimize use of pitch pockets; cover top of all pitch pockets with metal flashing.

Single-ply membrane roofing preferences:

- EPDM, white surface in rolls no less than 6 foot wide with a minimum 0.60 mil thickness that is fully adhered is the most preferred single ply roofing. Mechanically fastened TPO/PVC is acceptable as well.
- Lap joints should run along slope or as manufacturer recommends.
- Extend ply under, and to the outside edge of copings at parapet walls rather than terminate below.

Metal Roofing preferences:

- Structural standing seam metal roofing with minimum 24 gauge panel thickness, prefinished with PVDF finish (Kynar 500 or equal) is most preferred for sloped roof applications.
- Metal panels may be installed over sheathing faced with ice & water shield or according to manufacturer's recommendations.
- No exposed fasteners.
- Install pre-manufactured snow guards along roof edges where collected snow or ice would be likely to fall on a person or portion of the building that could be damaged by such an incident. Guards should be in two staggered rows over the insulated portion of roof (not on overhang). Guards are to be installed with SB-1900 plastic adhesive (that requires 30 days above freezing temperature to set up).
- Metals that are in high demand (therefore commonly subject to theft), such as copper, should not be used as a primary roofing material, gutters and /or downspouts.

Asphalt Shingle Roofing preferences:

- Asphalt Shingle Roofing is not a preferred type of roofing for this program, however is acceptable if it is an impact resistant, glass fiber reinforced

shingle with a minimum weight of 300 lbs. per square (100 SF), over 15 lbs. felt paper.
- Minimum slope for shingle roof is 4 inches per foot.

INSULATION:

Intent:
Insulation is necessary within the detailing of the building envelope to resist the passage of thermal and acoustical energy. (This portion of the guide does not address insulation for fire resistance). The thermal insulation shall, at a minimum, exceed the requirements of ASHRAE 90.1. Acoustical insulation shall be detailed to exceed values given in the building program between various spaces in the library.

Thermal Insulation Preferences:

- Insulation must be applied according to the manufacturer's intended use.
- See Building Standard Guidelines for WINDOWS for insulation in the design of windows and glazing.
- Detail insulation to avoid thermal pathways through framing members or other wall components that may transfer thermal energy.
- Insulation laid on top of suspended acoustical ceiling is unacceptable.
- Do not use Insulation that use CFCs or HCFCs in the manufacturing or installation of the product.
- Consider products with recycled content.

Acoustical Insulation Preferences:

- Fiberglass Sound Attenuating Batt (SAB) Insulation or other acoustical batt insulation may be installed in walls that run from top of floor to bottom of deck with caulking in any voids allowed by corrugation of deck.
- Fiberglass SAB are not to be exposed to return air plenum.
- Insulation laid on top of suspended acoustical ceiling is unacceptable.
- Do not use Insulation that use CFCs or HCFCs in the manufacturing or installation of the product.
- Consider products with recycled content.

3 - INTERIOR FINISHES

GENERAL

Interior design for the library will be a coordinated effort that is initiated with finishes suggested for the various spaces in the library in the Building Program. These must be developed relative to the design of the building and the furniture that will be selected by the FF&E Consultant.

A comprehensive finish board submitted with a finish plan (coded in relation to the board) will be submitted with the Design Development Submittal. The finish board must be labeled with the title of the project and must be assembled so that the board can be transported without samples falling off. Maximum size of the finish board is 30" x 42". Digital images of the finish board will be submitted with the board. The list of samples and minimum suggested sizes of the samples are as follows:

- Flooring Carpet sample – 8"square
- Resilient flooring 2"square
- Seamless or Terrazzo 3"square (larger if larger aggregate is used)
- Wood Floor Base 4" length
- All other floor base 2" length
- Paint Finishes 2" square
- Tile (under 8"square) Actual tile size
- Tile (over 8"square) 4" square
- Grout ¼" wide x 3" length
- Wall Covering 2" square
- Countertop 4" square
- Cabinet material 2" square
- Glazing/Translucents 4" square
- Window treatments 4" length
- Toilet partitions 4" square
- Ceiling Tile 4" square
- Ceiling grid 3" length
- Window Framing 2" length (if applicable)

Select high quality materials that are durable and require low maintenance. Avoid using imported finish materials with long delivery times that will make it difficult to replace portions of the installation consistently. Specify materials that are expected to remain in stock and are readily available.

Specify only finishes that meet code required flame spread and smoke development ratings for their application.

Specify finishes that are in accordance with the Georgia Accessibility Code and the ADA.

FLOORING

Intent:
Flooring and base molding play a large part in the experience of using the library. The flooring should reflect the qualities befitting a library. Many potential types or flooring are represented in these guidelines, and there may be other types of flooring that would be appropriate (and are not listed in the guideline). Wood base may be used with any type of flooring in lieu of rubber. Flooring must be designated for applications that do not require extra maintenance (i.e. carpet should not be indicated for restrooms).

Concrete Flooring Preferences:

- All Interior exposed concrete floors are to be sealed, stained or painted. Specify Light broom finish in utilities and mechanical rooms with exposed concrete. Trowel finish floors are to be stained.
- Protect concrete floors to be stained from grease, chipping and cracking and construction vehicles that leave wheel marks.
- Acid based stain with epoxy coating is preferred to acrylic stain.

Resilient Flooring Preferences:

- Vinyl Composite Tile is acceptable in a 12"x12"x1/8" size with integral color and pattern. Specify 5 coats of wax prior to Grand Opening, 3 coats of wax applied prior to furniture move-in.
- Linoleum sheet or tile flooring class 1, minimum 2.5mm thickness is acceptable. If cut pattern designs are used then they must be detailed on the drawings.
- Sheet vinyl is not preferred.
- Rubber flooring is acceptable in minimum thickness of 0.13" with a textured finish and a 10 year excessive wear warranty specified. Tiles are preferred over sheet goods
- Resilient floor base is to be at least 1/8" thick TS type rubber material. All corners are to be manufacturer's molded corner product.

Carpet Preferences:

- *Standard specification to be determined by consultant, during design.*
- *24 inch square tile with static control and stain guard protection treatment.*
- *Cut and loop construction with 0.25 inch pile height. 36 oz.*
- *Specify a 10 year wear and stain warranty.*
- Use nontoxic, low odor, low VOC, solvent free adhesives with no alcohol, glycol or ammonia.
- Carpet shall be aired out in a warehouse prior to installation to minimize odors and off-gassing.

Wood Flooring Preferences:

- Hardwood or Bamboo Flooring in strips or parquet application are acceptable.
- Hardness of the wood must be between 1300 and 2200 on the Janka Scale.
- Greater than ½" thickness flooring is preferred that can be sanded and refinished multiple times over the life of the floor.
- Edges/joints are to be square, not beveled, or eased.
- All flooring edges must be detailed on drawings.
- Cork flooring is not acceptable.

Tile Flooring Preferences:

- Porcelain tile is preferred with epoxy adhesive grout in dark colors.
- Tile installation is to be detailed and specified according to Tile Council of North America Handbook (2010 edition).
- Stone flooring may be used specifically as approved by the County. Designer must clarify all maintenance requirements of the product to the County prior to approval.
- Any variation in tile size should be accomplished by saw cutting tiles rather than different manufactured tile sizes.

Terrazzo or Seamless Preferences:

- Terrazzo or quartz epoxy seamless flooring is not preferred for this program, but is acceptable if detailed and specified to be installed according to the National Terrazzo and Mosaic Association for application approved by the County.
- Integral base should be installed.
- All edge conditions are to be detailed on drawings.
- Slip resistance in accordance with code requirements.
- Use low VOC seamless resins with quartz aggregate.
- Acceptable Seamless manufacturers include; BASF (Selby), Durabond, Polymerica, Silikal, or Stonhard.

INTERIOR WALLS

Intent:
Interior wall surfaces need to be rugged while maintaining a nice appearance. Other wall materials and finishes than what is listed below may be considered. All wall materials must have the code required flame spread and smoke development rating.

Corner Guards & Impact Protection:

- Specify Corner guards for walls in any location where a book truck may travel.
- Corner guards are to be 3 inch vinyl wing, surface mounted from top of base molding to door head height. Color to match walls or as selected by designer.
- Consider using a nice looking column cover on columns in public areas rather than 4 corner guards.

Gypsum Wall Board Preferences:

- Framing shall be Galvanized (G-60), with a deflection of L/240 at 5 PSF. With minimum 20 gauge galvanized steel blocking.
- All gypsum wall board to be a minimum of 5/8 inches thick.
- All Gypsum board walls in restrooms or near plumbing fixtures are to be moisture resistant. Tile walls are required on public restroom plumbing walls.
- Finishes are to be according the Gypsum Association GA 214-96 as follows:

  All Exposed .....Level 5
  Mechanical Rooms .....Level 1
  Unexposed/Above Ceiling ....Level 1
  Substrate for Tile.....Level 2

- Fire rated assemblies to be related to "UL" Fire Resistance Directory Number(s).

Wall Tile Preferences:

- Architectural CMU, Ceramic Tile, or Stone are acceptable wall finishes for accent walls. Such wall finishes will be required to be full height on plumbing "wet-walls".
- Use cementitious backer board as substrate for tile on frame walls.
- Dark colored epoxy adhesive grout is preferred.
- Tile installation is to be detailed and specified according to Tile Council of North America Handbook (2010 edition).
- Stone, architectural CMU may be used specifically as approved by the County for restroom walls. Designer must clarify all maintenance requirements of the product to the County prior to approval. Designer must

clarify all maintenance requirements of the product to the County prior to approval.

Wall Covering Preferences:

- Vinyl Wall Coverings are acceptable for accent walls.
- Wall coverings are to be avoided on interior side of exterior walls, and in wet locations (around sinks and in toilet rooms).

Paints and Protective Coatings Preferences:

- Specify paints and protective coatings for the full range of materials included in the project.
- Standard finish for paint on wall surfaces is egg shell. Trim paint may match walls or may be semi-gloss or gloss finish. Variance from these finishes are to be submitted to the County for approval.
- Plenum paint shall be dry-fall in flat finish. Indicate whether or not all building utilities in plenum area are to be painted or not.

CEILINGS:

Intent:

Ceilings in the library are highly visible, therefore, have a significant impact on the public perception of the library. Ceiling should reinforce the general aesthetic of the library or particular space within the library. There are many utilities that will be mounted in the ceiling that must be organized so the ceilings do not appear to be cluttered. All lighting and utilities mounted on the ceiling should be indicated on the reflected ceiling plans. Acoustical properties of ceilings must be considered to isolate noise and minimize reverberation.

Suspended Acoustical Tile (Grid) Preferences:

- Ceiling Tile: 2x2 lay-in tile with tegular edge that is easily removable is the preferred. All ceiling tile is to be resistant to high humidity. Basis for preference in staff or modestly finished spaces is Armstrong Cortega RH99 with tegular edge.
- Ceiling Grid: Standard 15/16" wide "T" grid and suspension cables to be hot-dipped galvanized, stainless steel or aluminum material. Grid may be installed without tile to suspend ceiling fixtures or lighting.
- Apply spring locks on all non-horizontal tiles, and in public areas where the ceiling is below 10 feet above floor.
- Suspended acoustical tile ceiling is not allowed in public toilet rooms.
- No insulation or loose materials are to be laid on top of ceiling tiles.
- Consider using products manufactured with recycled materials.

Hard Ceiling Preferences:

- Suspended or framed gypsum ceiling system may be used. Maximum allowable deflection shall be specified to be less that L/240.

- Detail ceilings in toilet rooms that do not allow the public to access space above ceiling.
- Access panels, where required, are to be flush mounted with a concealed frame and painted to match ceiling. See example basis of a preference is Bauco Access Panel Solutions

CABINETS AND COUNTERS:

Cabinet Preferences:

- Cabinets, counters and sinks must meet accessibility (ADA) requirements. Consider installing pipe protection with knee space apron panel at all sinks, rather than a cabinet with an integral base.
- Designers will work with the Library in consideration of what (generally) will be stored in each cabinet, drawer and shelf.
- Millwork shall conform to the Architectural Woodworking Institute (AWI) "Quality Standards" and specifications. Use Custom grade for millwork in staff areas, and Premium Grade for millwork in public areas.
- All Cabinets are to be flush overlay construction with frameless hinges and basic wire pulls. Extend wall cabinet doors past lip of bottom shelf to allow the door to act as a pull.

Countertop Preferences:

- Countertops are to be solid surface quartz acrylic material, minimum ½" thick with 1 ½" thick bullnose or eased edges and minimum of 4 inch high backsplash. Examples of products Zodiac from Corian, Silastone, Avonite. Use of solid surface counters with recycled contents is encouraged.
- Counter tops are to be one piece if possible, otherwise seam locations are to be shown on design drawings.
- Gap(s) between countertop and wall behind counter are not acceptable.
- Custom precast concrete countertops with integral sink(s) are acceptable, also. Maintenance requirements are to be review with County prior to detailing.

4 - DOORS & WINDOWS

DOORS

Intent:
The doors shall allow convenient access, privacy and security. The design and detailing of the doors will be an effort that must be coordinated with the Technology Consultant's program for building security. Access control will be considered. Information regarding the types of doors to be installed in various parts of the library is included in the Building Program. Weather seal around doors/frames shall be per the Georgia State Supplements and Amendments to the International Energy Code. Doors must be rugged as they will get many cycles of use and abuse.

Automatic Door Preferences:

- Entry doors shall be automatic, motion sensor activated swinging doors with a minimum opening width of 6 feet wide x 7 feet high.
- Two sets of automatic doors are to be provided on each side of the vestibule, spaced far enough apart to operate as an air lock. Consider staggering the opening so that both sets of doors will not create a clear, straight path for air to pass in or out of the building
- Doors are to be constructed of glass and aluminum.
- Consider tinting glass if there is potential for glare.
- Break out panels are acceptable if required for egress.

Exterior Door Preferences:

- In addition to the automatic main entry doors, exterior doors are to be provided at the staff entrance (that should be the same as the receiving door), the receiving doors, and other locations required for utilities and egress.
- Receiving/Staff Entrance doors are to be a pair of one 3'-10" door and one 2'-2" leafs that latch against a keyed removable mullion in order to use the full width of both open door leaves. The door shall be operated by a lever on the outside that latches to the mullion. A manual hold-open is to be provided for both doors. The staff door will be provided with a peep hole.
- The quantity of exterior doors is to be kept to a minimum.
- The standard exterior door is to be flush face, with no lites, insulated composite metal door, Grade 3, 16 gauge, heavy duty, seamless construction 1 ¾" thick. Door is to be set in a 14 gauge welded steel frame with a continuous hinge. Standard door height shall be 7 foot.
- Provide an accessible threshold that seals to the inside face of the door and weather stripping.
- Avoid exterior trim on exterior "exit only" doors.

Interior Door Preferences:

- Interior fire rated doors are to be specified and installed according to the UL label required.
- Standard interior doors are to be solid core wood doors with a glazed lite, to be sized and located by the Architect. The door is to set in a welded steel frame.
- Finish top edge of doors.
- Frameless glass interior doors may be used in specific applications approved by the County.
- Doors are to provide a 6 inch margin on the top and sides, and 12 inches on bottom between edge of door and internal lite.
- Core material for all doors will be non-combustible mineral fill.
- Veneer is to be factory finished, plain sawn hard wood with consistent matching of grain throughout.

Door Hardware Preferences:

- The hardware specification will be defined in the design process as a coordination effort with the Technology Consultant, the Library and the County to meet the Libraries' specific requirements. Meetings will be required and attended by design personnel with the required specific knowledge of door hardware options and requirements to determine the hardware specifications.
- Specify door hardware to be in accordance with the Georgia Accessibility Code and the ADA.
- The standard door latching mechanism shall be **mortise lockset**, grade 1, with a 7-pin removable lock core. Acceptable manufacturers include Corbin-Russwin, Sargent or Schlage.
- Use heavy-duty butt **hinges** with 5 knuckle, ball bearings that are mortised to door and frame, or pivot hinges with a built-in hold-open.
- Use door **closer** that is surface mounted on the door with parallel arm. Where possible mount closers on non-public side doors. Closers for pivot hinges should be concealed in head of door frame.
- Use rim type exit device.
- **Kick Plate** shall be provided on each side of staff room doors.
- Floor and wall mounted **stops** are to be located so they are unobtrusive and do not become a trip hazard.

WINDOWS

Intent:

The windows are very important to the library experience, the maintenance of the collection and the appearance of the library. Refer to the Building Program for more information about importance of window configuration. The windows must be secure and as vandal-resistant as possible. Weather seal around window frames per the

Georgia State Supplements to the International Energy Conservation Code. The windows must meet or exceed thermal performance required by ASHRAE 90.1.

Window Preferences:

- All exterior windows are to be aluminum frame design to meet applicable wind loading and to minimize deflection of framing system. Steel may be employed as part of the internal structure of the framing.
- Window, Storefronts and Curtain wall shall meet the following performance criteria:
    1) Air Infiltration: Test per ASTM E283, at less than 6.24 PSF, air infiltration shall not exceed 0.60 cfm/sf of wall surface.
    2) Water Penetration: Field test per ASTM E331; at a pressure of 8 PSF, no water shall penetrate on any side.
    3) Wind Loading: per Building Code Maximum deflection of L/175 of clear space.
    4) Condensation Resistance (CRF) for the system shall not be less than 56.
- Design consideration must include cleaning and maintenance required for windows.
- Glazing in hollow metal (steel) frames is acceptable for interior applications only.
- Do not use curtain wall where storefront glazing can be used.
- Place smaller panes of glass where breakage is more likely (below 4 feet).
- Framing for inside glazing should be used where access to the outside face of windows would be difficult.
- Windows installed in doors shall use metal window kits with non-reversible screws that are located on non-public side of door. Wire glass is not acceptable.

Glazing Preferences:

- Exterior glazing units are expected to have the greatest possible visible transmittance and the lowest possible solar heat gain/shading coefficient. Typical exterior glazing should use tinted, 1" thick insulated glass composed of 2 panes of ¼" thick annealed glass with Low-E coating on interior faces (#2 & #3 faces). Glass performance would be expected in the following range:

Visible Transmittance	> 70%
Solar Heat Gain Coefficient	< 0.65
Shading Coefficient	< 0.55
U-value	< 0.68

- Specify glazing to comply with code requirements.
- Use readily available, easily replaceable glazing products.

- Interior glazing may be glass or plastic sheet material that meets flame spread, and smoke developed properties required by code and visual transparency required for application.
- Deflection of interior glazing is to be less than L/175.

Operable Partitions

Intent:
Operable Partitions may be provided as suggested by the building program or as part of an architectural concept in exterior or interior applications. The operable partition should be design and manufactured for the purpose that it will serve in the library. The configuration and operation of the partition should be simple. The finishes and construction of the partition must be abuse resistant. The Sound Transmission Coefficient (STC) of all operable partitions and the walls (above ceiling, also) in which they are mounted must be at least 52.

Exterior Operable Partition Preferences:

- Doors may be aluminum and glass or solid; insulated consistent with adjacent walls or windows. Wood frame is not acceptable.
- Use panel folding or pocket doors with a recessed bottom and top track. The elevation change at the sill must be in accordance with accessibility codes (1/2 inch max elevation change).
- Operation and locking from the interior side only (no exterior trim) locking in open & closed position.
- Air infiltration test per ASTM E283, at less than 6.24 PSF, air infiltration shall not exceed 0.60 cfm/sf of wall
- Water Penetration test per ASTM E331; at a pressure of 8 PSF max no water shall penetrate exterior side.
- Structural design for local wind loading criteria with maximum deflection of L/175.
- Warranty: 10 years on roller and seal operation, and 2 years on all other parts.
- Basis of design, Nanawall SL60

Interior Operable Partitions Preferences:

- Doors may be aluminum and glass or solid panel hung from top rail only (no bottom track).
- Use manual pair panel operation with matching doors on the pocket to conceal stack of partition panels.
- Use manual drop seals along base of partition.
- Accordion partitions are not acceptable
- Panel and trim finishes are to be selected by designer.
- Avoid nested personnel doors.

5 - INTERIOR ACCESSORIES

This portion of the standard includes various manufactured items that must be installed in the building to serve a specific function and would be used or operated directly by the occupants of the building.

ENTRANCE MAT

Intent:
The entry mat should remove water and dirt off shoes so library patrons will be less likely to slip on the floor or bring dirt and wetness into the library. The entry mat should be consistent with the design décor of the library.

Entry Mat Preferences:

- Locate directly inside main entrance and staff entrance doors.
- Main Entrance: Provide recess mount in 7/16 inch deep recess (non-piped drainage) with aluminum frame construction with roll-back capability.
- Tread shall be slip resistant tufted monofilament or rubber. Consider using recycled material.
- Indicate a channel formed, or cut a channel in the walkway paving, to drain the recessed area under the mat.
- Staff Entrance: provide a heavy duty 4'x 6'x 3/8 rubber entrance mat to lay on the finished floor surface just inside the door with ADA compliant beveled edges.
- Specify products with the most extreme durability.

TOILET PARTITIONS

Intent:
The toilet partitions will provide privacy for each toilet or urinal in each group toilet. The partitions must be manufactured, and installed to operate in accordance with the Georgia Accessibility Code and the ADA. The partition material and construction must be sturdy, vandal resistant and easy to clean.

Solid Plastic Toilet Partitions Preferences:

- Partition material is to be High Density Polyethylene (HDPE) minimum of 1inch thick with a lightly textured surface. Flame spread and smoke developed rating is to be in accordance with code requirements (Class B minimum).
- Partitions around toilets (other than urinals) shall be ceiling hung, with no connection to floor. Steel framing for partition supports must be included in the design drawings.
- Urinal partitions may extend to the floor with connector running in a full height solid plastic shoe.

- Panel connectors are to be solid plastic flanges with non-reversible fasteners that are not exposed on the outside of toilet stalls.
- Hinges on stall doors are to be integral, self-closing.
- Latches and strikes shall be Aluminum or #316 Stainless Steel.

RESTROOM ACCESSORIES

Intent:
Serve the needs associated with the use of the restrooms. Accessories will be installed as part of the construction contract (not by paper/soap suppliers). Designers will provide location and color selection of such fixtures.

Toilet Paper Dispenser Preferences:

- Capacity of Four (4), six inch toilet paper rolls
- Stainless Steel Finish (may be Plastic)
- Model/Basis: Georgia Pacific #56746
- Acceptable manufactures include Bobrick, Bradley, San Jamar

Paper Towel Dispenser Preferences:

- Only installed in Staff toilet rooms and single occupant toilets.
- Stainless Steel US-32D Finish, semi-recessed, motion activated
- Battery powered
- Model/Basis: Georgia Pacific EnMotion

Soap Dispenser Preferences:

- May be provided by County Vendor.
- See through plastic finish, motion activated
- Battery powered
- Model/Basis: GP EnMotion

Toilet Seat Cover Dispenser Preferences:

- Install directly behind toilet.
- Stainless steel finish
- Wall mount, bottom feed cassette for half-fold flushable seat covers
- Model/Basis: Safe-T-Guard

Hand Dryer Preferences:

- AC Powered less than 15 amp, motion sensor controlled air blower with a maximum sound generation during use of 65 decibels.
- Located convenient to sink(s), on a tiled wall, and to minimize noise from operation escaping from toilet room.
- Model/Basis: Toto Clean-Dry recessed mounted
  ASI-Royal 20199, and Palmer BluStorm HD955 acceptable, also

Sanitary Napkin Disposal Preferences:

- Provide in each Women's room stall a Stainless Steel US-32D finish surface (3 inch max projection or flush mounted, if possible) sanitary napkin disposal.

Trash Receptacle Preferences:

- Counter top waste shoot with grommet to trash bin located under counter.

Mirror Preferences:

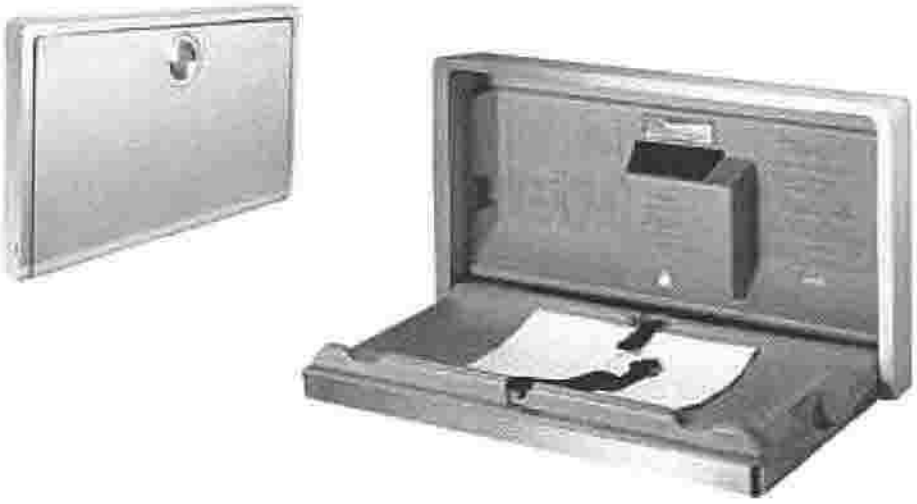
- Individual or full width tempered glass mirror at each sink or lavatory.
- Stainless steel mirrors are not acceptable.
- Tilt mirrors are not acceptable.
- Do not specify a shelf with the mirror.
- Each mirror is to be sized and installed at height to meet accessibility (ADA) requirements.

Coat Hook Preferences:

- Coat Hooks are to be provided on the back side of each toilet stall door with concealed fasteners.
- Coat Hooks are to be Aluminum or Stainless Steel.
- Model/Basis: Bobrick B-2116 or equal

Baby Changing Table Preferences:

- Locate in each group restrooms and family restrooms in children's area.
- Surface mounted, horizontal Stainless Steel at accessible (ADA compliant) height and location (opened or closed position).
- Model/Basis: Bobrick KB-110 SSWB



Handicapped Access Grab Bars Preferences:

- Locate in each group restrooms where require to comply with accessibility (ADA) requirements.
- Specify concealed fasteners for mounting.

FIRE EXTINGUISHER & CABINET

Intent:
Fire Extinguishers are to be installed in obvious but unobtrusive locations as required by code (including accessibility codes). Typical fire extinguisher is to be 8 lbs. Ammonium Phosphate Powder, Class ABC. Fire Extinguishers in public areas are to be located in a Semi-recessed (3.5 inch maximum projection) Stainless Steel cabinet, appropriate for the size of the extinguisher, with a clear, flat glass door and keyed lock. Extinguishers in staff only areas may be mounted on a standard wall bracket.

AED & CABINET

Intent:
An Automatic External Defibrillator (AED) shall be located near the circulation desk, in public space. The AED is to be housed in a surface mount Stainless Steel non-lockable glass front cabinet that is security enabled, with a strobe light and audible alarm. A wall mounted sign shall be located 80 inches above floor directly over the AED cabinet. The AED cabinet and kit is to be provided according to the Specifications for Cardiac Science Powerheart G5 Automated External Defibrillator (AED) (attached at the end of this section.).

MARKER/TACK BOARDS

Intent:
Marker, Chalk and/or Tack Boards are to be provided where indicated in the Building Program or where proposed by the architect for approval by the County. Writing surfaces may be a durable metallic or plastic surface that covers an entire wall, or may be a manufactured marker board of a specific standard shape to be permanently mounted to the wall surface. Dry erase markers with a housing/holder must be provide with each writing surface.

FACILITY DEDICATION PLAQUE

Intent:
Fulton County has established policy (600-71) for the process and specification of dedication plaques, as follows;

- A dedication plaque shall be provided on all new facilities and extensive renovations (where the renovation exceeds 50 percent of the replacement value of the facility or when the facility undergoes a change in use or purpose
- The dedication plaque will be furnished as a part of the construction of the new facility.
- The plaque will be mounted on the exterior of the building near the entrance more precisely located by the design Architect.
- The design for the plaque and location must be according to County Policy 600-71, and approved by the Director of General Services. A plan showing the location of the plaque, and elevation drawing of the plaque showing the design for text and graphics on the plaque, textures, finishes and borders and the wall material on which the plaque is mounted.
- Dedication plaques shall be 24 inches x 24". An example of the text and graphic form of the plaque is provided on the Guide Sheet, attached.

Dedication Plaque Guide Sheet

Facility Name

Board of County Commissioners

Name, Chair

Name, Vice Chair
Name, District #
Name, District #

Name, District #
Name, District #
Name, District #

Name, County Manager Name, County Attorney

Firm Name, Architect

Firm Name, Construction Manager

Awarded – Date

Dedicated - Date

SPECIFICATIONS

CARDIAC SCIENCE POWERHEART G5 AUTOMATED EXTERNAL DEFIBRILLATOR (AED)

DEFIBRILLATOR

Operations:	Fully automatic
Waveform:	STAR® biphasic truncated exponential
Therapy range:	(J) 95J to 354J (adult)
Fast shock feature:	5 energy protocols available
Voice prompts:	RescueCoach™ prompts provide user-paced instruction Text screen Displays rescue prompts and critical rescue information
Audible alerts:	Voice prompt, system alert
Synchronized shock:	Built-in automatic synchronization feature
Pacemaker pulse detection:	Yes
Synchronized shock:	Built-in automatic synchronization feature
Pacemaker pulse detection:	Yes
Pediatric capability:	Therapy range (VE) 22J to 82J, pediatric prompts
Dual Language:	Latin American Spanish
Customizable:	Voice prompt, CPR settings, and shock protocols via AED Manager
CPR:	Metronome for CPR compression rate
Visible indicators:	Rescue Ready®, battery, service, and pad status
Warranty:	8 years

PHYSICAL/ENVIRONMENTAL

Dimensions	(H × W × D): 3.4 in × 9.0 in × 11.8 in (9 cm × 23 cm × 30 cm)
Weight:	5.7 lbs. (2.6 kg), including battery and pads
Dust/water resistance:	IP55 (IEC 60529)
Operating temperature:	32 °F to +122 °F (0 °C to 50 °C)
Altitude:	–1,253 ft. (–382 m) to (15,073 ft.) 4,594 m
Drop:	MIL-STD-810G, 516.6 (Procedure IV) for 1.22 m drop
Shocks:	MIL-STD-810G, 516.6 (Procedure 1)
Vibration (sine and random):	MIL-STD-810G, 514.6 (Procedure 1, Cat 24)
EMI (radiated/immunity):	IEC 60601-2-4

PADS Intellisense™ Defibrillation Pads

Type:	Disposable, non-polarized (pads can be placed in either position) (2 sets per AED unit)
Shelf life:	2 years

BATTERY Intellisense® Lithium Battery

Guarantee:	4-year, full operational replacement
Capacity:	420 shocks (typical) at 300VE

AUTOMATIC SELF-TESTS

Daily, weekly, and monthly:	Electrical circuitry, AED software, medical grade battery and defibrillation pads (presence and function)
Weekly:	Includes partial energy charge
Monthly:	Includes full energy charge cycle

EVENT DOCUMENTATION

Internal memory:	90 minutes of rescue data, multiple rescue functionality
ECG and rescue review:	Viewable via AED Manager reporting and configuration software
Communications:	USB cable or USB memory stick

WALL CABINET

Surface Mount w/strobe/alarm/security enabled

Cardiac Science - (Part No. 50-00392-30)

6 - PLUMBING

This portion of the standard provides information regarding the scope of the plumbing systems involved in this program, as well as the County preferences for water efficiency and the quality level of fixtures and maintenance requirements. The designer is responsible to apply engineering principals to define a system that meets applicable code requirements and functions according to this standard. The designer is welcome to suggest alternatives or improvements to the standard for acceptance by the County. Some alternatives may require Life Cycle Cost Analysis from the designer for County acceptance.

Scope:
This portion of the standard applies to piping, and plumbing fixtures for potable water and sanitary sewer between the site utilities connection to each fixture in the building. Piping and fixtures related to Storm Water Drainage, HVAC systems, Natural Gas or Liquid Propane Systems and Fire Protection are included in other portions of the standard.

General System Requirements:
All fixtures, valves and plumbing accessories used on a project for a similar application are to be identical.

Room Numbers are to be indicated on Plumbing Plans.

All toilets and urinals are to be white in color with minimal gap between fixture and wall filled with white caulking.

Supports for wall mounted fixtures including urinals, and toilets are to be heavy-duty carriers with welded steel plate connections anchored to floor.

Hot water shall be provided only where required by code, except if showers are provided; then hot water shall be provided in each shower. *Note that IPC (2009 version) does not require hot water in restroom lavatories.*

Access shall be provided to all working parts of plumbing system.

Isolation/shut-off valves are to be provided at all toilets, kitchen, wall hydrants and other areas where it may be necessary to isolate fixtures for maintenance or replacement. The valve locations must be clearly marked and accessible to staff onsite, in above ceiling location. Individual supply stop valves on faucets that are not concealed should have removable handle or key operation to prevent tampering.

No piping is to be installed in locations subject to freezing temperatures. All hot and cold water piping is to be insulated.

Do not run water or drain lines above electrical or communications closets.

All faucets and fittings in domestic water supply are to be completely lead-free.

PIPING

Water Supply Preferences:

- Use hard drawn Type "L" Copper piping (ASTM B-88) for all locations within the building envelope with less the 3 inch diameter (OD) pipe. Use Type "K" for all other locations.
- Use cast iron piping (ANSI/AWWA C151) where larger than 3 inch diameter pipe is required.
- Insulate hot and cold water piping. Fittings and elbows are to be insulated with pre-formed insulation of the same type as adjacent pipe. All joints and ends of pipe insulation shall be covered with sealing strips.
- Water hammer arresters shall be installed at the top of each riser and on each fixture branch.
- Plastic piping shall not be used for water supply.

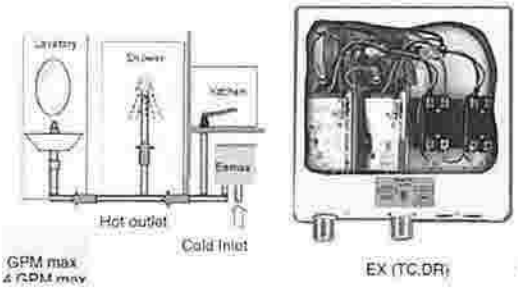
Sanitary Sewer & Vent Preferences:

- Use cast iron with cast iron fittings. PVC or ABS piping may only be used in interior above grade applications.
- Vent piping is to be minimum 4" diameter pipe with hub & spigot joints with neoprene gaskets to vent through roof/exterior.
- Air admittance valves are not permitted within the building envelope.
- Horizontal drain runs shall be no less than 2 inches in diameter. Use a minimum of 3 inch diameter where multiple sinks are connected.
- All fixtures and drains are to be provided with vented traps and automatic trap primer. The primer valve is to be located in an accessible concealed location.
- Cleanouts shall be provided at the base of each stack and at where piping changes direction. Cleanouts are to be 4 inch diameter with cast brass screw plug with raised nut. Cleanouts in floor slabs shall be recessed with flush access plate. Located cleanouts in floors strategically to be unobtrusive, but accessible for maintenance.
- Floor drains shall be provided in all restrooms, janitor closets, mechanical rooms and at water fountains. Floor drains are to be sized according to application; made of cast iron with an adjustable mounting height nickel-bronze strainer with tamper proof fasteners. The entire floor of each room with a drain is to slope to the drain.

FIXTURES

Water Heater Preferences:

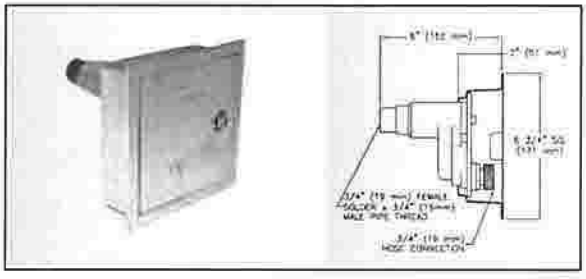
- Use tankless electric water heater capable of serving multiple fixtures in a group. Locate under counter and below the level of the faucet (or water outlet) near the fixtures served.
- Hot water temperature is to be between 110 & 120 Degrees F.
- Water Heater Basis: Eemax Series 3 (other manufacturers; Bosch, Chromonite, Rheem)



Tankless water heater

Wall Hydrants Preferences:

- Specify self-draining wall hydrants with vandal-resistant integral vacuum breaker with heavy metallic box for moderate climate installations and keyed valve operation.
- Provide wall hydrants on the exterior of the building, one for each 100 lineal feet of perimeter and in each restroom.
- Wall Hydrant Basis: Zurn Z1330-C (other manufacturers; JR Smith, Josam, T&S Brass)



Wall Hydrant

Mop Sink Preferences:

- Mop Sink shall be floor mounted 24 inch square X 12 inch deep precast terrazzo with Stainless Steel rim guard and dome strainer over the drain.
- Mop Sink Basis: Acorn TSH-24-SSP (other manufacturers; Fiat, Florestone)
- Mop sink faucet to be provided with a vacuum breaker, hot & cold stops, bucket hook with top brace. Faucet to be installed with a 5/8" diameter rubber hose 5 foot long with a clamp.

Mop sink

Toilets Preferences:

- Public and Staff toilets are to be wall hung, top spud flush valve type vitreous china with elongated bowl design for a water consumption of not more than 1.28 gallons per flush.
- Provide compatible hard-wired, auto-sensor flush valve with mechanical override button and chrome plated finish. Flush valve with self-recharging battery operator acceptable, also.
- Seat is to be heavy duty, white, solid plastic, open front (no cover) with stainless steel internal self-checking hinge (no slamming).
- Toilet Basis: Kohler K-4325 (Kingston) (other manufacturers; Crane, American Standard, Eljer, Gerber, Toto)
- Flush Valve Basis: Sloan Royal Optima – 111-1.28 ES-S TMO (other manufacturers; Kohler, Metroflush, Toto, Zurn)

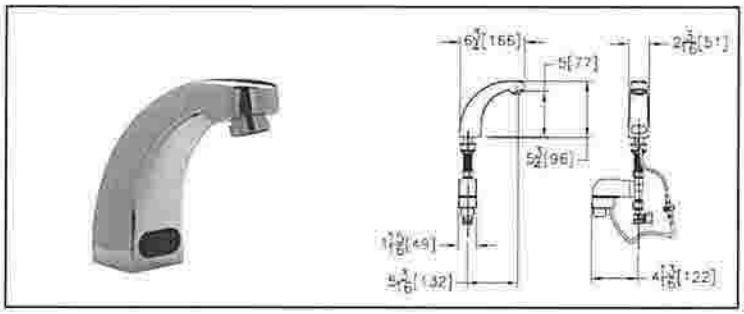
Wall Mounted Toilet & Flush Valve

Urinal Preferences:

- Urinals are to be waterless wall hung vitreous china fixtures mounted on foot supported carrier. All urinals are to be accessible, and all are to be installed at accessible height.
- Urinals that use a disposable liquid sealant cartridge are not acceptable.
- Maintenance procedures for the urinals are to be posted in the Janitor Closet.
- Acceptable Manufacturers include: American Standard, Duravit, Ecotech, Kohler, Urimat, Zero Flush, Zurn

Restroom Hand Sink Preferences:

- Sinks may either be integral with the solid surface counter or self-rimming, oval, counter mounted vitreous china with front overflow drain.
- Restroom faucets are to be cast brass spout infrared sensor operated with maximum 1.5 gallons per minute flow rate and vandal resistant, readily replaceable aerator.
- Basis: Zurn Aquasense Z6913-ACA (other manufacturers; Chicago Faucets, Eljer, Kohler, Toto).



Lavatory faucet

Public Craft/Kitchen Sink Preferences:

- Sinks in public areas may be integral with counter top, or self-rimming Stainless Steel counter mounted unit with sound shielding. Sinks are to be single bowl with an approximate length and width of 22 inches and a depth of 10 inches.
- Faucet is to be (lab type) sink mounted with swivel gooseneck spout with one side stop paddle (cold water only) with low flow 1.5 gpm vandal resistant readily replaceable aerator. Provide inline vacuum breaker if hose connection is included. Finish to be selected by designer.
- Basis: Speakman 7114-GB (other manufacturers; Chicago Faucets, Kohler, T&S Brass).

Staff Kitchen Sink Preferences:

- Sinks in public area may be integral with counter top, or self-rimming Stainless Steel counter mounted unit with sound shielding. Sinks are to be double bowl with approximate dimension of 34"W x 22"L x 9"D.
- Faucet is to be (lab type) sink mounted with swivel gooseneck spout with side stop paddles each side (hot & cold) with 2.2 gpm flow and readily replaceable aerator. Finish to be selected by designer.
- Basis: Speakman 7124 (other manufacturers; Chicago Faucets, Kohler, T&S Brass).

Staff Shower Preferences:

- Locate shower(s) near, but not directly accessible from staff restrooms.
- Use transfer type accessible shower with ½ inch curb, shower pan floor with center drain, and tile to the ceiling on 3 walls.
- Use folding, wall mounted transfer seat with capacity of at least 400 lbs. with satin finish Stainless Steel seat.
- Shower is to provide a clothes changing area that includes an accessible approach to the shower. The changing area shall be equipped with a clothes hanging rod, shelf and towel bar.
- Provide a hookless plastic shower curtain with weighted bottom fringe with Stainless Steel Rod.
- Fiberglass or plastic shower enclosures are not acceptable.
- Shower controls basis: Speakman SM 3040 (Other manufacturers; Acorn, Bradley, Kolhler)
- Seat basis; Swanstone BF2300 (other manufacturers Bobrick, Bradley, Brey-Krause, E.L. Mustee)
- Grab bars Stainless Steel configured per the Georgia Accessibility Code.

Interior Water Fountain Preferences:

- Double (dual height) accessible (ADA Compliant) wall mounted fountain Stainless Steel, enamel painted cast iron, or vitreous china with one accessible water bottle filler.
- Stainless Steel construction must be heavy gage resistant to denting.
- Either cold or tepid water fountain is acceptable.
- Locate near group toilets.

7 - MECHANICAL (HVAC SYSTEMS)

The mechanical system is to be designed specifically related to the building that it serves to provide a thermally comfortable interior environment, maintain healthy air quality, and control humidity in order to protect the library collection and other sensitive contents of the building. For detailed information regarding system design preferences, please see attached specifications, see attached Fulton County standards.

Reliability is the highest priority of the mechanical (HVAC systems). The operation of the library facility depends on the continual operation of the mechanical systems. The mechanical system should be as simple as possible; operating with minimal preventative maintenance or intervention by onsite staff. When maintenance is required the system shall be configured for quick diagnosis, and easy access for maintenance or repair.

Performance shall be in accordance with environmental parameters set in the design process, based on ASHRAE Standard 55 and the considerations stated in the Building Program related to the specific design of the building, under actual seasonal conditions. Among the design considerations that are important to the performance of mechanical systems are energy efficiency and quiet operation.

Security from tampering with the equipment or the operation of the system is critical to the reliability of the system. All components of the system are to be placed in secure locations with robust protection against theft that do not affect the optimal operation or maintenance of the system.

Scope:
This portion of the standard applies to Heating, Ventilation, Exhaust, Cooling, Air Conditioning, and humidity controls equipment and all related pumps, piping, air distribution devices and control systems. Relays required for interface with Fire Alarm Systems are to be located and specified as a part of the mechanical system design.

General System Requirements:
The mechanical systems of the library building will be designed to operate on a daily cycle of control for each zone of the building. The separate zones of the building will include, at a minimum

(1) Staff zone
(2) Collections and Reading Rooms Zone
(3) Entry Lobby and Meeting Rooms Zone

Additional zones may be provided based on sun exposure conditions or separation of spaces within the zones described based on intended use. Each zone will have environmental control set points (temperature, humidity, etc....) for two modes of operation based on whether the zone is occupied or not (open/closed). The entire building will generally operate in occupied mode when the library is open. All zones will generally maintain the set points for occupied mode when the building is open. The day

to day operation of the system will be based on a timed sequence input from a centralized digital control system with onsite, or remote override capability for each zone.

The parameters for the mechanical design will be established with the designers based on code requirements, considerations stated in the Building Program and the specific design of the building. The mechanical systems will be determined with Life Cycle Cost Analysis as a basis, assuming as long as practical life span of the system. Replacement of the parts of the mechanical system must not require major building demolition and repairs. Readily replaceable parts shall be used throughout the system.

HVAC equipment should be sized for average load rather that peak load. An energy recovery unit as part of the system should be considered as a life cycle cost option.

Avoid location of any equipment, air intakes or exhaust vents on the roof of the building.

Avoid gas heat. The library does not have any other use for gas utility and does not wish to establish and maintain a gas connection solely for heating.

Geothermal Heat Pump systems may be considered. Geotechnical investigation must be done early in the design to determine the feasibility and configuration of the proposed system. Confirmed incentives that are available for the installation of the proposed system may be included in the life cycle cost analysis.

System warranties are to be considered during design, based on the type of system specified.

HVAC EQUIPMENT

Chiller/Condenser Preferences:

- For A/C loads less 200 tons (but greater than 60 tons), an air cooled, reciprocating chiller is preferred.
- For A/C loads under 60 tons a split system heat pump with series of large commercial grade, semi-hermetic condensers may be considered.
- Chiller(s) should be mounted on a concrete pad, above grade, adjacent to the building in a location out of prominent view or hearing by the public.
- The chiller, as well as any other exterior mechanical equipment must be protected from unauthorized access with a strong burglar proof enclosure system. The enclosure must include a concrete floor that does not allow entry by digging under enclosure; walls and a lid that are consistent with the appearance of the building, and allows free flow of air required by the equipment.
- Chillers shall have self-diagnostic panel equipped to display chiller water and condenser water temperatures (entering/leaving); Evaporator and condenser refrigerant pressure; Evaporator and condenser water pressure

(entering/leaving); Oil pressure and sump oil temperature, motor operation and amperage; read faults.
- Use Variable Frequency Drive (VFD) on Pumps over 5 HP, unless the system is shown to be more efficient without the VFD.
- Acceptable manufacturers; Carrier, Johnson/York, McQuay, Trane.

Energy Recovery Unit Preferences:
- An energy recovery or heat recovery unit may considered as part of the mechanical/ventilation system to increase the efficiency of the HVAC system. The cost of the installation and replacement parts over time must be considered relative to the efficiency of the system.

Air Handler Units Preferences:
- The preferred configuration for air handlers is for multiple units to be located in one central mechanical room, serving different portions of the building with short runs of duct work. Otherwise air handlers should be located in separate mechanical rooms central to the chiller.
- Air handler shall be insulated double-wall construction, metal faced construction.
- Set Air Handler on 4" high concrete housekeeping pad with vibration isolators provide as part of the AHU.
- Provide and indicate clearance required for coil and filter replacement and maintenance access to air handlers on mechanical details.
- Filters are to be standard, readily available sizes.
- Do not install disconnects and related electrical devices on the air handling unit(s).
- Provide condensate drain with cleanouts per ASHRAE 62.1
- Acceptable manufacturers; Carrier, Johnson/York, McQuay, Trane.

Exhaust Preferences:
- Indicate exhaust in all restrooms and kitchens.
- Couple or gang exhaust ducts to reduce the number of fans and building penetrations.
- Use centrifugal fan(s) with motorized damper(s) or wall caps located away from public areas. Avoid placing fans or outlets on roof.
- Locate exterior exhaust outlet remote from exterior public areas.

Ceiling/Wall Fans Preferences:
- Fans may be considered to supplement air circulation, or as a part of a ventilation system that would operate if the building mechanical system breaks down.
- Consider high volume low speed fans in high bay areas only. Basis of preference; Isis, from Big Ass Fans, other manufactures; Macroaire, Rite Hite
- Small diameter fans may be used on exteriors; covered area must be manufactured for exterior use and must be mounted in locations protected from vandalism.

Ductwork Preferences:

- Ductwork is preferred to be run above ceilings low enough to access without extending a ladder above ceiling height.
- Access doors are to be hinged.
- Supply ductwork in concealed locations is to be insulated externally with a vapor barrier jacket.
- Return air is not required to be ducted, however, portions of return air should be ducted to reduce noise. Return air ductwork is to be lined internally with sound attenuating insulation.
- Exposed ductwork must be insulated double wall construction with a paintable exterior finish.
- Avoid using square elbows on supply ductwork.
- Use running vanes in supply ductwork; do not use turning vanes in return ductwork.
- Limit flex duct to straight runs less than 6 feet in length.

Air Distribution Device Preferences:

- Fan powered terminal units or VAV boxes shall be located away from noise sensitive areas (including circulation and service desks).
- Provide space to access terminal units and VAV boxes.
- Sound traps are to be provided to transfer air through meeting room walls, and walls between public and staff areas.

Mechanical Piping Preferences:

- Chilled water piping to be Schedule 40 for pipe diameters 2 inches or less with threaded connections and Ductile Iron with mechanical fittings or welded connection for pipe diameters greater than 2 inches.
- Run mechanical piping above ceiling. Avoid running mechanical piping below slab or grade.
- Specify strainer or filter in front of pumps or bypasses with temporary pumps to protect the equipment during construction.

ENVIRONMENTAL CONTROL SYSTEM(S) (OR BAS)

System General Description:

The County currently uses several different proprietary controls or building automation systems. The mechanical designers and the County will confirm the appropriate control system during design. The controls must be consistent with the County's Energy Management Strategy. The following is a system description:

The system is intended to provide direct digital control of multiple building/facilities including such building functions as HVAC, alarm systems, along with lighting, door access and fire alarm systems. The control system shall be web accessible, and shall be capable of displaying, printing and archiving current, and historical data regarding the operating functions listed above.

The system is to include software, controls hardware, input/output devices, wiring and control power, actuators for dampers, valves, and equipment, operations and maintenance training, special maintenance tools and warranty.

The direct digital control Building Automation System (BAS) shall have open protocol (BACNET) compatibility. The system shall be built of standard components that can be replaced within 48 hours. The system shall not require any customizing of the hardware.

If an "integrator framework" is considered to link various building control systems and devices into one interface then the framework will be considered for multiple projects to reap the benefit of a unified interface.

The BAS system display should be menu-driven graphical interface that groups all controlled or monitored elements in a clear and logical system. The system display shall have tutorial prompts for zone-by-zone control of temperature, scheduling, and equipment failure reporting for each facility under control. Individually assigned password security system to prevent unauthorized use shall be written into the software with at least 4 levels of access/control responsibility.

System Architecture:
The system shall be modular architecture, permitting expansion through the addition of processing units, input/output devices, sensors, actuators and control stations.

Onsite controls shall not be dependent on external communication. Control station shall not be necessary to sustain building operation.

Controller point monitoring must have the capability to process a the full range of possible input protocols (including binary, analog, floating point)

Basic System Functions:

1. Equipment monitoring and alarm function including information related to diagnosing equipment problems.
2. Automatic outbound dialing with emergency escalation
3. Time based scheduling controls and holidays on facility on a global basis
4. All system points programmed to report alarm conditions identifying facility location and point location.
5. Display set points, adjustable settings for alarms, and preset overrides for equipment controls.
6. Auto-reset without operator intervention.
7. Individual controllers shall be programmed to override schedule or energy efficiency settings and be preset amounts so that equipment will not be damaged, and/or health and safety compromised.
8. Various programmable alarm notices

Sensor/Controllers:
Controllers and sensors shall operate on building electrical current; a program control station shall have its own microprocessor and batter power supply with automatic converter to maintain operation in stand-alone mode for at 48 hours. Upon restoration of power, the control unit shall resume full operation without operator intervention.

Sensors that are vandal resistant shall be located in each zone of public areas with no on-the-spot control function. Finish of housing is to be Stainless Steel US-32D.

Controllers shall operate as a part of the building-wide control system and as an independent entity when not in communication with other controllers or the control system.

Minimum Set Points:
The following commands, display and data shall be available at operator terminal or connection:

1. Set points (for occupied or un-occupied mode and Summer/Winter mode)
2. Air Handler Unit Status/Control
3. Heat exchanger, energy recovery unit status
4. Fan status/control (w/ percent of full speed measure)
5. Outside air temperature
6. Mixed air temperature
7. Supply air temperature
8. Return air temperature
9. Coldest and warmest zone
10. Static pressure of ducts, FTUs or VAV boxes
11. Freeze protection status
12. Alarms (temperature, airflow, pressure)
13. VFD (Output)
14. Damper position (with percent of full open)
15. Valve Positions (with percent of full open)
16. Pump status/control

Acceptable Manufacturers; Siemens, Trane, Carrier.

For more specific information regarding Instrumentation and Controls for HVAC equipment, see Section 23 09 23, Instrumentation and Control for HVAC, Phase 2 Libraries Equipment Upgrade, Prepared by: Fulton County HVAC/BAS Department.

See other sections of the standard guidelines for functionalities other than mechanical operation (such as lighting, power).

Identification

Pipes & Valves:

- Stencil paint or use permanent adhesive back vinyl sign to identify type of service and direction of flow.
- Place arrow indicating direction of flow near all valves on chiller

piping and water supply piping.
- Letter size should be large enough to be readable by a person standing on the floor.

System Start-up

Hydronic System Cleaning:
- Design engineer to specify and detail thorough flushing and cleaning of the hydronic piping system to be performed prior to system operation.
- Remove construction strainers and protection of existing equipment.

Air Handling System Cleaning:
- Replace all air filters after the final rebalancing of the mechanical system.

System Test & Balance

TAB Preferences:
- The Architect's mechanical designer is to provide detailed specifications for Testing and Balancing (TAB) and adjusting of the mechanical system. This work shall be clearly indicated to be included in the construction contractor or Construction Manager's scope of work.
- The TAB is to be provided by a firm certified by the National Environmental Balancing Bureau (NEBB) or the Associated Air Balance Council (AABC). The TAB scope of work is to be coordinated with the scope of the Architect's Commissioning Agent and the LEED certification process.
- The TAB firm shall not be associated with the design or construction of the project in any other way but the TAB.
- The test shall begin immediately after equipment has been started and re-balanced prior to Substantial Completion.
- Mechanical systems are to remain in full operation once TAB is started.
- Re-Balance and Re-test(s) shall be performed after the building has been occupied for a period less than 30 days to rebalance the system to meet required temperature settings based on actual occupied conditions.
- The TAB firm shall schedule two visits after the rebalance in order to make seasonal adjustments.
- The installation shall not be considered complete until a final report has been submitted by the TAB firm and by the Architect.

8 - ELECTRICAL

The electrical system is to be designed to safely (per NFPA 70 & NEC) provide power to the facilities of the library including lighting, mechanical and library equipment used by the staff and the public. The function of the lighting and portions of the power system will be controlled by a Building Automation System. Power may be required for access control doors with electrified trim. It will be important to coordinate the electrical design with many other related consultants (security, communications, etc....).

The design for the power distribution and lighting systems must reflect the county's commitment to energy-efficiency in operation of county facilities.

Exterior Building Lightning protection is not specifically required. If lightning protection is provided it shall be detailed on drawings. Grounding is required per NEC requirements and IEEE guides for the type of system.

Power

Electrical Utility Connection Preferences:

- Clarify location of transformer with utility provider. Locate away from public access and close to the electrical switchgear to reduce the length of the secondary connection as much as possible.
- Maintain clearances around transformer as required by utility provider.
- Clarify scope of transformer installation in the design phase. Detail any items needed to set the transformer that are not provided by the utility provider.
- Install all onsite utilities below grade rather than overhead.
- Secondary power connection is to be run in rigid steel conduit buried a minimum of 48 inches deep with warning tape buried above. Radius bends conduit twelve times the diameter.
- Use Aluminum conductors sufficient to carry the electrical load for service connection.

Main Electrical Room Preferences:

- Provide dedicated electrical room for location of main service disconnect, distribution panels (switchgear) in a high and dry location. The electrical room is to be accessible from the interior of the building.
- Main Electrical Room is to be sized to fit panels and equipment required, in accordance with NEC requirements. Provide wall and floor space for two additional future panels equal to the size included in the design.

Electrical Panel Preferences:

- Specify distribution panels with a minimum of 10 percent spare capacity.
- Branch panels may be flush mounted on walls in staff only areas. Otherwise branch panels are to be located in lockable closet(s).

- Specify labeling of panel with plastic engraved sign above panel doors and machine printed letters on adhesive-back table with circuit information on the inside of panel door indicating circuit #, amperage of the circuit and the utility served.
- Install panel boards and accessories in accordance with NEMA requirements. Specify insulation resistance tests for each panel board, bus, feeder and control circuit.
- Acceptable manufacturers; Square-D and Siemens.

Raceway and Conductor Preferences:

- All interior power conductors are to be jacketed copper wire listed and labeled by a nationally recognized testing laboratory. Wire up to No. 10AWG is to be single solid, larger wire is to be stranded.
- All power wiring is to be run in conduit or duct with appropriate fittings.
- Conduit is not be exposed outside of utility rooms (electrical, mechanical, janitorial).
- Conduit installation is to be organized. Similar runs are to be grouped, and run parallel. Conduit is to be vertically and horizontally square with structure.
- Specify conduit and raceways to be galvanized, or plastic material manufactured to serve intended purpose. Secure conduit to structure with unistrut system, clamps or split ring hangers.
- Conduit is to be loaded per NEC guide lines (40%). Provide full length pull string in empty conduit.
- Site conduit per NEC 300-5 with trace tape.

Pull and Junction Box Preferences:

- Boxes shall be galvanized metal conforming to NEMA OS 1 with scew-on cover plate.
- Boxes are not to be installed back-to back, provide at least 6 inches of separation between boxes on opposite sides of the same wall.
- Secure all boxes to substrate or to stud/joist on each side if located in frame wall.
- Floor Boxes shall be set so the face plate is level and flush with finished floor and shall be tamper resistant. Box specification will be coordinated with Technology consultant to include data jacks and/or telephone in addition to power.

Outlet and Switch Plate Preferences:

- Wall mounted outlet and switch cover plates are to be Stainless Steel, US32D finish with matching screw mount.
- Toggles and outlets connected to normal power are to be grey (Emergency power is to be red).
- Wall mounted telecommunications outlets are to be 4-port with 2 integral label holders with telephone jacks color grey, and data jacks color black.

- Floor Boxes for Electrical and Data will be specified by Technology Consultant.
- Print the circuit for each electrical outlet on back side of cover plate.
- See Lighting Controls Section of this guideline for light switch designation.
- Locate switches for general lighting in staff controlled areas.

Lighting

Refer to the building program for lighting philosophy and desired levels. Glare is a major concern for reading, and computer use. Task lighting will be selected with the development of the Furniture, Fixtures and Equipment Design.

General Design Considerations:

Consider maintenance, including bulb, ballast or fuse changing in the design. Do not locate lamps that require tall ladders or lifts to change bulbs/lamps.

Use standard light fixtures with readily replaceable lamps, lenses, ballasts. Fixtures that require the replacement of the entire fixture rather than the damaged component are not to be specified.

Avoid incandescent and mercury-vapor light fixtures.

Use T5 or T8 fluorescent Lamps. Do not use fluorescent lamps over 48 inches long, or non-standard shaped bulbs, or ballasts. Specify rapid start ballast rather than instant start.

Typically lamps should be at least 3500K.

Emergency lighting is to be provided for all means of egress at the level of illumination and duration required by code. Use Emergency Ballast with battery back-up to provide power for required lighting to lights normally AC powered. Emergency ballast is to be "no maintenance product the charge indicator light for battery and test switch. Emergency pack "bug-eye" type lights are not preferred.

Lighting Controls Preference:

- All lighting shall be connected to a lighting control system that can be controlled remotely through the web-based Building Automation System or by onsite switches.
- The Central onsite controls should be centrally located in staff controlled location determined by the architect and engineers for each project.
- Where occupancy sensor/motion detection is called for in the building program for lighting control; provide ultrasonic type ceiling mounted sensors.

- On/Off Light Switches are to be grey toggle with Stainless Steel US32 cover plate.
- Dimmer Switches, where called for in the Building Program, are to be grey slide, with preset graduations, with a grey plastic molded cover plate.

Exterior Lighting Preferences:

- Specify building mounted or pole mounted LED with cut-off so no lighting is projected above horizontal.
- Except where design requirements dictate otherwise, provide standard box/cylinder type fixture mounting, on a ±20 foot aluminum pole, finish to be selected by architect.
- Consider mature tree growth in lighting fixture placement.
- Select light fixtures to allow re-lamping to be accomplished quickly without specialized tools.
- Lighted bollards, and façade/uplighting of the building or trees is discouraged.

Office/General Lighting Preferences for Suspended Ceilings:

- Low profile 2x4 lay-in type fixtures with T5 or T8 fluorescent lamps and parabolic reflectors or LED troffer.

General Collection (Shelving) Areas:

- Pendant Mounted linear indirect (up light) fixtures with some down lights is effective for shelf lighting. Lamp may be fluorescent or LED.

Down Lighting Preferences:

- Recessed or surface mounted down lights are to be specified with clear, aluminum reflectors and compact fluorescent lamps.

Exit Signage Preference:

- Edge lit LED product on clear/mirror media with green letters and battery back-up power in compliance with Life Safety requirements.
- Consider visibility in the direction of egress travel when locating signs.
- Basis of preference is Lithonia EDG, other acceptable manufacturers; Juno, Lightolier, many others

9 - FIRE PROTECTION & FIRE ALARM SYSTEMS

The Fire Protection and Fire Alarm Systems are to be design specifically to meet or exceed life safety requirements of authorities having such jurisdiction over the project. These guidelines are to be followed to the extent they do not over rule local requirements.

FIRE PROTECTION

System Design Preferences:

- Automatic fire protection is assumed to be necessary in all the facilities included in this program. The designer should review any consideration of omitting fire protection as part of the design with the County prior to negotiating with the local code authority.
- The preferred automatic fire protection system is wet pipe system with a separate metered water connection and flow switches on feeder lines that are tied to the fire alarm and electronic Building Automation System (BAS).
- The design drawings should include the locations of the following components of the Fire Protection System (for review and approval by the County):
    a) Fire Department Connection(s)
    b) Pump(s), where required
    c) Manual Valves
    d) System Drains
    e) Inspection Station(s)
- Assume the design drawings are to include location of main lines with all sprinkler heads located. Piping design of the feeder lines, and laterals and final hydraulic calculations may be deferred to construction. Submittal requirements for deferred design is to be specified in detail.
- Maximum length of flexible piping is 5 foot.
- Design systems to easily accommodate expansion of the library. Verify the extent of future expansion with the County prior to beginning of design.
- Designer is to define hazard level based on understanding of the Library Program. Ordinary Hazard is expected for this facility.
- Coordinate required signage for the system with Wayfinding Consultant.
- The system is to be design to conduct water with no additives such as glycol, and anti-freezing agents.

FP System Product & Installation Preferences:

- Wall mounted fire department connection (FDC) near the fire protection service entrance to the building with rough chrome finish is preferred unless AHJ prefers free standing type.
- All piping is to be hot-dipped galvanized, black iron pipe designed for applicable pressure. Thin wall or plastic pipe is not acceptable.
- Insulate fire protection where required by exposure.

- Welded, screw threaded, or roll-groove (Victaulic) pipe connections are acceptable.
- All sprinklers are to be quick response UL and/or FM approved products.
- Typical Sprinkler heads are to be quick response frangible or fusible, semi-recessed with a chrome body and white ceiling cup.
- Fully recessed sprinkler heads shall be quick response with flush cover plate to match ceiling finish.
- Upright sprinkler heads are to be rough brass body.
- Paint all fire protection piping exposed to view in public areas.
- Basis of preference for sprinkler heads are Tyco, Reliable, or Viking.

System Testing Preferences:

- All testing required by the local authority (AHJ) are to be included in the specifications.
- Testing is to be witnessed and/or results are to be reviewed by the Architect and County representative for construction.
- The Architect is to deliver a letter to the County representative prior to final completion stating that the Fire Protection System has been tested according to the specifications, and that no deficiencies were found.

FIRE ALARM

System Design Preferences:

- Each Library is to be equipped with an automatic fire detection and alarm system. This system is to be connected the Building Automation System (BAS) to provide condition status as outlined in these guidelines.
- Design is to provide location of Fire Alarm Control Panel, surge protection and secondary (battery back-up) power supply, and all detection and notification devises.
- Dual rate battery charger with low voltage and defective cell alarms and amp meter.
- All addressable loops have loop isolation protection devices to maintain partial fire alarm system integrity should a fault occur. A loop isolation device shall not exceed 20 devices.
- A maximum of 80% capacity of initiating devices is allowed per loop. Additionally, the system shall easily accommodate a future addition to the building. Power supply/Battery to be designed for ultimate number of devices.
- All fire alarm system wiring is to be run in dedicated raceway/conduit system.
- Fire Alarm Control Panel (FACP) is to be specified to be provided with permanent labels. Writing on tape or adhered paper will not acceptable.
- All components of the system shall be standard, readily replaceable parts.

FA Detection Device Preferences:

- The type of detector and the sensitivity of the detector is to be set specifically for its application. The vendor shall verify that the sensitivity and configuration is in accordance with their recommendations.
- Protect Smoke and Heat detectors from dust during construction.
- Heat detectors must have capability of being reset.

FA Notification Device Preferences:

- Strobes and speakers/horns should be combined in one device where both are required.
- Ceiling strobes and horns are preferred to wall mounted. Finish is to be white.
- Fire Alarm notification devices are to be design in terms of addressability, loudness, brightness, and weather resistance required by code for the conditions in which the device is installed.
- Manual pull stations are to be point addressable, surface mounted, double action device in red housing with white letters or another color that contrasts with the wall on which the pull station is mounted. Basis of preference is Silent Knight PS-SATK, SK IFP, Firelite, and any non-proprietary addressable panel. Other acceptable products Kidde, Potter, Simplex Grinnell. The FACP is to indicate which station was pulled until manually reset.

FA Control Device Preferences:

- Flush mounted Fire Alarm Control Panel (FACP) is to be installed near building security controls. The FACP shall be software controlled with the capability of owner programming.
- The FACP shall have audible and LED display indicating "Alarm", "Trouble" and "Supervisory" conditions with each have a separate distinguishable sound. The FACP shall communicate alarm, status and controls off-site via telephone lines to receivers in the Electronics section offices and to E911.
- Pre-set "Fire Drill" function.
- Auto reset capability for controlled systems.
- Bypass function for specific controlled systems.
- Locate power supply/battery with control panel.
- FACP Basis: Simplex 4100ES, other acceptable manufacturers include Edwards, Silent Knight (Honeywell), Potter.

FA Testing Preferences:

- Testing is to be witnessed and/or results are to be reviewed by the Architect and County representative for construction and AHJ, when required.
- Specify function tests to verify the compliant operation of the following:
  - Smoke and/or Heat Detectors
  - Duct Detectors
  - Flow Switches
  - Strobes and/or Horns

  - Magnetic Releases
  - Relays (including AHU shutdown, Fire Protection, Elevator Recall, Exhaust Fans).
  - Panel and Remote Operation
- Specify test to verify system functions according to the specifications in regard to the following:
  - Decibel level of audible devices
  - Transition from AC to battery power
- The Architect is to deliver a letter to the County representative stating that the Fire Alarm System has been tested according to the specifications, and that no deficiencies were found.

EXHIBIT 2

FACILITY CONDITION ASSESSMENT REPORTS

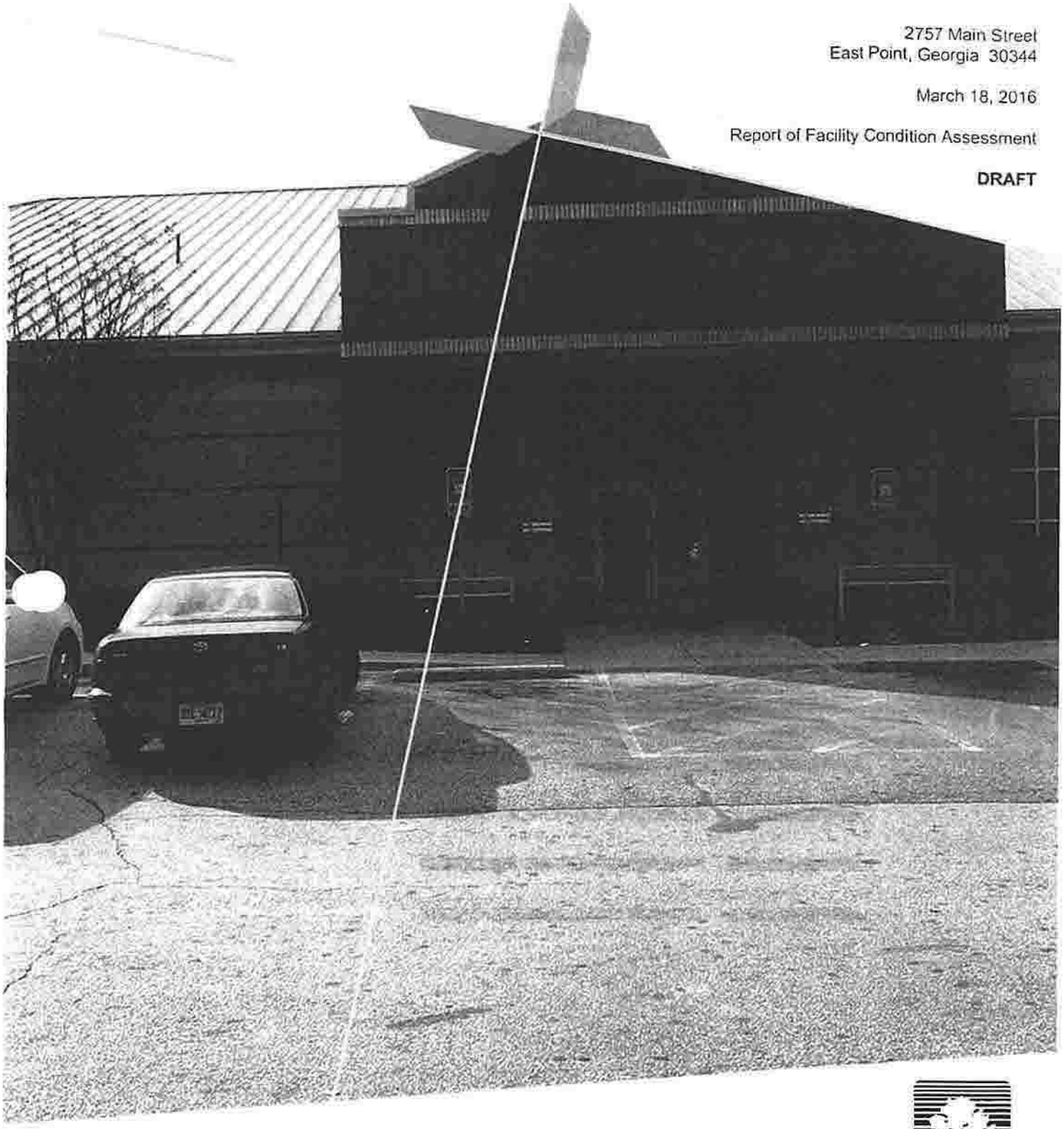
EAST POINT BRANCH LIBRARY

2757 Main Street
East Point, Georgia 30344

March 18, 2016

Report of Facility Condition Assessment

DRAFT



FAITHFUL + GOULD
CONSTRUCTIVE CAPABILITIES

FULTON COUNTY

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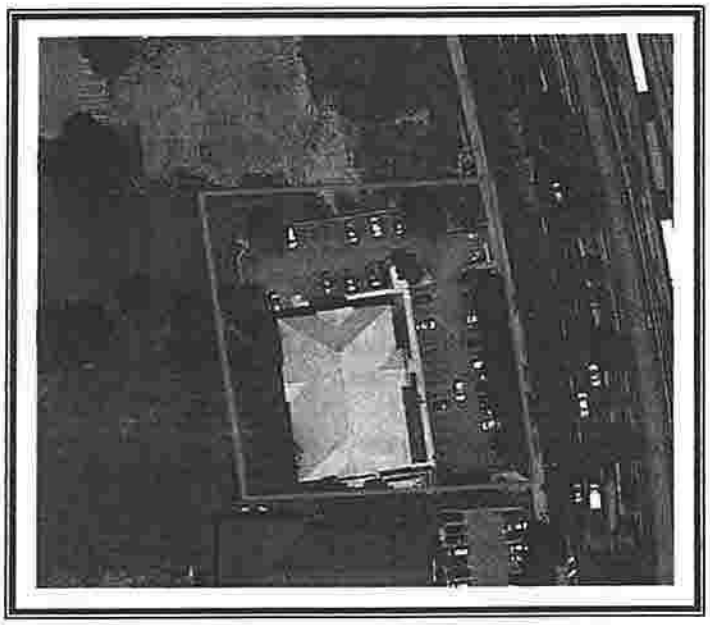
1.0 EXECUTIVE SUMMARY

INTRODUCTION

The East Point Branch library ("the Property") located at 2757 Main Street in East point, Georgia consists of a single story structure developed in 1998 and contains a gross floor area of 11,378 square feet. Site features at the property include asphalt paved parking areas and driveways, concrete sidewalks, concrete curb and gutter, and stormwater management features, site lighting, building lighting and landscaping. The Property contains a land area of approximately 2-1/3 acre (102,098 square feet) bounded by railroad tracks to the east, Grady Health Center and Cleveland Avenue to the south, East Point Street to the west, and Ware Avenue to the north. Interior areas of the building consist of a main entry lobby, a public meeting room, public and staff restroom, open stacks and reading spaces, staff offices, work area, and breakroom facilities. Plan 1-1 provides a graphical overview of the Property and indicates site areas considered by this report.

Plan 1-1 – Aerial View of Property



PROJECT DETAILS

On January 15, 2016, Mr. Alexander Morgan, PMP from BuildSmart Enterprises, LLC (a Consultant working under contract from Faithful+Gould, Inc., and hereafter referred to as Faithful+Gould) visited the Property to complete a comprehensive facilities condition assessment of the building and site systems. The objectives of the assessment were to:

1. Identify the condition of the Property and the timing and cost of expenditures required over the next five years. Capital expenditures considered by this report typically have an aggregate value of $1,000 or more and generally exclude minor repair and maintenance items.
2. Determine failure probability of the various systems and components.

3. Determine criticality of system and component failure in relation to the functions served or area supported.
4. Validate existing maintainable equipment inventories and develop preliminary budgets for preventative maintenance activities of the identified equipment.

SCOPE OF SERVICES

Faithful+Gould was requested to complete a Facility Condition Assessment of the site and site improvements of the facility and related site features contained at the East Point Branch Library. The key issues to be addressed by the Facility Condition Assessment include the following:

- Identify the condition of the Property and the prioritization, timing, and cost of expenditures (>$1,000) required over the next 5-years.
- Determine criticality of system and component failure.
- Document the maintainable equipment within each facility and develop preliminary preventative maintenance budgets for equipment maintained by the General Services/Public Works Department.

Strategy Employed to Meet Key Issues

The strategy employed to meet the key issues detailed above (i.e. our scope of services) consisted of performing a visual assessment of the interior, exterior and site components of the subject Property.

The primary purpose of the Facility Condition Assessment was to identify visually apparent deficiencies in the buildings. The evaluation included site visits to observe the buildings and site systems, interviewing building management and maintenance personnel, and reviewing available maintenance systems, design and construction documents and plans, and public records.

This Facility Condition Assessment has been conducted in general accordance with industry standards and the American Society for Testing and Materials (ASTM) Standard E 2018-15 Standard Guide for Property Condition Assessment: Baseline Property Condition Assessment Process and the Contract Documents for 15RFP082615K-DJ Facilities Condition Assessment for the Fulton County General Services/Public Works Department.

We performed a visual non-destructive assessment of the interior, exterior and site components of the Property, including the following major components and systems:

- **Substructure.** We observed the structures for visible signs of distress and reported our findings. We also reviewed available structural drawings for information regarding the design load criteria of the existing structures and the building codes to which the structures were designed. We did not complete a seismic evaluation (PML) of the Property.

- **Shell.** We visually observed the exterior wall system, window and door systems for visible evidence of deficiencies, continuity of seals, and other types of distress and have our findings. We reviewed available flashing and connection details for drainage design and observed the condition and placement of expansion joints. Our visual observations were based on those conditions that can be observed from ground level, roof level and with binoculars. We visually evaluated the condition of accessible roof systems, accessories, and details. In addition, where applicable we discussed existing roof warranties.

- **Interiors.** We visually observed the interior areas of the Property and reported their general condition. Interior finish replacement costs are included if they are significant or if they are part of a repair. Otherwise, interior finish costs are considered part of the interior finish replacement program and are not included in the cost tables.

- **Services.** We observed the age and condition of the Mechanical, HVAC, Electrical, Plumbing (MEP) Systems and related building systems and have commented on their condition and visible deficiencies.

- **Sitework.** We visually observed the exterior areas of the Property and reported their general condition.

- **Accessibility.** We reviewed the Property for conformance with applicable accessibility requirements and reported our findings.

The scope of services under which the Facility Condition Assessment was completed was visual in nature and not intended to be destructive to the Property to gain access to hidden conditions. We did not perform any destructive testing, uncover, or expose any system members. We have documented the type and extent of visually apparent defects in the systems in order to perform the condition assessment.

The scope of services under which the Facility Condition Assessment was completed includes only those items specifically indicated. The evaluation does not include any environmental services such as (without limitation) sampling, testing, or evaluation of asbestos, lead-based paint, lead-in-water, indoor air quality, PCB's, radon, mold, or any other potentially hazardous materials, air-borne toxins or issues not outlined in the previous scope of services. In addition, the assessment does not include identification of underground soils, identification, or quantification of underground contaminants.

Code References

We have considered that the Property holds a grandfathered status in terms of only having to comply with codes in effect at the time of construction or retroactive codes. Codes considered within this report include the following:

- IBC Codes
- Americans with Disabilities Act
- ASHRAE
- National Electrical Code
- EPACT 2005
- NFPA 10 1

Cost Estimates

We have developed cost estimates for completion of the repair and replacement projects recommended over the study period. Cost estimates have been developed on a labor and material basis primarily from data provided by Faithful+Gould project costing group. This data has been amended to reflect the geographic location of the Property. Where the County has supplied us with cost estimate information relating to completed or planned projects we have verified and included this information.

BUILDING DETAILS

Refer to table EX-1 for summary details of the facility.

Table EX-1 Facility Details

Item	Description
Project Name	East Point Branch Library
Property Type	Library
Full Address	2757 Main Street East Point, Georgia 30344
Onsite Date	January 15, 2016
Year Built	1998
Occupancy Status	Occupied
Number of Stories	Single Story
Gross Building Area (SF)	11,378
Current Replacement Value	$3,128,950
ARV/GSF ($/Sq Ft)	$275

SUMMARY OF FINDINGS

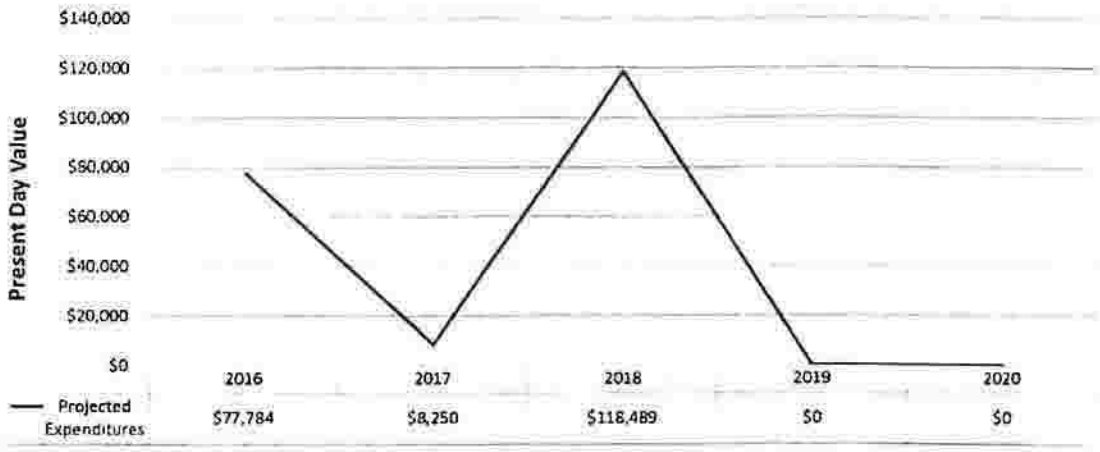
The Property is generally in good condition, well-constructed, and has had a reasonable level of maintenance carried out over the years. However, given the age of the building, we anticipate the following major expenditures over the 5-year study period:

- Site – Fill cracks, seal coat, restripe parking lot and remark ADA spaces
- Mechanical – Upgrade control system
- Electrical – Upgrade lighting (main and administration areas)
- Fire and Life Safety – Replace fire alarm control panel
- Interior – Renovate Restrooms
- Interior – Replace carpet
- Interior – Replace acoustical ceiling as a result of roof leaks

BUILDING EXPENDITURE SUMMARY

The building expenditure summary section provides an executive overview of the findings from the assessment. Chart EX-1 provides a summary of the anticipated expenditures over the **5-year study**. Further details of these expenditures are included within each respective report section and within the expenditure forecast, in Appendix A of this report.

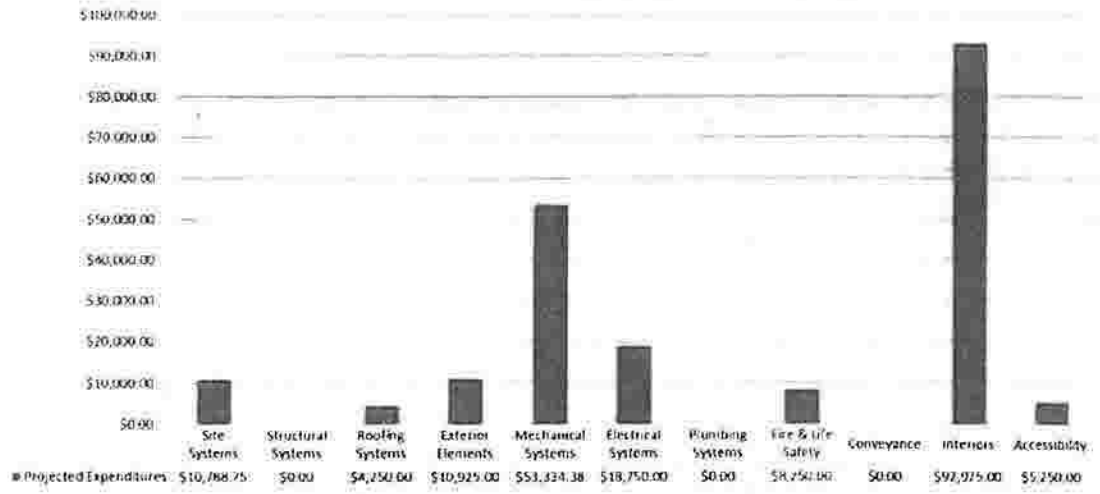
Chart EX-1 Building Expenditure Summary by Year



DISTRIBUTION OF EXPENDITURES BY BUILDING SYSTEM

Chart EX-2 illustrates a summary of the expenditures by building system over the **5-year study**. A more detailed analysis is provided within Appendix A, which provides a breakdown of individual work items as recommended within the main body of the report.

Chart EX-2 Expenditures by Building System over 5-Years



Facility Condition Needs Index

In this report, we have calculated the Facility Condition Needs Index (FCNI), which is used in Facilities Management to provide a benchmark to compare the relative condition of a group of facilities. The FCNI is primarily used to support asset management initiatives of federal, state, and local government facilities organizations.

The FCNI is the ratio of accumulated Total Cost (TC) (Deferred Renewal, Deferred Maintenance, Capital Renewal, and Capital Improvement) to the Current Replacement Value (CRV) for a constructed asset calculated by dividing the TC by the CRV. The range is from zero for a newly constructed asset, to one for a constructed asset with a TC value equal to its CRV. Acceptable ranges vary by "Asset Type', but as a general guideline the FCNI scoring system is as follows:

$$FCNI = \frac{\text{Deferred Maintenance/Renewal + Capital Renewal + Capital Improvement (TC)}}{\text{Current Replacement Value of the Facility(s) (CRV)}}$$

If the FCNI rating is 60% or greater then replacement of the asset/building should be considered instead of renewal.

Condition	Definition	Percentage Value
GOOD	In a new or well-maintained condition, with no visual evidence of wear, soiling or other deficiencies	0% to 5%
FAIR	Subject to wear, and soiling but is still in a serviceable and functioning condition	5% to 10%
POOR	Subjected to hard or long-term wear. Nearing the end of its useful or serviceable life.	Greater than 10%
V-POOR	Subjected to hard or long-term wear. Has reached the end of its useful or serviceable life. Renewal now necessary	Greater than 60%

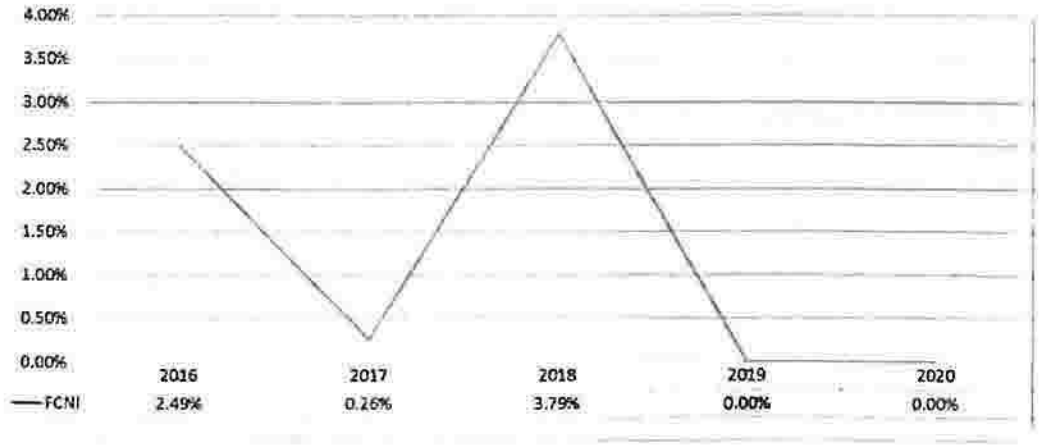
The table below indicates the current FCNI ratio of the East Point Branch Library.

Table EX-3 Facility Condition Needs Index

Key Findings	Metric
Current Year Facility Condition Needs Index	2%
Immediate Capital Needs (included in FCNI)	$77,784
Year 2 to Year 5 Capital Needs	$126,739

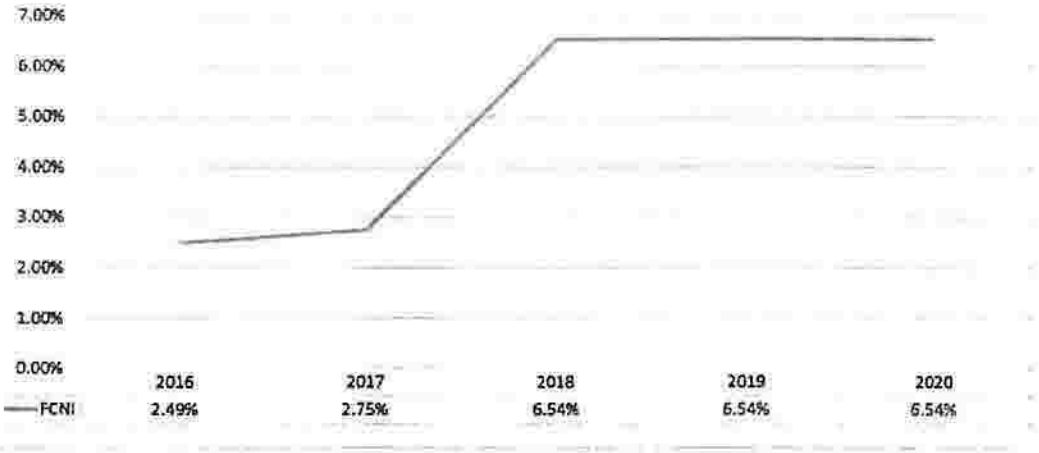
Chart Ex-3 below indicates the effects of the FCNI ratio per year, assuming the required funds and expenditures **ARE** made to address the identified actions each year.

Chart EX-3 Fully Funded FCNI Ratio per Year



The Chart below indicates the cumulative effects of the FCNI ratio over the study period assuming the required funds and expenditures are **NOT** provided to address the identified works and deferred maintenance each year.

Chart EX-4 Unfunded FCNI Ratio per Year

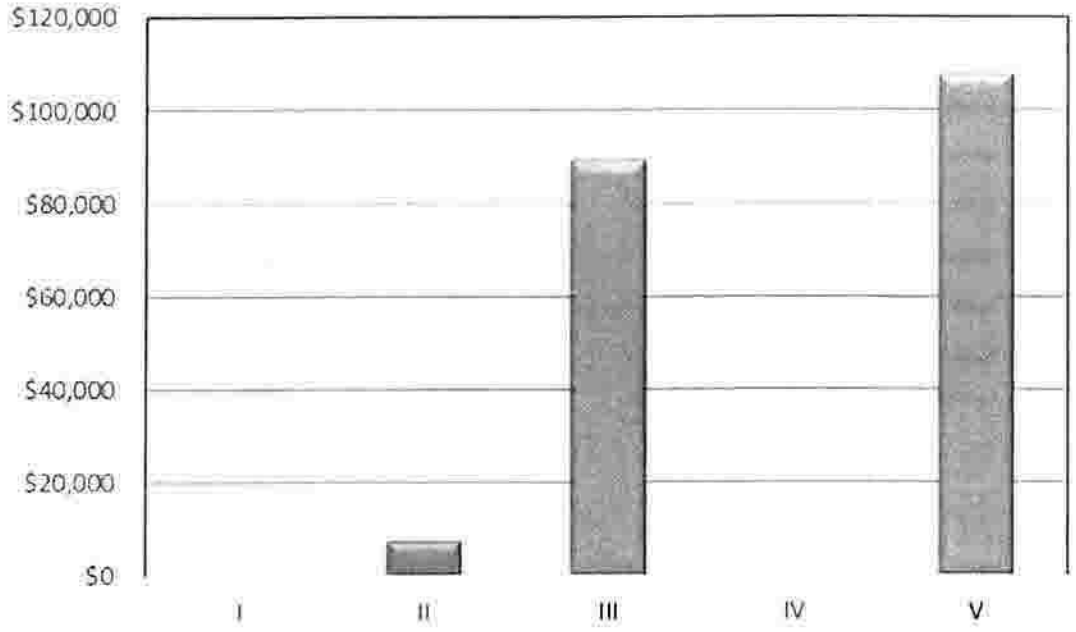


Needs Sorted By Prioritization of Work

Faithful+Gould has prioritized the identified work in order to assist with analyzing the deficiencies found during the assessment. The baseline prioritization model is not just based on replacement year or criticality but uses five key data attributes to build an overall importance metric for every recommendation: System type, the cause or nature of the issue, timing and building mission incorporated into the model with relative weighting to provide an overall priority score. Priority categories are shown below:

Priority I Life safety and code compliance	•Systems requiring immediate action that compromises staff or public safety or requires to be upgraded to comply with current codes and accessibility
Priority II Currently Critical:	•Required to bring a system or building component back into operation or to improve reliability. Necessary to maintain continuity of operations:
Priority III Necessary / Not Critical:	•Lifecycle replacements neccessary but not critical or mid-term future replacements to maintain the integrity of the facility or component
Priority IV Recommended	•Expenditures typically based on service life or are recommended to enhance a system or component.
Priority V Appearance	•Expenditures related to improving public perception or improving aesthetics of a facility. These would mostly relate to renewal of interior finishes.

The chart below illustrates the breakdown of expenditure according the priority coding providing an opportunity to strategically plan and effectively direct funding to the highest priority.

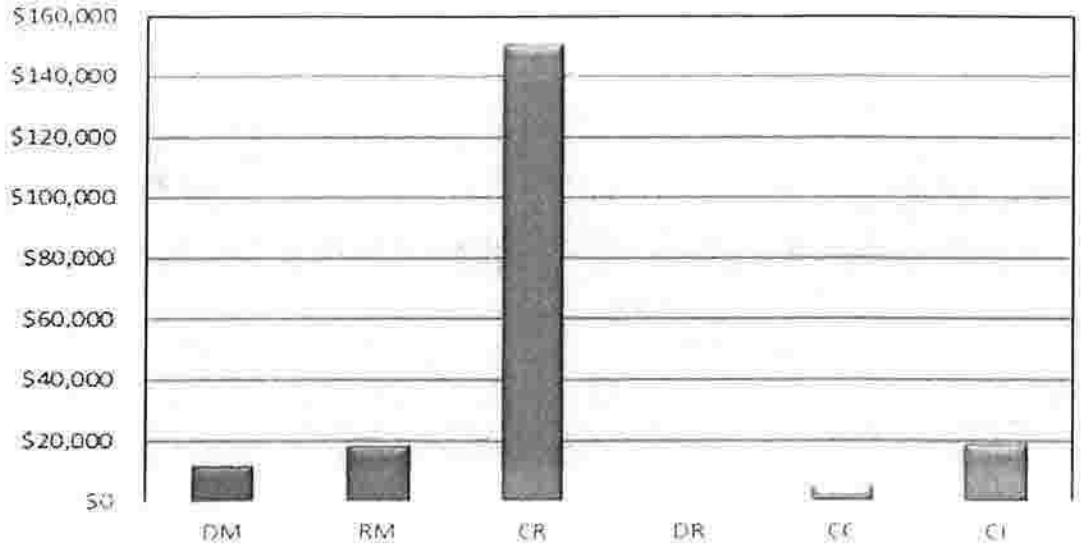


Needs Sorted By Plan Type

Faithful+Gould has prioritized the identified work according to the Plan Type or deficiency categories in order to assist with analyzing the deficiencies found during the assessment. The following Plan Types are shown below:

Plan Type 1 Deferred Maintenance	•Projects required for repair of a failed component in order to restore proper function.
Plan Type 2 Routine Maintenance	•Maintenance that is planned and performed on a routine basis to maintain and preserve the condition. Does not inclue preventative maintenance.
Plan Type 3 Capital Renewal	•Planned replacement of building systems that have or will reach the end of their useful life.
Plan Type 4 Deferred Capital Renewal	•Projects required for replacement of a failed building system in order to restore proper function.
Plan Type 5 Code Compliance	•Projects required modifying or replacing existing building systems in order to comply with current codes.
Plan Type 6 Capital Improvement	•Projects required/requested to enhance government services. Also includes projects resulting from changes in building use or system functionality to support a new agency.

The chart below illustrates the breakdown of expenditure according to the Plan Type or deficiency categories providing an opportunity to strategically plan and effectively direct funding.



RISK

In order to allow Fulton County to balance containment of capital investment with probability and consequence of failure, we have assigned each project with a risk number. These numbers are in addition to the Priority 1, 2, 3, and 4, descriptive ratings previously detailed. Risk numbers have been calculated based upon a numerical assignment of risk resulting from four categories: 1) Impact of Failure, 2) Condition, 3) Probability of Failure, and 4) Frequency of Failure. Numbers assigned to each category are added together to create a total risk number. This risk number is assigned a risk category based upon its numerical range. For instance, deterioration of a computer room air conditioning unit could score 2 under Impact of Failure, 3 under Condition, 3 under Probability of Failure, and 3 under Frequency of Failure, resulting in a score of 11 (2 + 3 + 3 + 3) which equates to a high risk. Table EX-4 below details the risk criteria.

Table EX-4 Risk Criteria Table

Impact of Failure	Condition	Probability of Failure	Frequency of Failure
1 - Catastrophic: The Facility/System/ Component cannot be used; personnel death	1 – Very Poor OR Critical active non grandfathered code violation	1 – In state of failure OR Regulatory enforcement action	1 - Frequent: Occurs at least once per week OR Item failure will be of [illegible] consequence to the facility
2 - Major: A large portion of the facility is rendered unusable; interruption of facility's official mission activities; personnel injury; deterioration of historic fabric, critical operations severely affected	2 – Poor OR Severe active non grandfathered code violation	2 – Chance of immediate failure	2 - Common: occurs at least once per month
3 - Significant: Reduced use of a facility; scaled back operations; interruption of business (staff) activities; property damage as result of Facility/System/Component failure	3 – Fair OR System / component not present	3 – Increased chance of failure	3 - Seldom: occurs at least once every 31-90 days
4 - Minor: Active intervention required to maintain operations; repairs needed to maintain operations, reduced use of mission elements/actions	4 – Good	4 – Slight chance of failure	4 - Rare: occurs less than once every three months, but more than once a year
5 - Insignificant: [illegible] OR [illegible]	5 – [illegible]	5 – [illegible]	5 - [illegible]

The Risk Score and the Risk Categories are detailed in Table EX-5 below.

Table EX-5 Risk Category

Risk Score	Risk Category
4 – 8	Critical Risk
9 – 13	High Risk
14 – 16	Medium Risk
17 – 21	Low Risk

To allow Fulton County to balance containment of capital investment with probability and consequence of failure, we have assigned each project with a risk number. The table below provides a summary of Critical and High risk expenditures identified over the 5-year study period. A complete risk assignment for each recommended project is included within Capital Expenditure Forecast provided in Appendix A of this report. No Critical items were noted for the Property; however, the following high risk items were identified:

Table EX-6 Critical & High Risk Expenditures

Risk Category	Year	Component	Cost
	2016	Investigate, Locate, and Reseal Roof Leaks	$4,250
	2016	Replace and Reseal Deteriorated Window Seals	$3,450
		TOTAL	$7,700

PREVENTATIVE MAINTENANCE

Table EX-7 provides a summary of the financial requirements to complete industry standard preventative maintenance activities on the building systems identified in Appendix C. In-house costs represent the cost to complete the recommended preventative maintenance activities utilizing in-house staff at current labor rates provided by the County, while contract costs includes general markups associated with contracting out the same activities to a service contractor.

Table EX-7 Annual Preventative Maintenance

System	In-House Costs	Contract Costs
Roofing	$277.41	$416.12
Mechanical	$1,846.41	$2,769.62
Electrical	$1,609.79	$2,414.69
Plumbing	$160.39	$240.59
Fire & Life Safety	$430.80	$646.20
Conveyance	$0	$0
TOTAL	**$4,324.80**	**$6,487.22**

2.0 SITE SYSTEMS

DESCRIPTION

The Property contains a land area of approximately 2-1/3 acre (102,098 square feet) bounded by railroad tracks to the east, Grady Health Center and Cleveland Avenue to the south, East Point Street to the west, and Ware Avenue to the north. Parking is provided in one principal asphalt paved lot contained at the east and north sides of the building. The parking lot contains 40 parking spaces, including three handicapped parking spaces.

There is an asphalt parking lot enclosed by concrete curb and gutter. The parking lot is drained by surface runoff, a drop inlet and a curb inlet. Cast-in-place concrete sidewalks are provided along the north and east (main entrance to library) sides of the building. Landscape areas are at the front and sides of the building and in islands in the parking lot. Site lighting is provided by pole mounted light fixtures in the parking lot.

There is a site stormwater detention pond at the south side of the building surrounded by a chain-link fence. There is also an HVAC equipment yard on the south side of the building surrounded by a brick enclosure with a chain-link double gate.

CONDITION

Cracks in the asphalt paving exist and parking space stripes have faded. We recommend that the cracks are filled, the pavement seal coated and the pavement markings re-applied in the mid-term.

The caulking expansion joints in the concrete sidewalk near the front entrance of the building are failing. We recommend that those expansion joints be cleaned out and resealed in the near-term. This work can be combined with the sealant work required for failed exterior caulk joints at the windows. We also noted several cracked concrete curbs and damaged sidewalk panels. These areas should be replaced in the mid-term.

The landscape beds appeared to be mostly overgrown with weeds. Cleaning out weeds and installing new plants and/or mulch would improve the aesthetic appearance of the site. Plant debris has built up in the retention pond (including sections of the surrounding fencing) and the enclosed area around the HVAC equipment. We recommend removing debris from the detention pond, fencing and the enclosure around the HVAC equipment. We anticipate that these items will be completed as part of general maintenance or addressed as a larger exterior landscaping program developed by the County.

Stormwater management features appeared to be in good condition and based upon observed conditions should not require significant repair or replacement within the study period. We recommend that the gate to the detention pond be secured to prevent unauthorized access and reduce the potential safety hazard to the public.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Fill Cracks, Sealcoat, Re-stripe Parking Lot and Remark ADA Spaces	III	Routine Maintenance	2018	$6,326
Replace Concrete Curbs and Sidewalks Cracks	III	Routine Maintenance	2018	$4,463

3.0 STRUCTURAL SYSTEMS

DESCRIPTION

The building structure consists of a steel framed post and beam superstructure with a concrete masonry unit (CMU) back-up and an external facing brick skin. We were not provided with details of the sub-structure. However, foundations are likely to consist of cast-in-place concrete footings.

Foundations

We anticipate that the building is supported on isolated footings for columns and spread footings for the walls.

Floor Slab

The ground floor slab is assumed to consist of a 4" deep steel reinforced slab on a waterproof membrane, select fill sub-base and compacted subgrade.

Interior Walls and Ceilings

Interior walls primarily consist of non-loading bearing steel stud partitions with gypsum wallboard sheathing.

Exterior Walls

Exterior wall systems typically consist of 4" thick facing brick anchored to CMU blockwork and metal stud walls with a 1" air gap, rigid and batt insulation. The inter face of the exterior walls consists of painted gypsum board.

Roof Structures

The roof structure consists of steel lattice beams supporting a profiled metal roof deck.

CONDITION

The structure was generally found to be sound with no evidence of differential settlement or displaced structural members.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

4.0 ROOFING SYSTEMS

DESCRIPTION

The roof comprises gable and hip roofs supported by light metal roof trusses overlaid with a profiled steel deck, rigid insulation, and a standing seam metal roof system. Pre-finished gutters and downspouts are provided around the perimeter roof eaves to capture the stormwater from the roof. The downspouts are tied into the underground stormwater management system.

CONDITION

When observed from the exterior of the building, the roofing system appeared to be in fair condition; however, we did note several locations of stained ceiling tiles from within the interior of the building. We recommend that the roof be investigated and leaks be located and resealed in the near-term. Once the repairs are completed, the ceiling tiles and damaged finishes should be repaired.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Investigate, Locate and Reseal Roof Leaks	III	Deferred Maintenance	2016	$4,250

5.0 EXTERIOR ELEMENTS

DESCRIPTION

The building is placed in a rectangular configuration with exterior elements consisting of brick masonry, double glazed aluminum framed windows, and painted metal. Windows in the building consist of aluminum-framed units with double glazed sections with rubber gasket sealants between glazed elements and the aluminum frames, and elastomeric sealants between window frames and brickwork elements. Windows range in size from 3' x 4' to 9' x 14'.

The main entrance to the Library is accessed at the eastern elevation. The entrance consists of one set each of aluminum framed glazed doors, separated by a vestibule area. The entrance door has storefront glazed units on each side. There is a covered exterior vestibule at the front entrance with brick columns and painted metal rails. The fire exit doors consist of hollow metal doors set within metal frames. The exit door on the west side of building is covered by a metal framed canopy with a wood ceiling.

CONDITION

The exterior masonry appeared to be in generally good condition. However, there are masonry joints, on the south and west sides of the building that should be repointed. There are also failed sealants between some of the windows and the adjacent brick masonry. We recommend that these areas of failed joints be stripped, cleaned and resealed. We have included the associated costs for this work in the renewal of the mortar joints within the Capital Expenditure Forecast.

The painted finish on the hollow metal door and frame, on the rails at the exterior vestibule, and on the metal framing at the exterior canopy, and the lintel on the overhang on the north side of the building was faded and showed signs of corrosion. We recommend these surfaces be prepped, cleaned and repainted as part of routine maintenance to improve the aesthetic appearance of the building. Given the minimal cost to complete this work, we anticipate it will be completed as part of general maintenance.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace and Reseal Deteriorated Window Seals	II	Deferred Maintenance	2016	$3,450
Renew Exterior and Mortar Joints and Flashing of Roof Building	III	Routine Maintenance	2016	$7,475

6.0 MECHANICAL SYSTEMS

HEATING AND COOLING SYSTEMS

DESCRIPTION

Conditioned air for the building is provided by one packaged air conditioning unit manufactured by Trane (Model SXHLF30EO-48CSC), and installed in 2013. The cooling capacity for the unit is 30-tons. Heating for the building is provided by electric resistance heating elements within the air distribution network.

CONDITION

The package unit appeared to be in good condition having been installed in 2013. We did note some organic growth growing on the exterior housing of the unit. We recommend that the unit be cleaned in the near-term as part of the next schedule maintenance activities. These types of units often have a service life of at least 20 years if properly maintained. The unit should remain serviceable throughout the study period with the implementation of a comprehensive preventative maintenance program.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

AIR DISTRIBUTION SYSTEMS

DESCRIPTION

Conditioned air from the package unit is distributed throughout the building via sheet metal with flexible duct connections to terminal units installed within the ceiling plenum. It is presumed that the terminal units are provided with electric heating elements and volume dampers to adjust the amount and temperature of the supply air discharged to the space.

CONDITION

The air distribution systems appeared to be in fair to good working condition. As part of the control upgrades, we recommend a series of re-commissioning activities to ensure the terminal units are functioning properly. An allowance for as needed repairs has been included.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

VENTILATION AND EXHAUST SYSTEMS

DESCRIPTION

Outside air for ventilation purposes is supplied to the building through outside air intakes on the package unit. General building exhaust includes ceiling mounted exhaust fans within the restrooms. The exhaust fans are controlled by local light switches and ducted through the roof.

CONDITION

The ventilation and exhaust systems for the building appeared to be in fair to good working condition. We were unable to determine if the outside air dampers on the package unit were functioning properly and therefore recommend that the outside air dampers be tested as part of the next scheduled maintenance to ensure they are operational.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

HVAC CONTROLS

DESCRIPTION

The HVAC system is controlled by a building automation system manufactured by Johnson Controls. The control system utilizes Johnson Controls Metasys system in order to program and control the HVAC systems throughout the building. Low voltage actuators are utilized to operate the zone dampers in response to the zone thermostats and system setpoints.

CONDITION

The control system is in poor to fair condition primarily due to system obsolescence. The components for the system appeared to have been installed at the time of construction. We recommend budgeting for near-term upgrades of the control system, including the VAV controllers. At a minimum, this should include replacement of zone damper and controllers, new building control panel with a touchscreen human interface and providing remote access capabilities. Once the system is upgraded, a series of commissioning activities should be undertaken to ensure the new components and sequence of operation are functioning properly.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Upgrade HVAC Controls	III	Capital Renewal	2016	$53,334

7.0 ELECTRICAL SYSTEMS

ELECTRICAL SERVICE AND DISTRIBUTION EQUIPMENT

DESCRIPTION

Electrical Service Equipment

The building is provided with one main electrical feed from a pole mounted utility transformer located at the southeast corner of the building. Secondary service from the transformer is routed underground to an electrical service panel, MDP, located in the electrical room. The main electrical panel is provided with a surge suppressor. Service characteristics for the electrical service are 120/208-volts, 3-phase and 4-wire. The main distribution panel is rated at 600-amps.

Wire and Conduit

Typical power distribution for the feeders and branch circuits is accomplished using wire in conduit. Conduit types varied based on the area and usage, but is primarily rigid metal conduit.

Motor Control

Motor control is provided locally to the driven equipment. Motors are controlled by circuit breakers at the distribution panels and disconnect switches located at the equipment.

CONDITION

The major electrical equipment items appear to be in good condition. There is no indication of damage from short circuit or overload condition. Electrical distribution equipment of the type installed are generally considered to have a service life of 30 years or more. Switchboards, panelboards and wiring are often serviceable beyond this time if properly maintained, and not subjected to repeated overload or short circuit conditions. We do not anticipate a requirement to upgrade or replace the electrical systems during the study period as replacement and repair components are still readily available if the systems required repair.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

LIGHTING SYSTEMS

DESCRIPTION

General area lighting consists of nominal 2' x 4' and 2' x 2' lensed, lay-in fluorescent fixtures with some recessed down lights in common areas and restrooms. Illuminated exit signs are installed at exit doors. A General Electric lighting control panel is provided for the building lighting. Exterior lights are flushed mounted on the brick structure perimeter.

CONDITION

The interior light fixtures appeared to be in good condition. We recommend that the lighting fixtures be upgraded in the main and administrative areas in the mid-term in order to improve lighting quality and energy efficiency. The retrofit of these fixtures should include replacement of the lenses cover in order to improve the quality of lighting provided to the space. By improving the lighting quality, often times the number of fixtures can be reduced, which in turn improves energy efficiency. In addition, we have allowed for the replacement of the lighting control panel due to the potential for component obsolescence.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Upgrade Lighting (Main and Administrative Area)	V	Capital Improvement	2018	$18,750

COMMUNICATIONS AND SECURITY SYSTEMS

DESCRIPTION

Telephone and communications service enters the building in the main Electrical Room. Incoming service cables belong to the telephone company. An electronic security system is installed and tied in with the fire alarm control panel. Motion detectors are provided at various locations.

CONDITION

The communications systems appear to be in good condition and primarily maintained by the serving utility company. Consideration of the IT and associated equipment is excluded from this report. The security system was reportedly to be operational; however, we did note that the security key pad was duct taped around the perimeter of the unit in order to keep it from falling off the wall. As part of the recommended fire alarm control panel replacements, we recommend that the security key pad be replaced and properly secured to the wall.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

8.0 PLUMBING SYSTEMS

DOMESTIC WATER SYSTEMS

DESCRIPTION

Domestic cold water service consists of a water main that enters the building. Domestic hot water is generated by a 30-gallon electric storage tank type water heater and is located in the mechanical room. Water distribution relies on service pressure from the local utility. Domestic water piping is typically copper.

Plumbing Fixtures

Plumbing fixtures in the restrooms consist of floor mounted water closets with sensor controlled flush valves, wall mounted urinals with sensor controlled flush vales and vitreous china sinks with sensor controlled faucets. The employee break room is equipped with a stainless steel service sink. There is one public drinking water fountain located between the men's and women's public restrooms.

CONDITION

The domestic water service, backflow preventer and domestic water heater appear to be in good condition. There is no evidence of leaks or other areas of deterioration noted or reported to us for the building. The tankless water heater appeared to have been installed in the last 5 years.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

SANITARY WASTE AND STORM DRAINAGE SYSTEMS

DESCRIPTION

Sanitary Waste Systems

Sanitary waste is collected from multiple laterals and routed to the municipal sanitary system via lateral gravity drains lines. The sanitary lateral pipes are not visible.

Stormwater Systems

Stormwater drainage systems consist of perimeter gutters and downspouts. The downspouts in turn connect to the site stormwater management system.

CONDITION

The sanitary waste and storm drainage piping is believed to be in good condition and adequate for the building. Reports of routine blockages or leaks were not reported to us, nor was historical evidence of such issues noted. Based on the age of this system, we anticipate that it should last throughout the study period. Plumbing sanitary steel piping usually has an average service life of 40 plus years.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

9.0 FIRE & LIFE SAFETY

STRUCTURAL FIRE PROTECTION

DESCRIPTION

The building was constructed in 1998 and based upon classification of code requirements and occupancy type, the building is not required to have additional structural fire protection.

CONDITION

No significant firewall penetrations were observed during this inspection. However, we recommend periodic inspections be completed to ensure that through wall penetrations in areas such as mechanical and electrical rooms remain properly sealed.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

MEANS OF EGRESS

DESCRIPTION

Primary means of egress for the building is provided by one entrance and exit on the front elevation of the building as well as a secondary means of egress on the south side of the building. Lighting for the egress paths appears to be provided by emergency lights and exit signs on an emergency circuit.

CONDITION

Means of egress appear to be sufficient and unobstructed from all points in the building relative to exit discharge and travel distance. Exit signage appears to be installed at the exterior doors and installed above doors at interior work areas and public restrooms.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

FIRE DETECTION AND ALARM SYSTEMS

DESCRIPTION

The building is protected by a Silent Knight Model 5207 burglary/fire communicator zone fire alarm system. The fire alarm control panels (FACP) are located in the main Electrical Room. The fire alarm system monitors manual pull stations, smoke and heat detectors within various zones throughout the building. Smoke detectors are located in common areas and pull stations are provided at exits. Alarm notification is provided by either horn/strobe combination devices or a single strobe or horn devices located throughout the building.

CONDITION

The fire alarm system appeared to be in fair condition and installed in general accordance with the codes enforced at the time of installation. The 5207 fire alarm control panel has since been discontinued by Silent Knight. Repair and replacement components are now primarily only available on the secondary market. We recommend budgeting for the replacement of the fire alarm control panel, as needed initiating/notification devices, and replacement of the security alarm key pad in the near-term.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace Fire Alarm Control Panel	III	Capital Renewal	2017	$8,250

10.0 INTERIORS

DESCRIPTION

The interior of the building is divided into the Main Library Media Center, Conference Room, Manager's Office, and Administrative Area. The building is occupied by the Fulton County Library, Staff and Library Patrons.

Finishes within the meeting room and office areas consist of broadloom carpeting, painted drywall and 2' x 2' suspended ceiling tile contained within a prefinished grid. Finishes within the common area of the library consist of broadloom carpeting, painted drywall soffits and 2' x 2' suspended ceiling tile contained within a prefinished grid. Finishes in the break area consist of 12" x 12" resilient floor tiles (VCT). The break area has casework consisting of laminated countertops and cabinets.

Single stall male and female restrooms are located in the corridor near the conference room. Finishes consist of 4' x 4' ceramic wall and 2' x 2' ceramic floor tile, suspended acoustical ceiling, and plastic laminate counters.

A children's restroom is located adjacent to the Child reading area. The staff restroom is located in the administration area.

CONDITION

The interior finishes range from poor to good condition. Poor to fair conditions that should be addressed are as follows:

- There is damaged sheet rock at the south reading bay windows
- Carpet is ripped, starting to buckle, and/or worn in numerous locations throughout the building
- Ceiling tiles above the west reading bay windows and in the staff break room are stained and should be replaced
- Floor tiles in the restrooms are in fair condition but should be replaced
- VCT in the entry vestibule is worn and should be replaced

We recommend budgeting for near and mid-term renewal of interior finishes.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Renovate Restrooms	V	Capital Renewal	2018	$37,950
Replace Carpet	V	Capital Renewal	2018	$31,680
Replace Floor Tile	V	Capital Renewal	2018	$1,208
Replace Suspended Acoustical Ceiling As A Result of Roof Leaks	V	Capital Renewal	2018	$18,113
Repair or Replace Damaged Sheet Rock in Main Library and Bay Windows	II	Deferred Maintenance	2016	$4,025

11.0 ACCESSIBILITY

ACCESSIBILITY ISSUES

THE GUIDELINES

As a publically accessible facility, the Property should seek compliance with the 2010 ADA Standards for Accessible Design (2010 Standards), made effective March 2012. These standards are revised standards for the ADA Accessibility Guidelines (ADAAG), issued in July 1991. This report section compares the requirements of the ADA with as-built conditions, and where applicable, recommends upgrades required to achieve compliance. Specifically, two areas of the ADA have significant effect on the physical aspects of the Property.

Title I deals with employment discrimination, and requires that employers not discriminate against a disabled person in hiring or employment. This can impact the configuration and features of buildings and those employers are expected to make "reasonable accommodation", including making facilities readily accessible to disabled employees.

Title III requires that public accommodation provide goods and services to disabled patrons on an equal basis with the non-disabled patrons. This title is the part of the ADA with perhaps the greatest impact on buildings, which provide public accommodations.

The ADA has provided a benchmark for measuring accessibility, primarily orientated towards new construction. It also provides guidance for modification of existing facilities to eliminate barriers to access. This benchmark is the 2010 ADA Standards for Accessible Design (2010 Standards). The stated purpose of the guidelines is to ensure that newly constructed facilities and altered portions of existing facilities covered by the ADA are readily accessible to disabled persons.

Regulatory implementation of the ADA includes the following priorities for barrier removal in existing facilities:

- **Accessible Entrances.** Providing access from public sidewalks, parking or public transportation that enables disabled individuals to enter the facility.
- **Access to Goods and Services.** Providing access to areas where goods and services are made available to the public.
- **Usability of Restrooms.** Providing access to restroom facilities.
- **Removal of Remaining Barriers.** Providing access to the goods, services, facilities, privileges, advantages, or accommodations.

APPLICABILITY

The ADA in its purest form relates only to facilities occupied or significantly altered after March 13, 1991. As this building was constructed in 1998, it is therefore required to comply with the applicable aspects of 1991 ADA guidelines. Any subsequent refurbishments must comply with the ADA guidance in affect at that time.

SITE ACCESS AND BUILDING ENTRANCES

REQUIREMENTS

The first consideration relates to measures that will enable individuals with disabilities to physically approach and enter a place of public accommodation. The priority of "getting through the door" recognizes that providing actual physical access to a facility from public sidewalks, public transportation or parking, is generally preferable to any alternative arrangement in terms of both business efficiency and the dignity of individuals with disabilities. Additionally, if passenger drop-off areas are provided, they must be accessible and an accessible route must connect each accessible drop-off area with the accessible entrance(s). Curb ramps must be provided if the drop-off area is next to a curb and raised sidewalk.

Section 405 (Ramps) of the ADAAG requires that any part of an accessible route with a slope greater than 1:20 shall be considered a ramp. Confirmation should be sought that all exterior ramps on accessible routes meet these requirements.

The parking areas should contain a suitable amount of car and van accessible spaces in line with Section 502 (Parking Spaces) of the ADA. These should be located near the accessible building entrance, along the accessible path and should be provided with suitable signage and pavement markings.

The entrance approach, door widths and hardware must be compliant with ADAAG, and it is advised that automated door openers are provided if the opening force to entrance doors is considered excessive.

ON-SITE CONDITIONS

Disabled persons wishing to access the Property are able to gain entry utilizing the public sidewalks that lead to the parking lot driveway to the previously detailed entrances. The route of travel from the public street frontage to the entrance is generally unrestricted and accessible in compliance with the GAC and ADA standards. There are two accessible parking spaces available in the parking lot. Access for visitors is restricted to the main entrance. Employees are able to access the building at a service entrance at the east side of the building. Access at the entrance is through a double swinging door. Access at the service entrance is through an outward swinging door. Each door has a compliant clear opening width of 32".

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

ACCESSIBLE ROUTES

REQUIREMENTS

All publically accessible areas should be provided with suitable horizontal and vertical circulation. Elevators should comply with Section 407 (Elevators), including suitable controls, signage (including braille), audio floor indicators, and the applicable spatial requirements. All publically accessible floors should be provided with an elevator along the accessible path.

Section 405 (Ramps) of the ADAAG requires that any part of an accessible route with a slope greater than 1:20 shall be considered a ramp.

Section 308 (Space Allowance and Reach Ranges) of the ADAAG requires that a minimum clear width for single wheelchair passage shall be 32-inches, the minimum width for two wheelchairs to pass is 60-inches, the space required for a wheelchair to make a 180-degree turn is a clear space of 60-inches, and the minimum clear floor or ground space required to accommodate a single, stationary wheelchair occupant is 30-inches by 48-inches.

Section 307 (Protruding Objects) of the ADAAG requires that objects projecting from walls (e.g. drinking fountains) with their leading edges between 27-inches and 80-inches above the finished floor shall protrude no more than 4-inches into walks, halls, corridors, passageways, or aisles. Objects mounted with their leading edges at or below 27-inches above the finished floor may protrude any amount. Free-standing objects mounted on posts or pylons may overhang 12-inches maximum from 27-inches to 80-inches above the ground or finished floor. Protruding objects shall not reduce the clear width of an accessible route or maneuvering space.

Section 302 (Floor or Ground Surfaces) of the ADAAG requires that ground and floor surfaces along accessible routes and in accessible rooms and spaces, including floors, walks, ramps, stairs, and curb ramps, be stable, firm and slip-resistant. Flooring within the Property generally complied with this requirement.

This section also requires that changes in level between ¼-inches to ½-inches be beveled with a slope no greater than 1:2, and that changes in level greater than ½-inches be accomplished by means of a ramp. The section also states that carpet or carpet tile used on a ground or floor surface be securely attached; have a firm cushion, pad or backing or no cushion or pad; and have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Where gratings are located on walking surfaces, then they shall have spaces no greater than ½-inches wide in one direction.

ON-SITE CONDITIONS

Once through the entrance doors, the Property generally complies with these requirements. Door widths were compliant with the applicable sections of the GAC and 2010 Standards. Access to the main lobby, horizontal and vertical circulation through the remaining public areas of the building is unrestricted, and no protruding objects were noted. In addition, all floor surfaces along accessible routes are firm and slip resistant. The stated requirements for elevators, ramps and changes in level between floor surfaces do not apply.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

DOORS AND SIGNAGE

REQUIREMENTS

The ADAAG states that signs that identify permanent rooms and spaces such as those identifying restrooms and exits or providing room numbers must have Braille and raised letters or numbers to allow them be read visually or tactilely. The ADAAG also states that signs must also meet specific requirements for mounting location, color contrast and non-glare surface. Signs that provide direction to or information about functional spaces must only comply with requirements for character proportion, character height and finish, and with contrast between the characters and background.

Letters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10. The letters and numbers on signs shall be raised 1/32-inches minimum and shall be sans serif. The characters or symbols on signs shall be at least 5/8-inches high, but no higher than 2-inches. Symbols or pictographs on signs shall be raised 1/32-inches minimum. The ADAAG also requires that doors to hazardous areas be equipped with tactile warnings.

Section 404 (Doors, Doorways and Gates) states that doorways and gates, including security entrance gates shall have a minimum clear opening of 32-inches and that the respective maneuvering clearances are maintained.

This section of the ADAAG also states that the threshold at doorways shall not exceed ½-inches in height, and that door hardware (handles, pulls, latches, locks, etc.) on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching or twisting of the wrist to operate.

ON-SITE CONDITIONS

The limited signage used to identify offices and other permanent rooms and spaces within the building generally meet these requirements. Signs at each public restroom do not meet the physical requirements and positioning requirement of the GAC and ADA standards and should be replaced as a routine maintenance item. The doorways at each building entrance and at the book sensor met this requirement with a typical clear opening width of 33 to 34-inches.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

ACCESSIBLE AMENITIES AND FUNCTION SPACES

REQUIREMENTS

The ADA requires that all primary function areas are readily accessible for all. Confirmation should be sought that all such facilities and equipment is readily accessible in line with the respective section of the ADAAG.

ADAAG requires that where provided, at least one of each type of depository, vending machine and change machine shall comply with Section 309. Such requirements including that operable parts are located no more than 48" above finishes floor level and that operable parts shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist.

Drinking fountains should meet the requirements set out in Section 211 – Drinking Fountains, including the requirement for a minimum of two drinking fountains. Section 602.4 (Spout Height) of the ADA requires that the spout height of drinking fountains not exceed 36-inches. Additionally they should have a clear floor space in line with Section 602.2 and a minimum of 27" knee clearance.

ON-SITE CONDITIONS

Generally, the Property complies with these requirements, as primary function areas are readily accessible. However, we did note that the circulation desk was standard height across its entire length. We recommend budgeting for the modification of the circulation desk to accommodate disabled individuals.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Install ADA Compliant Circulation Counter	III	Code Compliance	2016	$5,250

USABILITY OF RESTROOMS

REQUIREMENTS

The third priority emphasizes those measures that will provide individuals with disabilities with access to restroom facilities. A clear approach should be provided to one of each fixture type within an accessible restroom and a minimum of a 60" diameter turning space should be provided.

The ADAAG requires that the minimum width of the standard accessible stall shall be 60" and the minimum depth of floor mounted standard accessible stall shall be 59" (or 56" if wall mounted). The height of water closets shall be 17" to 19", measured to the top of the toilet seat. A 36" minimum length grab bar is required behind the water closet, extending 24" from the centerline of the toilet on the open side. A 42" minimum length grab bar is required on the sidewall, which should extend at least 54" from the rear wall. All grab bars should be mounted between 33" and 36" above the finished floor.

The ADAAG requires that urinals shall be stall-type or wall-hung with an elongated rim at a maximum of 17-inches above the finish floor. The ADAAG also requires that a clear floor space of 30-inches x 48-inches shall be provided in front of urinals to allow for a forward approach. Flush controls shall be hand operated or automatic, and shall be mounted no more than 44-inches above the finish floor.

The ADAAG requires that lavatories shall be mounted with the rim or counter surface no higher than 34-inches above the finish floor and a minimum of 27" knee clearance should be provided beneath a lavatory. Faucets are required to be operable with a closed fist. Lever-operated, push-type and electronically controlled mechanisms are examples of acceptable designs. Hot water and drain pipes under lavatories shall be insulated or otherwise configured to protect against contact.

Mirrors located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface 40 inches maximum above the finish floor or ground. Mirrors not located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface no more than 35 inches maximum above the finish floor or ground.

ON-SITE CONDITIONS

Restrooms were generally compliant with the requirements of the GAC and ADA.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

APPENDICES

APPENDIX A: Capital Expenditures

APPENDIX B: Photographic Record

APPENDIX C: Other Documentation

APPENDIX A:
CAPITAL EXPENDITURES

Five Year Capital Expenditure Forecast
East Point Branch Library
2757 Main Street
East Point, Georgia 30344

FAITHFUL + GOULD

Component No.	Component	Priority Category	Deficiency Category	Impact of Failure	Condition	Probability of Failure	Frequency of Failure	Risk Score	Risk Category	Estimated Useful Life or Replacement Cycle (Yrs)	Remaining Useful Life (Yrs)	Cost Multiplier	Quantity	Unit of Measurement	Unit Cost	2016	2017	2018	2019	2020	Required
															Year	1	2	3	4	5	
Site Systems																					
Required																					
1	Fill Cracks, Sealcoat, Re-stripe Parking Lot, and Remark ADA Spaces	III	RM	5	4	5	5	19	Low	10	3	1.05	2,410	SY	$2.50			$6,326			$6,326
2	Repair Concrete Curbs and Sidewalk Cracks	III	RM	5	4	5	5	19	Low	5	3	1.05	125	LF	$34.00			$4,463			$4,463
Structural Systems																					
Required																					
No Expenditures Required At This Time																					
Roofing Systems																					
Required																					
1	Investigate, Locate and Reseal Roof Leaks	III	OM	3	3	3	3	12	High	5	1	1.00	50	Hour	$85.00	$4,250					$4,250
Exterior Elements																					
Required																					
1	Replace and Reseal Deteriorated Window Seals	II	DM	4	3	3	3	13	High	20	1	1.15	12	EA	$250.00	$3,450					$3,450
2	Renew Exterior and Mortar Joints and Flashing of Building Roof	II	RM	4	4	4	4	16	Medium	15	1	1.15	1	Allowance	$6,500.00	$7,475					$7,475
Mechanical																					
Required																					
1	Upgrade Control System	III	CR	3	3	4	5	15	Medium	15	1	1.15	11,978	EA	$3.75	$53,334					$53,334
Electrical																					
Required																					
1	Upgrade Lighting (Main and Administration Area)	V	CI	4	4	4	5	17	Low	20	3	1.00	25	EA	$750.00			$18,750			$18,750
Plumbing																					
Required																					
No Expenditures Required At This Time																					
Fire & Life Safety																					
Required																					
1	Replace Fire Alarm Control Panel	III	CR	4	3	4	5	16	Medium	15	2	1.50	1	EA	$5,500.00		$8,250				$8,250
Communication Systems																					
Required																					
No Expenditures Required At This Time																					
Interiors																					
Required																					
1	Renovate Restrooms	V	CR	4	4	4	5	17	Low	20	3	1.15	6	FXT	$5,500.00			$37,950			$37,950
2	Replace Carpet	V	CR	4	4	4	5	17	Low	10	3	1.20	880	SY	$30.00			$31,680			$31,680
3	Replace Floor Tile	V	CR	4	4	4	5	17	Low	20	3	1.05	230	FT	$5.00			$1,208			$1,208
4	Replace Suspended Acoustical Ceiling As A Result of Roof Leaks	V	CR	4	4	4	5	17	Low	20	3	1.05	3,000	SF	$5.75			$18,113			$18,113
5	Repair or Replace Damaged Sheet Rock in Main Library and Bay Windows	II	DM	4	4	4	4	16	Medium	15	1	1.15	1	Allowance	$3,500.00	$4,025					$4,025
Accessibility																					
Required																					
1	Install ADA Compliant Circulation Counter	III	CC	5	5	5	5	20	Low	20	1	1.05	1	Allowance	$5,000.00	$5,250					$5,250
															Required Cost (2016 Dollars)	$77,784	$8,250	$118,489	$0	$0	$204,523

APPENDIX B:
PHOTOGRAPHIC RECORD

Photograph No. 1

Bay structure
separation

Photograph No. 2

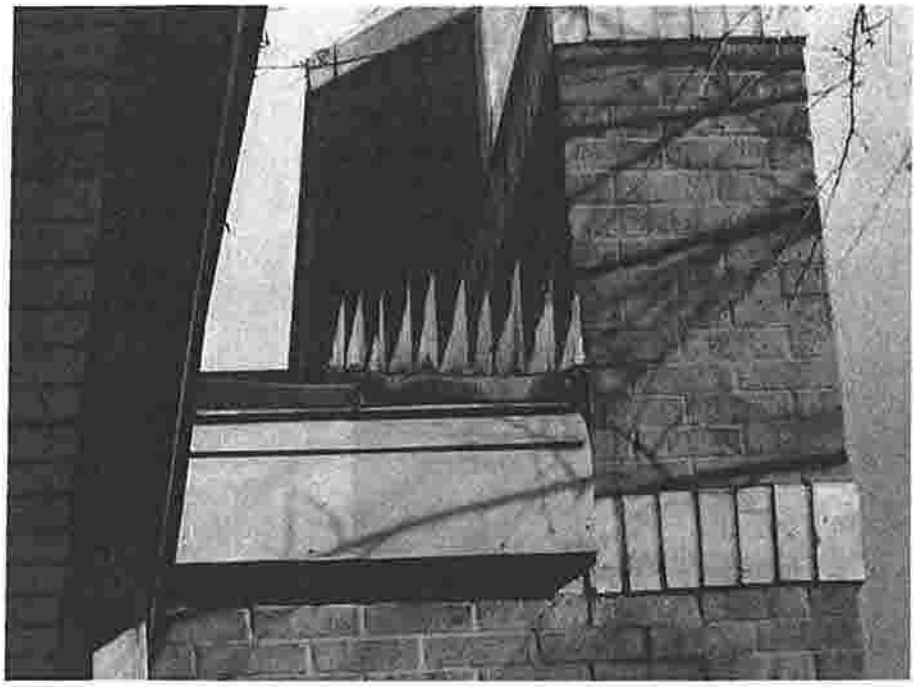
Front Entrance

Photograph No. 3

Fencing not secure

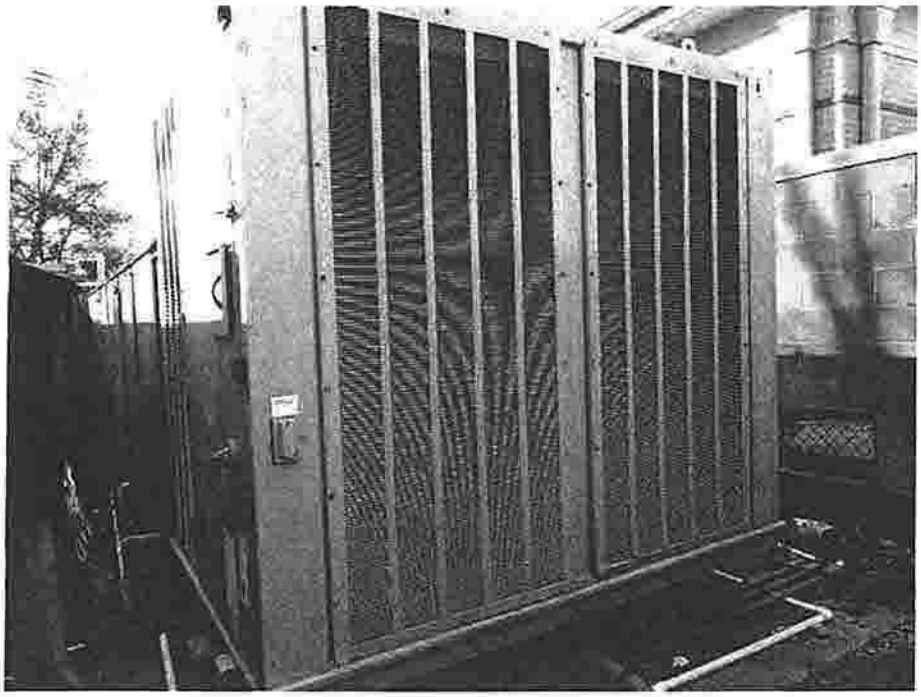
Photograph No. 4

Fencing of holding pond



Photograph No. 5

Flashing repair

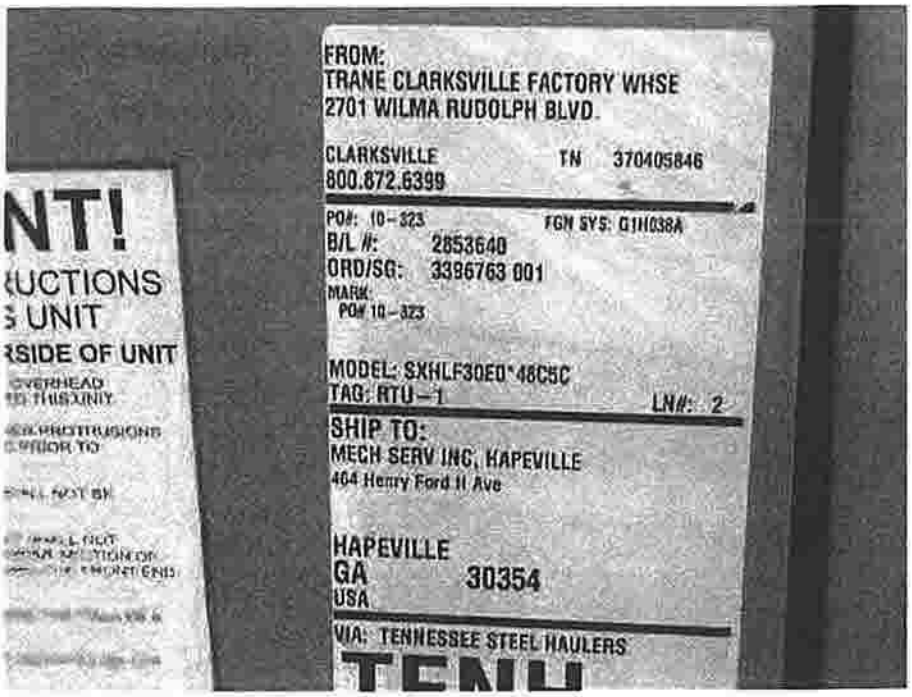


Photograph No. 6

HVAC Trane unit

Photograph No. 7

Trane HVAC rear view



Photograph No. 8

HVAC label

Photograph No. 9

Library entrance

Photograph No. 10

Patch caulking

Photograph No. 11

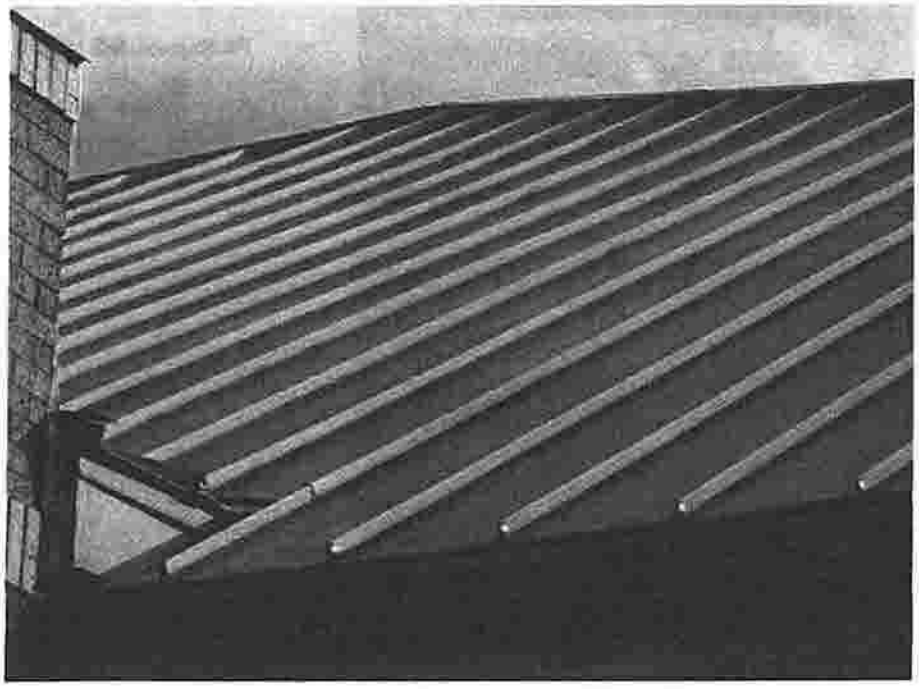
Power system

Photograph No. 12

Retaining pond drainage

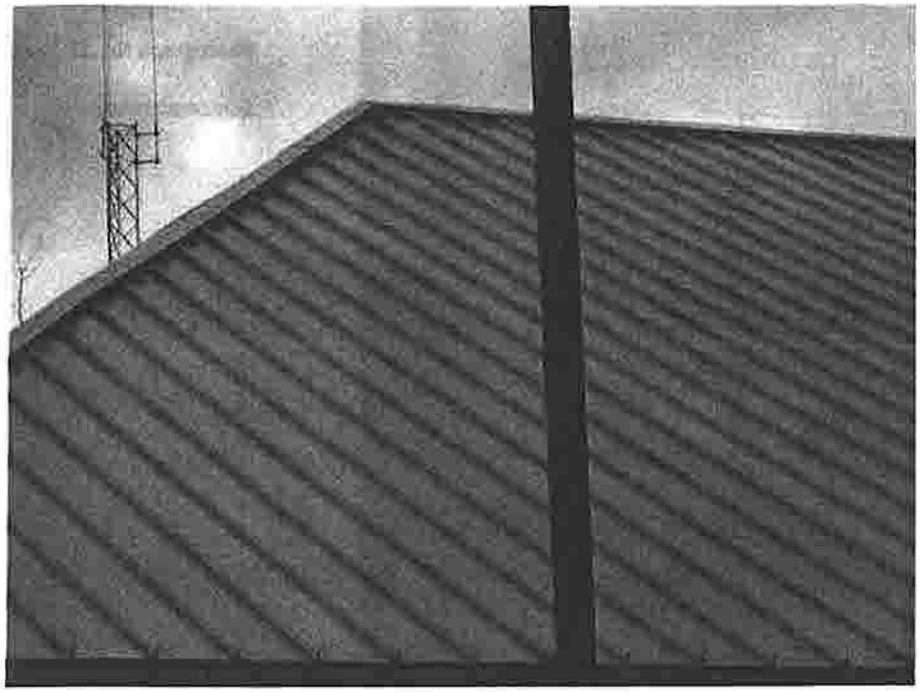
Photograph No. 13

Roof patch caulking



Photograph No. 14

Roof patches



Photograph No. 15

Roof

Photograph No. 16

Circulation desk

Photograph No. 17

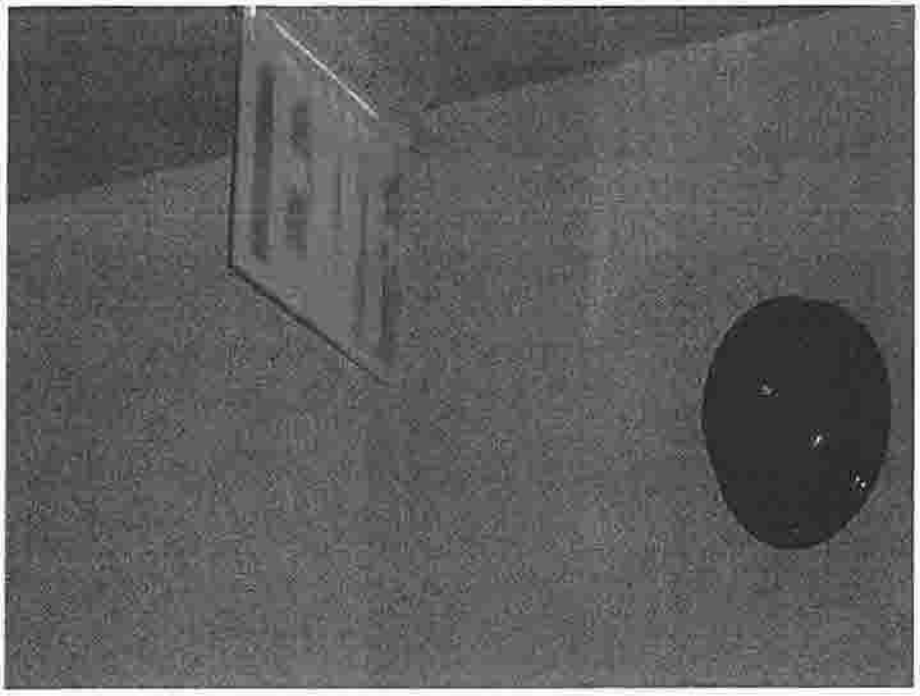
Sensor entrance

Photograph No. 18

Breakroom

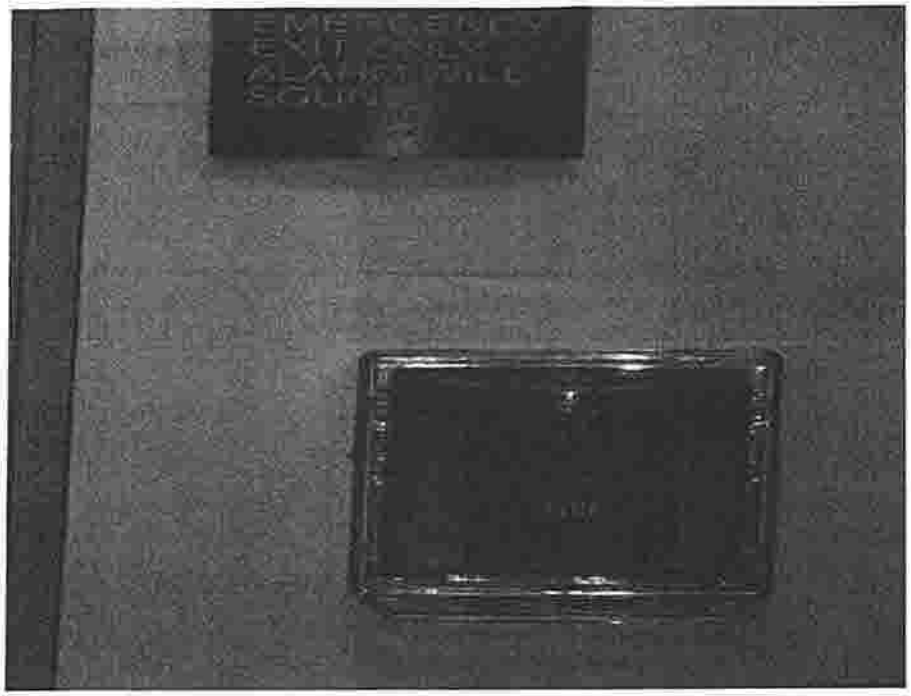
Photograph No. 19

Electrical power



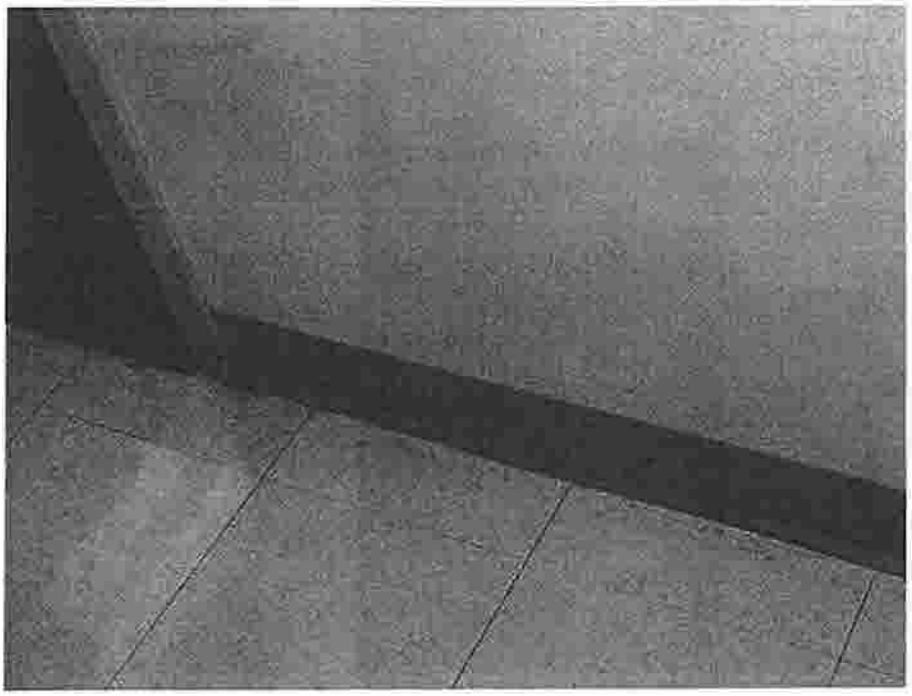
Photograph No. 20

Exit sign



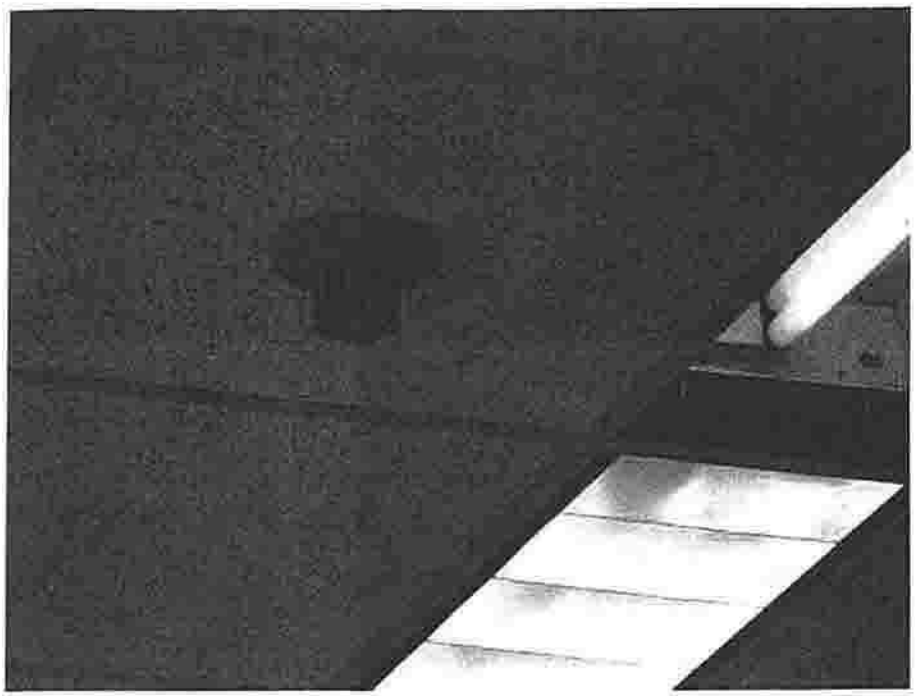
Photograph No. 21

Fire alarm



Photograph No. 22

Floor tile breakroom

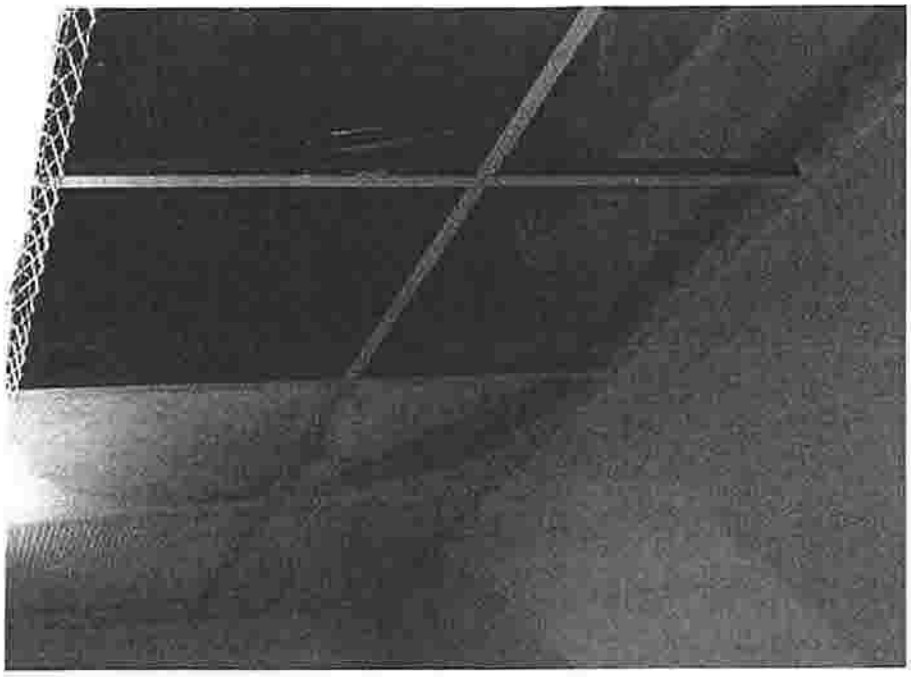


Photograph No. 23

Light cover missing and smoke detector

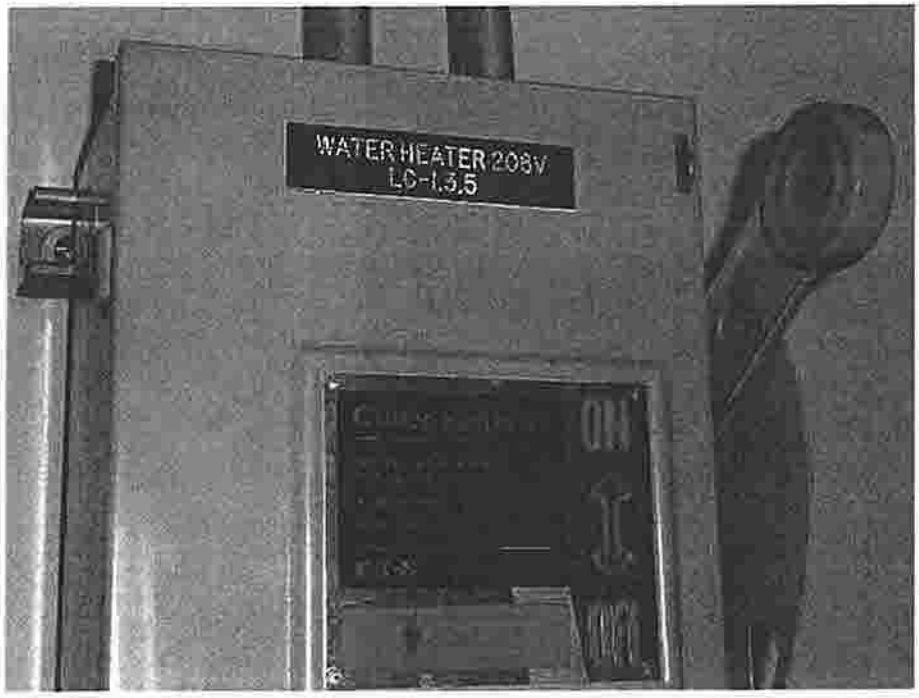
Photograph No. 24

Men's restroom



Photograph No. 25

Missing ceiling

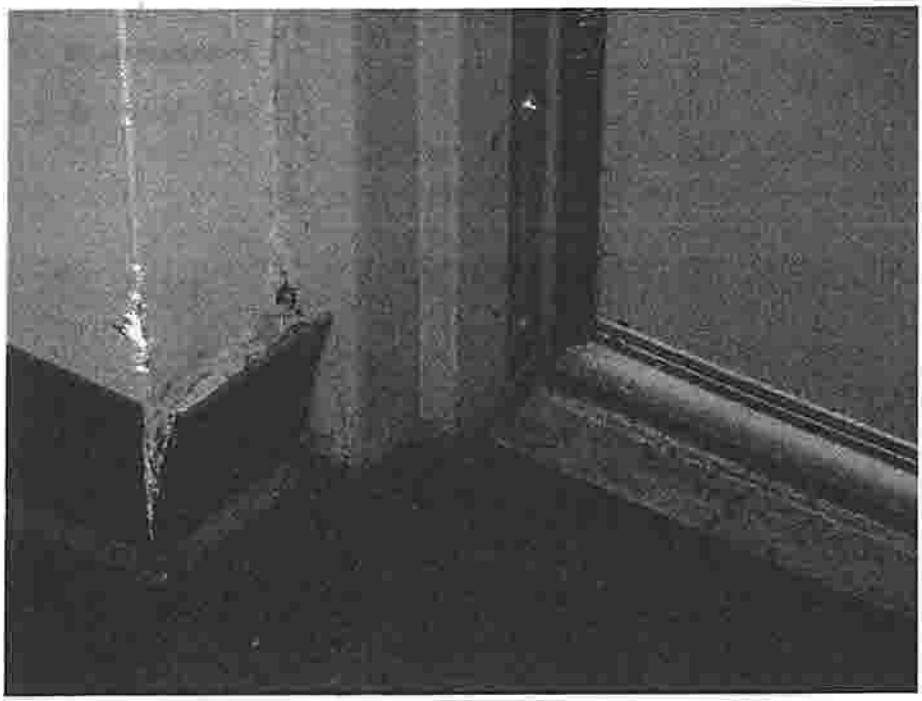


Photograph No. 26

Power source

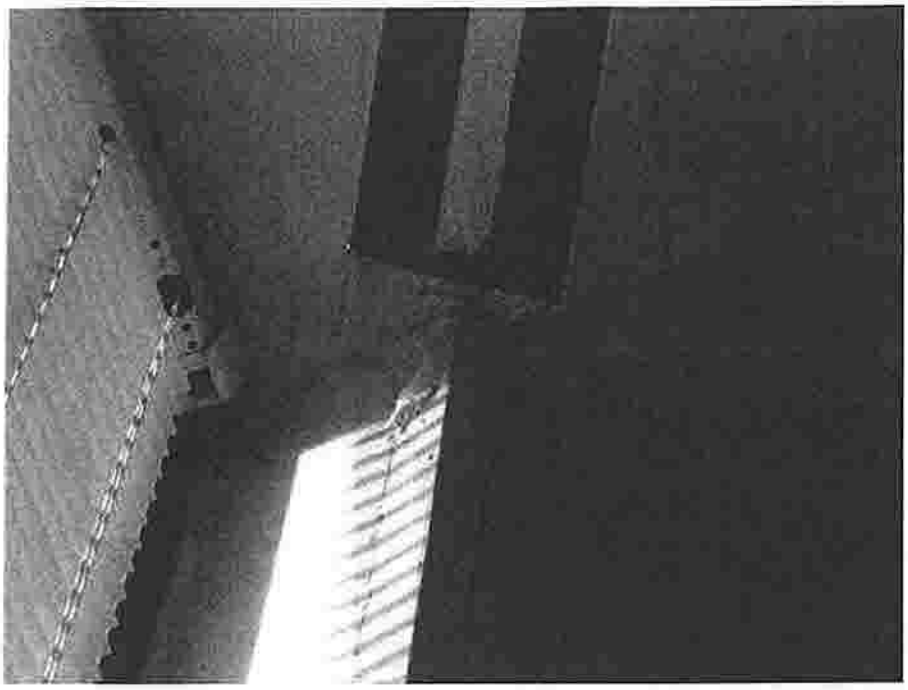
Photograph No. 27

Power System



Photograph No. 28

Wall and floor damage

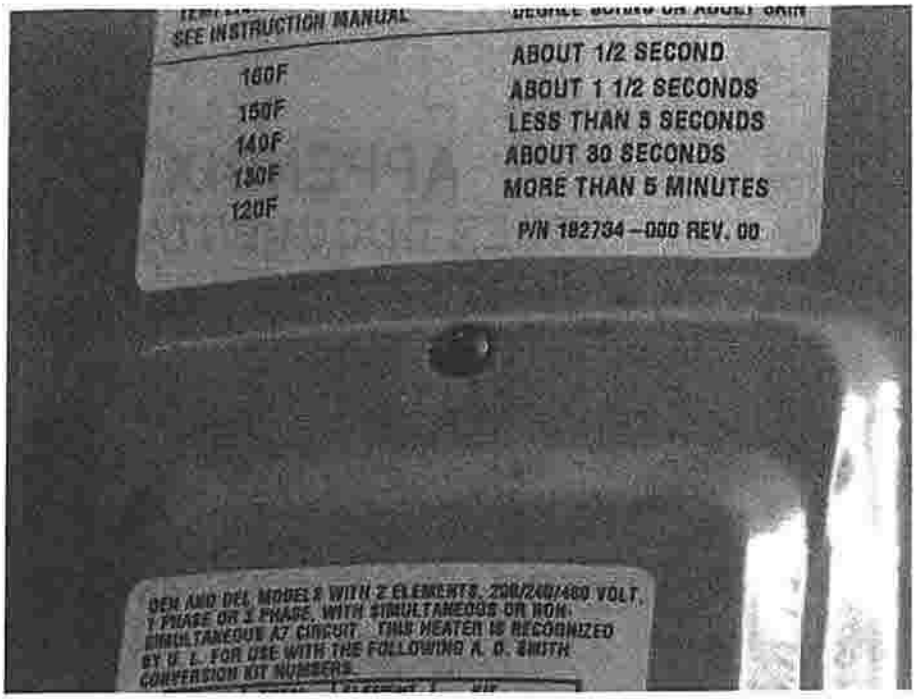


Photograph No. 29

Water ceiling damage

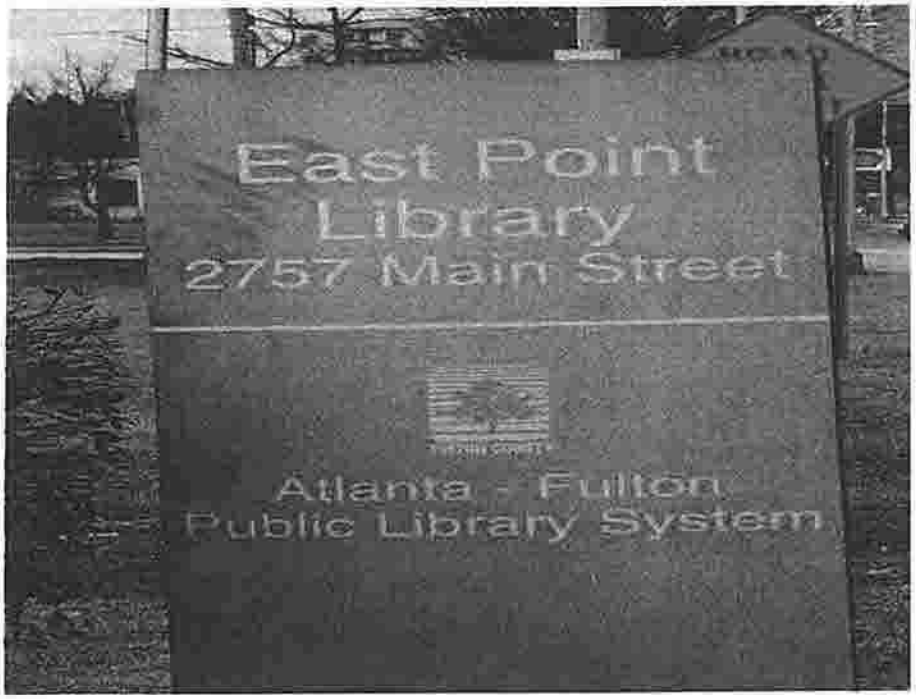
Photograph No. 30

Water heater label



Photograph No. 31

Water tank



Photograph No. 32

Sign

APPENDIX C:
OTHER DOCUMENTATION

Preventative Maintenance Budget

Building Name	Uniformat Level 2	Title	Quantity	Total Labor Hours per Year	Cost In-House	Cost Contract
Roofing Systems						
East Point Library	Roofing Systems	Preventative maintenance of roof coverings.	3.0	2.86	$277.41	$416.12
Subtotal:			3.00	2.86	$ 277.41	$ 416.12
Mechanical						
East Point Library	Mechanical	HVAC control system, Zone Controllers	3.0	8.65	$850.86	$1,276.29
East Point Library	Mechanical	Package unit, 25 tons through 50 tons	1.0	9.01	$995.55	$1,493.33
Subtotal:			4.00	17.66	$ 1,846.41	$ 2,769.62
Electrical						
East Point Library	Electrical	Main electrical switchgear/distribution panel preventative maintenance	1.0	1.64	$190.48	$285.72
East Point Library	Electrical	Lighting system, emergency w/ battery backup	14.0	16.84	$1,066.31	$1,599.47
East Point Library	Electrical	Switchboard, Electrical	4.0	4.6	$353.00	$529.50
Subtotal:			19.00	23.09	$ 1,609.79	$ 2,414.69
Plumbing						
East Point Library	Plumbing	Backflow prevention device, up to 4"	2.0	1.1	$160.39	$240.59
Subtotal:			2.00	1.10	$ 160.39	$ 240.59
Fire & Life Safety						
East Point Library	Fire & Life Safety	Fire Alarm System Testing and Maintenance, 50	1.0	5.56	$430.80	$646.20

Preventative Maintenance Budget

Building Name	Uniformat Level 2	Title	Quantity	Total Labor Hours per Year	Cost In-House	Cost Contract
		devices or less				
Subtotal:			1.00	5.56	$ 430.80	$ 646.20
Total:			29.00	50.27	$ 4,324.80	$ 6,487.22

Count: 8

FAIRBURN HOBGOOD-PALMER BRANCH LIBRARY

60 Valley View Drive
Fairburn, Georgia 30213

March 21, 2016

Report of Facility Condition Assessment

DRAFT

..ITHFUL GOULD
CONSTRUCTIVE EXPERTISE

FULTON COUNTY

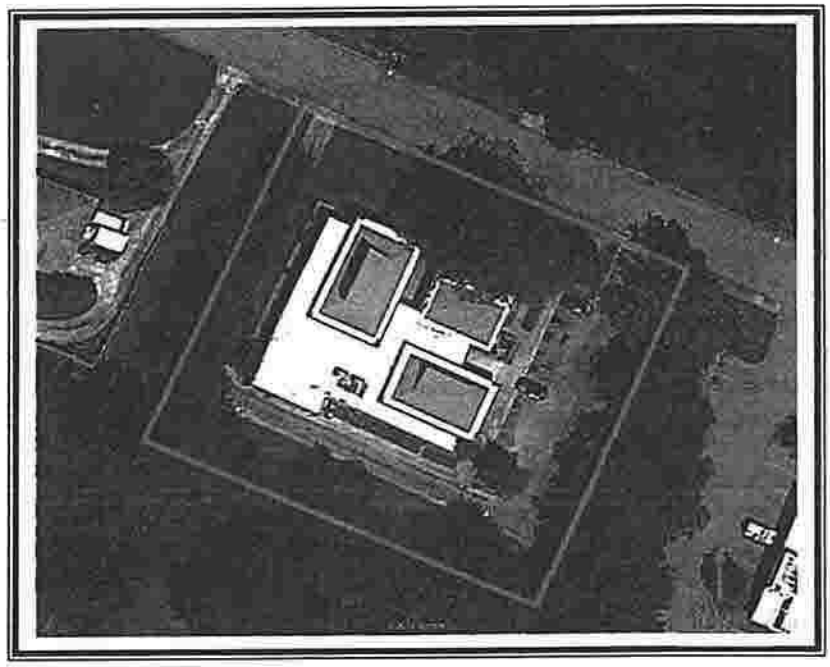
TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

INTRODUCTION

The Fairburn Hobgood-Palmer Branch Library ("the Property) is located at 60 Valley View Drive in Fairburn, Georgia. Site features at the Property contains a land area of approximately 1.00 acre (roughly 43,560 square feet) bounded by Valley View Drive to the north, business properties to the east, Washington Street to the south, and Malone Street to the west. This single story structure of 9,625 GSF was constructed in 1969 and contains a main entry lobby, a public meeting room, public and staff restrooms, open stacks and reading spaces, and staff offices, work areas and breakroom facilities. Plan 1-1 provides an overview of the Property considered by this report

Plan 1-1 – Aerial View of Property



PROJECT DETAILS

On January 21, 2016, Mr. Alexander Morgan, PMP from BuildSmart Enterprises, LLC (a Consultant working under contract from Faithful+Gould, Inc., and hereafter referred to as Faithful+Gould) visited the Property to complete a comprehensive facilities condition assessment of the building and site systems. The objectives of the assessment were to:

1. Identify the condition of the Property and the timing and cost of expenditures required over the next five years. Capital expenditures considered by this report typically have an aggregate value of $1,000 or more and generally exclude minor repair and maintenance items.
2. Determine failure probability of the various systems and components.
3. Determine criticality of system and component failure in relation to the functions served or area supported.

4. Validate existing maintainable equipment inventories and develop preliminary budgets for preventative maintenance activities of the identified equipment.

SCOPE OF SERVICES

Faithful+Gould was requested to complete a Facility Condition Assessment of the site and site improvements of the facility and related site features contained at the Fairburn Hobgood-Palmer Branch Library. The key issues to be addressed by the Facility Condition Assessment include the following:

- Identify the condition of the Property and the prioritization, timing, and cost of expenditures (>$1,000) required over the next 5-years.
- Determine criticality of system and component failure.
- Document the maintainable equipment within each facility and develop preliminary preventative maintenance budgets for equipment maintained by the General Services/Public Works Department.

Strategy Employed to Meet Key Issues

The strategy employed to meet the key issues detailed above (i.e. our scope of services) consisted of performing a visual assessment of the interior, exterior and site components of the subject Property.

The primary purpose of the Facility Condition Assessment was to identify visually apparent deficiencies in the buildings. The evaluation included site visits to observe the buildings and site systems, interviewing building management and maintenance personnel, and reviewing available maintenance systems, design and construction documents and plans, and public records.

This Facility Condition Assessment has been conducted in general accordance with industry standards and the American Society for Testing and Materials (ASTM) Standard E 2018-15 Standard Guide for Property Condition Assessment: Baseline Property Condition Assessment Process and the Contract Documents for 15RFP082615K-DJ Facilities Condition Assessment for the Fulton County General Services/Public Works Department.

We performed a visual non-destructive assessment of the interior, exterior and site components of the Property, including the following major components and systems:

- **Substructure.** We observed the structures for visible signs of distress and reported our findings. We also reviewed available structural drawings for information regarding the design load criteria of the existing structures and the building codes to which the structures were designed. We did not complete a seismic evaluation (PML) of the Property.

- **Shell.** We visually observed the exterior wall system, window and door systems for visible evidence of deficiencies, continuity of seals, and other types of distress and have our findings. We reviewed available flashing and connection details for drainage design and observed the condition and placement of expansion joints. Our visual observations were based on those conditions that can be observed from ground level, roof level and with binoculars. We visually evaluated the condition of accessible roof systems, accessories, and details. In addition, where applicable we discussed existing roof warranties.

- **Interiors**. We visually observed the interior areas of the Property and reported their general condition. Interior finish replacement costs are included if they are significant or if they are part of a repair. Otherwise, interior finish costs are considered part of the interior finish replacement program and are not included in the cost tables.

- **Services.** We observed the age and condition of the Mechanical, HVAC, Electrical, Plumbing (MEP) Systems and related building systems and have commented on their condition and visible deficiencies.

- **Sitework.** We visually observed the exterior areas of the Property and reported their general condition.

- **Accessibility.** We reviewed the Property for conformance with applicable accessibility requirements and reported our findings.

The scope of services under which the Facility Condition Assessment was completed was visual in nature and not intended to be destructive to the Property to gain access to hidden conditions. We did not perform any destructive testing, uncover, or expose any system members. We have documented the type and extent of visually apparent defects in the systems in order to perform the condition assessment.

The scope of services under which the Facility Condition Assessment was completed includes only those items specifically indicated. The evaluation does not include any environmental services such as (without limitation) sampling, testing, or evaluation of asbestos, lead-based paint, lead-in-water, indoor air quality, PCB's, radon, mold, or any other potentially hazardous materials, air-borne toxins or issues not outlined in the previous scope of services. In addition, the assessment does not include identification of underground soils, identification, or quantification of underground contaminants.

Code References

We have considered that the Property holds a grandfathered status in terms of only having to comply with codes in effect at the time of construction or retroactive codes. Codes considered within this report include the following:

- IBC Codes
- Americans with Disabilities Act
- ASHRAE
- National Electrical Code
- EPACT 2005
- NFPA 10 1

Cost Estimates

We have developed cost estimates for completion of the repair and replacement projects recommended over the study period. Cost estimates have been developed on a labor and material basis primarily from data provided by Faithful+Gould project costing group. This data has been amended to reflect the geographic location of the Property. Where the County has supplied us with cost estimate information relating to completed or planned projects we have verified and included this information.

BUILDING DETAILS

Refer to table EX-1 for summary details of the facility.

Table EX-1 Facility Details

Item	Description
Project Name	Fairburn Hobgood-Palmer Branch Library
Property Type	Library
Full Address	60 Valley View Drive Fairburn, Georgia 30213
Onsite Date	January 21, 2016
Year Built	1969
Occupancy Status	Occupied
Number of Stories	Single Story
Gross Building Area (SF)	9,625
Current Replacement Value	$2,646,875
ARV/GSF ($/Sq Ft)	$275

SUMMARY OF FINDINGS

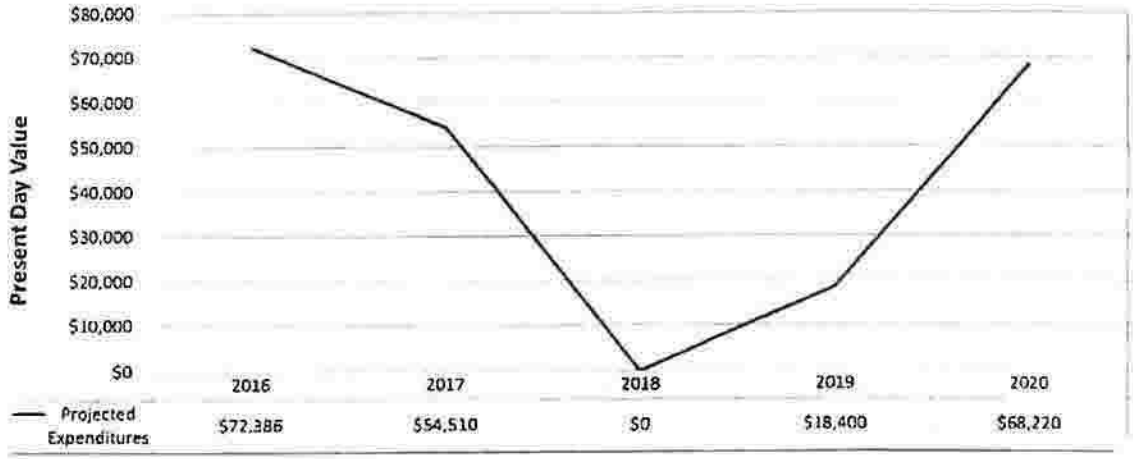
The Property is generally in fair condition, well-constructed, and has had a reasonable level of maintenance carried out over the years. However, given the age of the buildings, we anticipate the following major expenditures over the 5-year study period:

- Exterior – Surface clean and paint exterior elements
- Mechanical – Replace rooftop Carrier unit
- Mechanical – Replace split system unit
- Electrical – Upgrade lighting (Main and Administration Areas)
- Interior – Replace carpet
- Interior – Replace suspended acoustical ceiling
- Interior – Renovate restrooms (public and employee)

BUILDING EXPENDITURE SUMMARY

The building expenditure summary section provides an executive overview of the findings from the assessment. Chart EX-1 provides a summary of the anticipated expenditures over the **5-year study**. Further details of these expenditures are included within each respective report section and within the expenditure forecast, in Appendix A of this report.

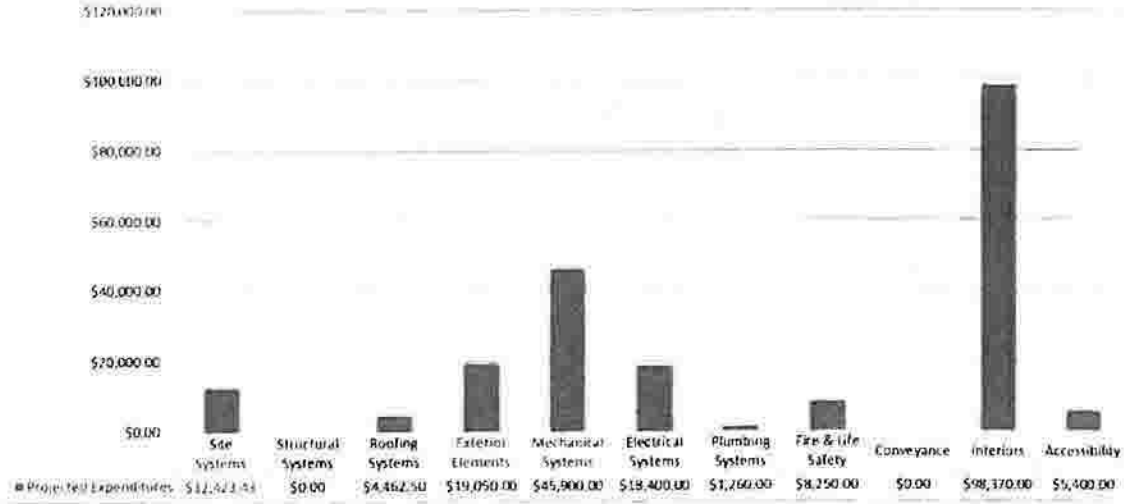
Chart EX-1 Building Expenditure Summary by Year



DISTRIBUTION OF EXPENDITURES BY BUILDING SYSTEM

Chart EX-2 illustrates a summary of the expenditures by building system over the **5-year study**. A more detailed analysis is provided within Appendix A, which provides a breakdown of individual work items as recommended within the main body of the report.

Chart EX-2 Expenditures by Building System over 5-Years



FACILITY CONDITION NEEDS INDEX

In this report, we have calculated the Facility Condition Needs Index (FCNI), which is used in Facilities Management to provide a benchmark to compare the relative condition of a group of facilities. The FCNI is primarily used to support asset management initiatives of federal, state, and local government facilities organizations.

The FCNI is the ratio of accumulated Total Cost (TC) (Deferred Renewal, Deferred Maintenance, Capital Renewal, and Capital Improvement) to the Current Replacement Value (CRV) for a constructed asset calculated by dividing the TC by the CRV. The range is from zero for a newly constructed asset, to one for a constructed asset with a TC value equal to its CRV. Acceptable ranges vary by "Asset Type', but as a general guideline the FCNI scoring system is as follows:

$$FCNI = \frac{\text{Deferred Maintenance/Renewal + Capital Renewal + Capital Improvement (TC)}}{\text{Current Replacement Value of the Facility(s) (CRV)}}$$

If the FCNI rating is 60% or greater then replacement of the asset/building should be considered instead of renewal.

Condition	Definition	Percentage Value
GOOD	In a new or well-maintained condition, with no visual evidence of wear, soiling or other deficiencies	0% to 5%
FAIR	Subject to wear, and soiling but is still in a serviceable and functioning condition	5% to 10%
POOR	Subjected to hard or long-term wear. Nearing the end of its useful or serviceable life.	Greater than 10%
V-POOR	Subjected to hard or long-term wear. Has reached the end of its useful or serviceable life. Renewal now necessary	Greater than 60%

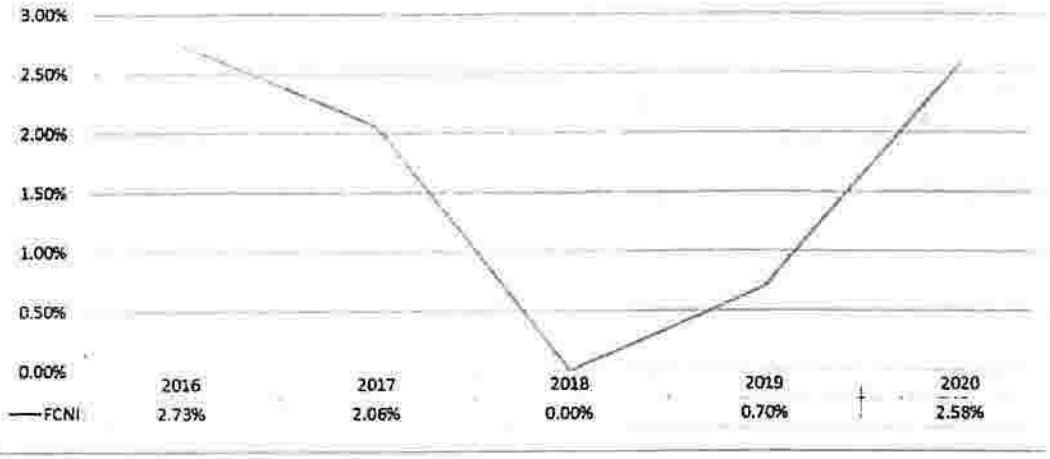
The table below indicates the current FCNI ratio of the Fairburn Hobgood – Palmer Branch Library.

Table EX-3 Facility Condition Needs Index

Key Findings	Metric
Current Year Facility Condition Needs Index	3%
Immediate Capital Needs (included in FCNI)	$72,386
Year 2 to Year 5 Capital Needs	$141,130

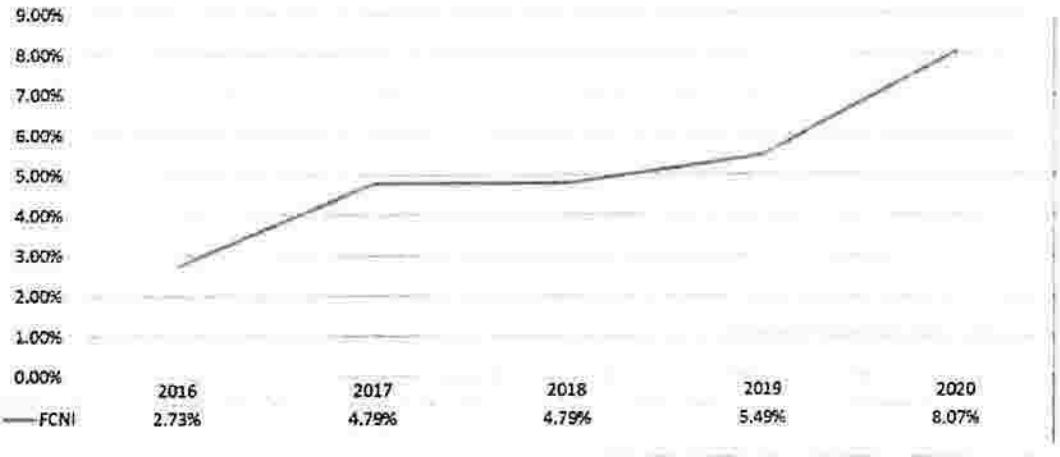
Chart Ex-3 below indicates the effects of the FCNI ratio per year, assuming the required funds and expenditures **ARE** made to address the identified actions each year.

Chart EX-3 Fully Funded FCNI Ratio per Year



The Chart below indicates the cumulative effects of the FCNI ratio over the study period assuming the required funds and expenditures are **NOT** provided to address the identified works and deferred maintenance each year.

Chart EX-4 Unfunded FCNI Ratio per Year

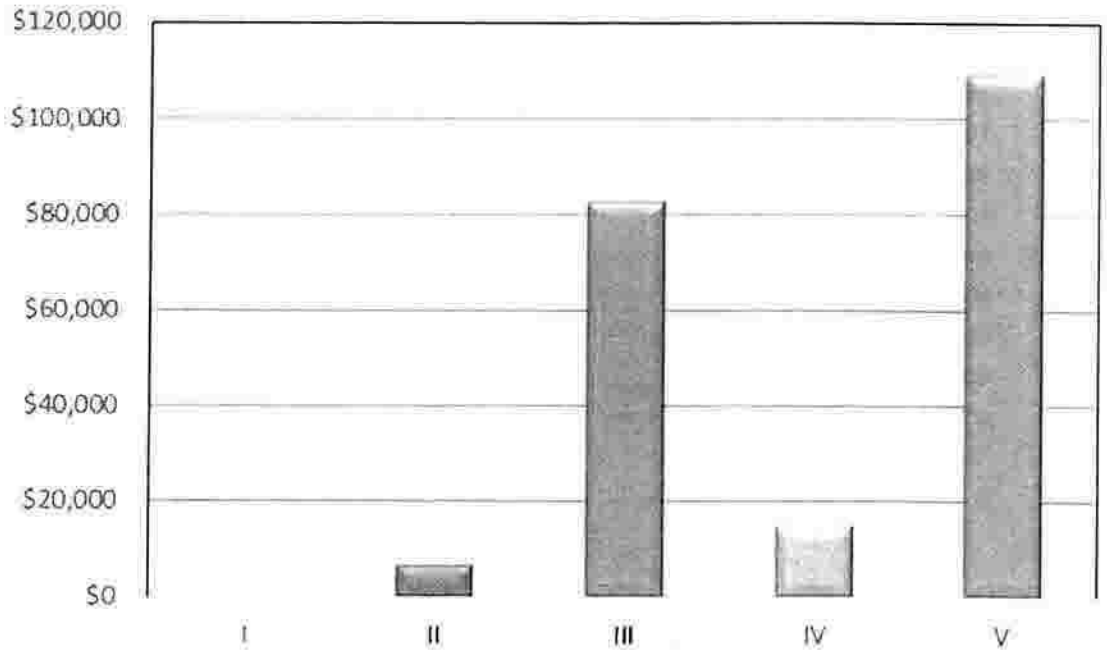


NEEDS SORTED BY PRIORITIZATION OF WORK

Faithful+Gould has prioritized the identified work in order to assist with analyzing the deficiencies found during the assessment. The baseline prioritization model is not just based on replacement year or criticality but uses five key data attributes to build an overall importance metric for every recommendation: System type, the cause or nature of the issue, timing and building mission incorporated into the model with relative weighting to provide an overall priority score. Priority categories are shown below:

Priority I Life safety and code compliance	•Systems requiring immediate action that compromises staff or public safety or requires to be upgraded to comply with current codes and accessibility
Priority II Currently Critical:	•Required to bring a system or building component back into operation or to improve reliability. Necessary to maintain continuity of operations:
Priority III Necessary / Not Critical:	•Lifecycle replacements neccessary but not critical or mid-term future replacements to maintain the integrity of the facility or component
Priority IV Recommended	•Expenditures typically based on service life or are recommended to enhance a system or component.
Priority V Appearance	•Expenditures related to improving public perception or improving aesthetics of a facility. These would mostly relate to renewal of interior finishes.

The chart below illustrates the breakdown of expenditure according the priority coding providing an opportunity to strategically plan and effectively direct funding to the highest priority.

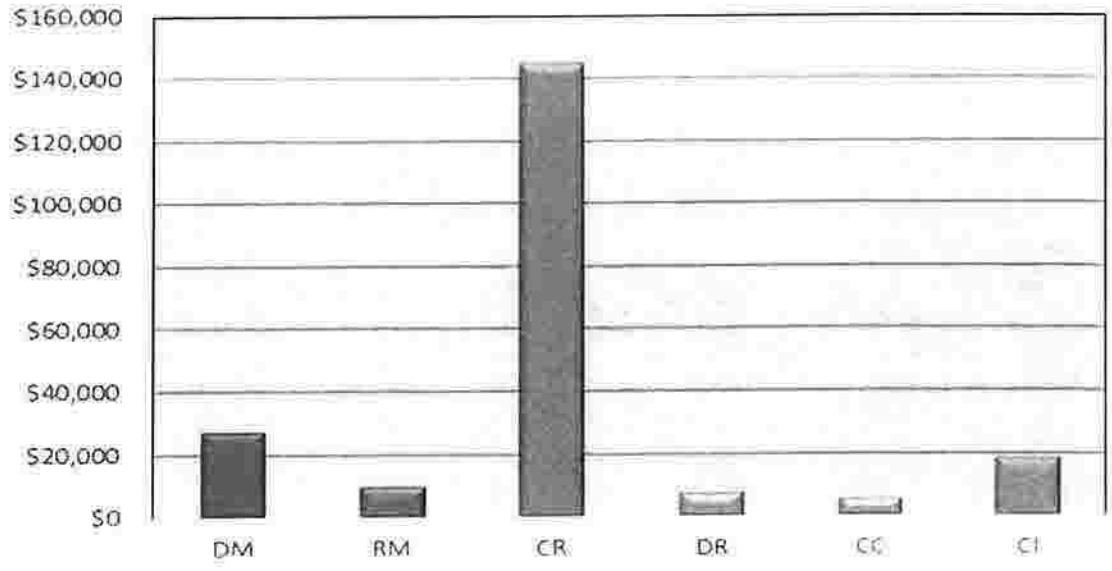


NEEDS SORTED BY PLAN TYPE

Faithful+Gould has prioritized the identified work according to the Plan Type or deficiency categories in order to assist with analyzing the deficiencies found during the assessment. The following Plan Types are shown below:

Plan Type 1 Deferred Maintenance	•Projects required for repair of a failed component in order to restore proper function.
Plan Type 2 Routine Maintenance	•Maintenance that is planned and performed on a routine basis to maintain and preserve the condition. Does not inclue preventative maintenance.
Plan Type 3 Capital Renewal	•Planned replacement of building systems that have or will reach the end of their useful life.
Plan Type 4 Deferred Capital Renewal	•Projects required for replacement of a failed building system in order to restore proper function.
Plan Type 5 Code Compliance	•Projects required modifying or replacing existing building systems in order to comply with current codes.
Plan Type 6 Capital Improvement	•Projects required/requested to enhance government services. Also includes projects resulting from changes in building use or system functionality to support a new agency.

The chart below illustrates the breakdown of expenditure according to the Plan Type or deficiency categories providing an opportunity to strategically plan and effectively direct funding.



RISK

In order to allow Fulton County to balance containment of capital investment with probability and consequence of failure, we have assigned each project with a risk number. These numbers are in addition to the Priority 1, 2, 3, and 4, descriptive ratings previously detailed. Risk numbers have been calculated based upon a numerical assignment of risk resulting from four categories: 1) Impact of Failure, 2) Condition, 3) Probability of Failure, and 4) Frequency of Failure. Numbers assigned to each category are added together to create a total risk number. This risk number is assigned a risk category based upon its numerical range. For instance, deterioration of a computer room air conditioning unit could score 2 under Impact of Failure, 3 under Condition, 3 under Probability of Failure, and 3 under Frequency of Failure, resulting in a score of 11 (2 + 3 + 3 + 3) which equates to a high risk. Table EX-4 below details the risk criteria.

Table EX-4 Risk Criteria Table

Impact of Failure	Condition	Probability of Failure	Frequency of Failure
1 - Catastrophic: The Facility/System/Component cannot be used; personnel death	1 – Very Poor OR Critical active non grandfathered code violation	1 – In state of failure OR Regulatory enforcement action	1 - Frequent: Occurs at least once per week OR more failures will be of significant consequence to the facility
2 - Major: A large portion of the facility is rendered unusable; interruption of facility's official mission activities; personnel injury; deterioration of historic fabric; critical operations severely affected	2 – Poor OR Severe active non grandfathered code violation	2 – Chance of immediate failure	2 - Common: occurs at least once per month
3 - Significant: Reduced use of a facility; scaled back operations; interruption of business (staff) activities; property damage as result of Facility/System/Component failure	3 – Fair OR System / component not present	3 – Increased chance of failure	3 - Seldom: occurs at least once every 31-90 days
4 - Minor: Active intervention required to maintain operations; repairs needed to maintain operations; reduced use of mission elements/actions	4 – Good	4 – Slight chance of failure	4 - Rare: occurs less than once every three months, but more than once a year
5 - Insignificant: Nuisance; operations not impaired; alternative service available without active intervention OR Failure does not require operations active intervention	5 – Very Good	5 – No chance of failure	5 - Very rare: occurs less than once a year, but more than once per year

The Risk Score and the Risk Categories are detailed in Table EX-5 below.

Table EX-5 Risk Category

Risk Score	Risk Category
4 – 8	Critical Risk
9 – 13	High Risk
14 – 16	Medium Risk
17 – 20	Low Risk

To allow Fulton County to balance containment of capital investment with probability and consequence of failure, we have assigned each project with a risk number. The table below provides a summary of Critical and High risk expenditures identified over the 5-year study period. A complete risk assignment for each recommended project is included within Capital Expenditure Forecast provided in Appendix A of this report. No Critical items were noted for the Property; however, the following High risk items were identified:

Table EX-6 Critical & High Risk Expenditures

Risk Category	Year	Component	Cost
High	2016	Investigate, locate and patch roof leaks	$4,463
High	2016	Replace Rooftop Carrier Unit	$31,050
		TOTAL	$35,513

PREVENTATIVE MAINTENANCE

Table EX-7 provides a summary of the financial requirements to complete industry standard preventative maintenance activities on the building systems identified in Appendix C. In-house costs represent the cost to complete the recommended preventative maintenance activities utilizing in-house staff at current labor rates provided by the County, while contract costs includes general markups associated with contracting out the same activities to a service contractor.

Table EX-7 Annual Preventative Maintenance

System	In-House Costs	Contract Costs
Roofing	$221.93	$332.90
Mechanical	$1,084.89	$1,627.34
Electrical	$1,431.95	$2,147.93
Plumbing	$0	$0
Fire & Life Safety	$375.80	$563.70
Conveyance	$0	$0
TOTAL	**$3,114.57**	**$4,671.87**

2.0 SITE SYSTEMS

DESCRIPTION

The Property contains a land area of approximately 1.00 acre (43,560 square feet) bounded by Valley View Drive to the north, business properties to the east, Washington Street to the south, and Malone Street to the west. A concrete sidewalk is provided in front of the main entrance to the library. Handrails are provided at the concrete steps near the building's entrance.

The Property contains one principal parking lot for visitors and employees. The parking lot is contained at the east side corner of the building. There are approximately 20 parking spaces, including two accessible spaces available for use by customers and employees. A concrete sidewalk is located in front of the main entrance to the library. Handrails are provided at the concrete steps near the building's entrance. The parking lot and the building site are boarded by cast-in-place concrete curb sections.

Concrete sidewalks are provided along the east, south and north (main entrance) perimeter of the building.

A rectangular concrete structure situated hillside south of the library between a residential area is designed to control water flowing off of slope.

CONDITION

The asphalt paving in the parking areas appear to be in fair to good condition. However, we noted localized areas of alligator cracking and noted failed surface markings and general aging of the wearing surface. Based upon these conditions, we recommend budgeting for near-term replacement of alligator cracking, fillings of cracks, seal coating and re-striping.

Site concrete and associated handrails appeared to be in good condition. However, we noted two locations where the concrete curb is broken. We have inflated our opinion of cost for pavement work to include for replacement of concrete curbs. Caulked expansion joints in the concrete sidewalks are failing. We recommend that the expansion joints be cleaned-out and resealed in the near-term. This work can be combined with the sealant work required for failed exterior caulk joints at the windows.

The drainage structure is in good condition. We recommend backfilling the structure to minimize erosion in the near-term.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Partial Asphalt Pavement Resurfacing/Repair at Parking Lot	III	Deferred Maintenance	2016	$4,600
Sealcoat and Stripe Parking Lot and Remark ADA Spaces	III	Deferred Maintenance	2016	$4,148
Backfill Drainage Structure to Minimize Erosion	III	Deferred Maintenance	2016	$3,675

3.0 STRUCTURAL SYSTEMS

DESCRIPTION

No construction drawings were available and few structural elements were visible at the time of the site visit. However, the Property is assumed to consist of a single story, structural steel framed post and beam construction with a concrete masonry unit (CMU) back-up with an external facing brick skin. The roof structure consists of steel lattice beams supporting a profiled metal roof deck. We were not provided with details of the sub-structure. However, foundations are likely to consist of a combination of cast-in-place concrete isolated and continuous footings.

Foundations

No design or construction drawings showing the foundation details were available for review, so the exact foundation composition cannot be commented on as the design of this element varies from site to site.

Floor Slab

The ground floor slab is assumed to consist of a 4" deep steel reinforced slab on a waterproof membrane, select fill sub-base and compacted subgrade.

Interior Walls and Ceilings

Interior walls primarily consist of non-loading bearing steel stud partitions with gypsum wallboard sheathing, plus small areas of textured fabric wall panels. Public restrooms have some ceramic tile wall finishes. Suspended acoustical ceilings are typically provided throughout and within the mechanical room in the ceiling is open to the above structural system.

Exterior Walls

Exterior wall systems typically consist of 4" thick facing brick anchored to CMU blockwork and metal stud walls with a 1" air gap, rigid and batt insulation. The inter face of the exterior walls consists of painted gypsum board.

Roof Structures

The roof structure consists of light steel beams supporting a profiled metal roof deck.

CONDITION

The structure was generally found to be sound with no evidence of differential settlement or displaced structural members.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

4.0 ROOFING SYSTEMS

DESCRIPTION

The building contains a low-slope roof covered with a thermoplastic polyolefin (TPO) single-ply roofing membrane. The building also contains sloped triangular shaped dormers and skylights. The sloped face of the dormers are covered with fiberglass reinforced asphalt shingles with the vertical faces clad with metal panels. The main building is trimmed with either metal fascia panels or horizontal metal trim at the eave. The roof appears to be drained to the building perimeter to scupper drains and painted metal downspouts.

CONDITION

The roof system is in fair condition. The probabilities that there are breaches in the roofing system are apparently causing damages to ceiling tiles and soffits inside the building. We recommend that the roof leaks be patched in the near-term based upon an investigation that identifies the areas to be repaired.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Investigate, locate and patch roof leaks	II	Deferred Maintenance	2016	$4,463

5.0 EXTERIOR ELEMENTS

DESCRIPTION

The building is placed in a rectangular configuration with exterior elements consisting of brick masonry, double glazed aluminum frame windows and painted metal. The exterior wall system of the library is consistent and primarily consists of exposed brickwork with cementitious mortar filled joints laid in a stretcher bond with indented accent detailing. Building control joints consist of a compressible backer road, and are sealed with elastomeric sealant.

Windows in the building consist of aluminum-framed units with double glazed sections with rubber gasket sealants between glazed elements and the aluminum frames and elastomeric sealants between window frames and brickwork elements. Windows range in size from 3' x 4' to 9' x 14'. The main entrance to the library is accessed from the north elevation of the building, and a more frequent entrance is accessed from the eastern elevation of the building. Both entrances consist of one set each of aluminum framed glazed doors, separated by a vestibule area. These entrance doors have storefront glazed units on each side.

CONDITION

The exterior masonry appears to be in fair condition. There are numerous locations where mortar and sealant has deteriorated, especially near the downspouts. There are also locations of previous poor tuckpointing and patching. We recommend that deteriorated mortar joints and control joints be repaired.

The paint on the exterior hollow metal doors and frames, the steel lintel angle at the front entrance, and the handrails at the front steps is faded are starting to rust. We recommend that these surfaces be cleaned, prepped and painted in the near-term. This work would improve the aesthetic appearance of the building exterior. This work can be combined with other aesthetic improvements.

Elastomeric 'wet sealants' at the perimeter of window frames and skylights were found to be in fair condition with limited areas of deterioration noted. Considering the age and condition of these elements, we recommend that the sealants are replaced alongside the building control joints in the near-term of the study period. Additionally, we recommend that the failed glazing units be replaced in the near-term.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Surface Cleaning and Painting Exterior Elements	III	Routine Maintenance	2016	$8,625
Renew Exterior Sealant and Mortar Joints	III	Deferred Maintenance	2016	$8,125
Replace Failed Glazing Units	II	Deferred Maintenance	2016	$2,300

6.0 MECHANICAL SYSTEMS

HEATING AND COOLING SYSTEMS

DESCRIPTION

Heating and cooling for the Property is provided by one rooftop package unit with direct expansion and natural gas fired furnace. The unit was manufactured by Carrier in 1995 with a capacity of 15-tons. The rooftop unit serves the office areas and portions of the main library. There is also a split system heat pump unit which serves the multipurpose room, entry area and additional areas of the building. The split system was manufactured by York in 2006 with a rated capacity of 7.5-tons.

CONDITION

The rooftop system malfunctions about 60% of the time and has become increasingly maintenance intensive and costly to repair. Based on the age and historical failures, we recommend budgeting for the replacement of the rooftop unit in the near-term. The split system appeared to be in fair condition, we did note that the filter appeared to have not been replaced recently and refrigerant lines were missing insulation. As the unit has been in service for 10-years and with a typical service life of 15-years for these types of units, we recommend budgeting for the replacement of the split system late-term. It may be possible to defer the replacement if a structured preventative maintenance program is implemented.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace Rooftop Carrier Unit	III	Capital Renewal	2016	$31,050
Replace Split System Unit	IV	Capital Renewal	2020	$14,850

AIR DISTRIBUTION SYSTEMS

DESCRIPTION

Conditioned air from the rooftop package unit and split system air-handling unit is distributed via sheet metal and flexible duct connections to the respective areas served. Air is discharged into the respective areas via ceiling mounted diffusers.

CONDITION

The air distribution systems appeared to be in fair to good working condition.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

VENTILATION AND EXHAUST SYSTEMS

DESCRIPTION

Ventilation Air

Outside air for ventilation purposes is supplied to the building either through fresh air intakes located on the rooftop unit, split system unit or through natural air infiltration.

Exhaust Systems

General building exhaust systems included exhaust fans for the restrooms. The exhaust fans are installed in the ceiling and ducted through the roof.

CONDITION

The ventilation and exhaust systems for the building appeared to be in fair to good working condition. We did note that the exhaust fan in the men's restroom exhaust fan was not operational. Given the minimal expense of repairing the exhaust fan, we recommend that it be repaired as an operational expense.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

HVAC CONTROLS

DESCRIPTION

The controls for the rooftop units consists of wall mounted thermostats.

CONDITION

The HVAC controls system is adequate for the building occupant's needs based on the types of systems installed. We anticipate that the thermostats will be replaced in conjunction with the respective units. We also recommend that where none programmable thermostats are provided, they be replaced with a programmable thermostat in order to set an operational schedule based on the occupancy status of the building. This will help decrease energy usage and help ensure optimal thermal comfort.

PROJECTED EXPENDITURES

No capital expenditures are expected at this time.

7.0 ELECTRICAL SYSTEMS

ELECTRICAL SERVICE AND DISTRIBUTION EQUIPMENT

DESCRIPTION

Electrical Service Equipment

The building is provided with one main electrical feed from a pole mounted utility transformer located at the southwest of the building. Secondary service from the transformer is routed overhead to an electrical service panel. Service characteristics for the electrical service are 120/208-volts, 3-phase and 4-wire. The main distribution panel is rated at 400-amps.

Power Distribution

The HVAC equipment, lighting and general purpose loads throughout the building are supplied from the 120/208-volt system panels.

Wire and Conduit

Typical power distribution for the feeders and branch circuits is accomplished using wire in conduit. Conduit types varied based on the area and usage.

Motor Control

Motor control is provided locally to the driven equipment. Motors are controlled by circuit breakers at the distribution panels and disconnect switches located at the equipment

CONDITION

The major electrical equipment items appear to be in fair condition. There is no indication of damage from short circuit or overload condition. We did note that some stored materials in front of the panels that should be removed to help ensure clear unrestricted access to the panels. Electrical distribution equipment of the type installed is generally considered to have a service life of 30 years or more. Switchboards, panelboards and wiring are often serviceable beyond this time if properly maintained, and not subjected to repeated overload or short circuit conditions. Even though the panels are original to the time of construction, replacement components are still available and the equipment still provides reliable service. We do not anticipate a requirement to upgrade or replace the electrical systems during the study period, but electrical upgrades should be planned for within the next 8 to 12 years.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

LIGHTING SYSTEMS

DESCRIPTION

General area lighting consists of nominal 2' x 4' and 2' x 2' lensed, lay-in fluorescent fixtures and some recessed down lights in common areas and restrooms. Illuminated exit signs are installed at exit doors. Exterior lights are flushed mounted on the brick structure perimeter. No other site lighting exists.

CONDITION

The interior light fixtures appear to be in dated but fair condition. We recommend that the lighting fixtures be upgraded in the main and administrative areas in far-term in order to improve lighting quality and energy efficiency. The retrofit of these fixtures should include replacement of the lens covers in order to improve the quality of lighting provided to the space. By improving the lighting quality, often times the number of fixtures can be reduced, which in turn improves energy efficiency.

ROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period and scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Upgrade Lighting (Main and Administration Area)	V	Capital Improvement	2019	$18,400

COMMUNICATIONS AND SECURITY SYSTEMS

DESCRIPTION

Telephone and communications service enters the building on the southwest elevation. The main equipment and incoming cables are rack mounted and easily accessible within the administrative office area. An electronic security system is incorporated as part of the fire alarm system.

CONDITION

The communications systems appear to be in good condition and primarily maintained by the serving utility company. Consideration of the IT and associated equipment is excluded from this report.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

8.0 PLUMBING SYSTEMS

DOMESTIC WATER SYSTEMS

DESCRIPTION

Domestic cold water service consists of an approximate 2" water main that enters the building in the mechanical room on the southeast elevation. Domestic hot water is generated by a 30-gallon electric storage tank type water heater and is located in the mechanical room. Water distribution relies on service pressure from the local utility. Domestic water piping is typically copper.

Plumbing Fixtures

Plumbing fixtures in the restrooms consist or floor mounted water closets with sensor controlled flush valves, wall mounted urinals with sensor controlled flush vales and vitreous china sinks with sensor controlled faucets. The employee breakroom is equipped with a stainless steel service sink. There is one public drinking water fountain located between the men's and women's public restrooms.

CONDITION

The domestic water service, backflow preventer and domestic water heater appear to be in fair condition. There is no evidence of leaks or other areas of deterioration noted or reported to us for the building. The domestic water heater appeared to have been installed within the last 10 years. Given the age of the water heater, we anticipate that it will require replacement in the near-term.

The plumbing fixtures appeared to be in fair condition and are scheduled to be replaced in conjunction with the recommended restrooms refurbishments.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5 year study period and scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace Water Heater	III	Routine Maintenance	2017	$1,260

SANITARY WASTE AND STORM DRAINAGE SYSTEMS

DESCRIPTION

Sanitary Waste Systems

Sanitary waste is collected from multiple laterals and routed to the municipal sanitary system via lateral gravity drains lines. The sanitary lateral pipes are not visible.

Stormwater Systems

Strom drainage from the roof is via collection boxes and downspouts, which tie into the underground stormwater management system.

CONDITION

The sanitary waste and storm drainage piping is believed to be in good condition and adequate for the building. Reports of routine blockages or leaks were not reported to us nor was historical evidence of such issues noted. Based on the age of this system, we anticipate that it should last throughout the study period. Plumbing sanitary steel piping usually has an average service life of 40 plus years. There did appear to be some interior water damage along the walls behind the downspouts; however, we anticipate that the damage was historical in nature as the gutters appeared to have been replaced in conjunction with the roof replacement.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

9.0 FIRE & LIFE SAFETY

STRUCTURAL FIRE PROTECTION

DESCRIPTION

The building was constructed in 1969 and based upon classification of code requirements and occupancy type, the building is not required to have additional structural fire protection.

CONDITION

Based on the Occupancy and Construction type classifications, the building structure is not required to have additional means of fire protection.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

MEANS OF EGRESS

DESCRIPTION

Primary means of egress for the building is provided by one front entrance and exit on the front elevation of the building as well as at the south side of the building. Lighting for the egress paths appears to be provided by emergency lights and exit signs on an emergency circuit.

CONDITION

Means of egress appear to be sufficient and unobstructed from all points in the building relative to exit discharge and travel distance. Exit signage appears to be installed at the exterior doors and installed above doors at interior work areas and public restrooms.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

FIRE DETECTION AND ALARM SYSTEMS

DESCRIPTION

The building is protected by a Silent Knight Model 4720 (and Model 4120 extender panel) burglary/fire communicator zone fire alarm system. The fire alarm control panel (FACP) is located in the main mechanical room. The fire alarm system monitors manual pull stations, smoke and heat detectors within various zones throughout the building. Pull stations are provided at exits. Alarm notification is provided by horn devices located throughout the building.

CONDITION

The fire alarm system appeared to be in fair condition and installed in general accordance with the codes enforced at the time of installation. Current code requirements need to be verified to determine if a combination audio/visual (horn/strobe) alarm device is required to notify fire alarm activation to a person with a visual or hearing impairment. We recommend that the dated fire alarm panel be replaced in the near-term and additional devices installed as necessary.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace Fire Alarm Control Panel	III	Capital Renewal	2017	$8,250

10.0 INTERIORS

DESCRIPTION

Ceiling finishes within the main library, meeting room and office area consists of gypsum ceilings and soffits combined with 2' x 2' suspended ceiling tiles contained within a prefinished grid. Finishes in the break area consist of 12" x 12" resilient floor tiles. Break areas have casework consisting of laminated countertops and cabinets.

Single stall male and female restrooms are located in the corridor near the conference room. Finishes consist of 4" x 4" ceramic wall and floor tile, painted gypsum ceiling systems and plastic laminate counters.

CONDITION

Ceiling tiles were painted during a rehabilitation program in circa 2012. Recently, a few tiles were stained due to roof leaks. We recommend due to age, that the tiles be replaced in the far-term.

The interior finishes are in fair condition due to a rehabilitation program performed in or about 2012. New carpeting was installed, and the interior walls and ceiling tiles were painted. A few ceiling tiles are stained from water leaks in the roof. We recommend that the dated restroom facilities be renovated in the near-term.

The multi-purpose room appeared to be in fair condition with many damaged concealed spline ceiling tiles and stained carpeting. These types of ceiling systems are maintenance intensive and hard to repair. In addition, replacement tiles are hard to match. We recommend budgeting for the renovation of the multi-purpose room in the near-term.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace Carpet	V	Capital Renewal	2020	$33,660
Replace Floor Tile	V	Capital Renewal	2020	$1,080
Replace Suspended Acoustical Ceiling	V	Capital Renewal	2020	$18,630
Renovate Restrooms (Public and Employee)	V	Capital Renewal	2017	$37,500
Renovate Multi-Purpose Room	III	Deferred Renewal	2017	$7,500

11.0 ACCESSIBILITY

ACCESSIBILITY ISSUES

THE GUIDELINES

As a publically accessible facility, the Property should seek compliance with the 2010 ADA Standards for Accessible Design (2010 Standards), made effective March 2012. These standards are revised standards for the ADA Accessibility Guidelines (ADAAG), issued in July 1991. This report section compares the requirements of the ADA with as-built conditions, and where applicable, recommends upgrades required to achieve compliance. Specifically, one area the ADA has a significant effect on the physical aspects of the Property.

Title I deals with employment discrimination, and requires that employers not discriminate against a disabled person in hiring or employment. This can impact the configuration and features of buildings and those employers are expected to make "reasonable accommodation", including making facilities readily accessible to disabled employees.

Title III requires that public accommodation provide goods and services to disabled patrons on an equal basis with the non-disabled patrons. This title is the part of the ADA with perhaps the greatest impact on buildings, which provide public accommodations.

The ADA has provided a benchmark for measuring accessibility, primarily orientated towards new construction. It also provides guidance for modification of existing facilities to eliminate barriers to access. This benchmark is the 2010 ADA Standards for Accessible Design (2010 Standards). The stated purpose of the guidelines is to ensure that newly constructed facilities and altered portions of existing facilities covered by the ADA are readily accessible to disabled persons.

Regulatory implementation of the ADA includes the following priorities for barrier removal in existing facilities:

- **Accessible Entrances.** Providing access from public sidewalks, parking or public transportation that enables disabled individuals to enter the facility.
- **Access to Goods and Services.** Providing access to areas where goods and services are made available to the public.
- **Usability of Restrooms.** Providing access to restroom facilities.
- **Removal of Remaining Barriers.** Providing access to the goods, services, facilities, privileges, advantages, or accommodations.

APPLICABILITY

The ADA in its purest form relates only to facilities occupied or significantly altered after March 13, 1991. As this building was constructed in 1999, it is therefore required to comply with the applicable aspects of 1991ADA guidelines. Any subsequent refurbishments must comply with the ADA guidance in affect at that time.

SITE ACCESS AND BUILDING ENTRANCES

REQUIREMENTS

The first consideration relates to measures that will enable individuals with disabilities to physically approach and enter a place of public accommodation. The priority of "getting through the door" recognizes that providing actual physical access to a facility from public sidewalks, public transportation or parking, is generally preferable to any alternative arrangement in terms of both business efficiency and the dignity of individuals with disabilities. Additionally, if passenger drop-off areas are provided, they must be accessible and an accessible route must connect each accessible drop-off area with the accessible entrance(s). Curb ramps must be provided if the drop-off area is next to a curb and raised sidewalk.

Section 405 (Ramps) of the ADAAG requires that any part of an accessible route with a slope greater than 1:20 shall be considered a ramp. Confirmation should be sought that all exterior ramps on accessible routes meet these requirements.

The parking areas should contain a suitable amount of car and van accessible spaces in line with Section 502 (Parking Spaces) of the ADA. These should be located near the accessible building entrance, along the accessible path and should be provided with suitable signage and pavement markings.

The entrance approach, door widths and hardware must be compliant with ADAAG, and it is advised that automated door openers are provided if the opening force to entrance doors is considered excessive.

ON-SITE CONDITIONS

Access for visitors and employees are restricted to the main entrances and east entrance. Access at both entrances is through double doors.

Each door has a compliant clear opening width of 32". Once through the entrance doors, access to the main lobby and remaining portions of the building is unrestricted. Door widths were compliant with the applicable sections of the GAC and 2010 Standards.

Ramps of the GAC and the ADA standards requires that any part of an accessible route with a slope greater than 1:20 shall be considered a ramp. There is one ramp serving the building. The Property contains approximately 20 parking spaces including two accessible spaces.

Disabled persons wishing to access the Property are able to gain entry utilizing the public sidewalks that lead to a ramp (with handrails) to the previously detailed entrances. The route of travel from the public street frontage to the entrances is generally unrestricted and accessible in compliance with the GAC and ADA standards. ADA and GAC requires that two accessible parking spaces should be provided for parking of this size.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

ACCESSIBLE ROUTES

REQUIREMENTS

All publically accessible areas should be provided with suitable horizontal and vertical circulation. Elevators should comply with Section 407 (Elevators), including suitable controls, signage (including braille), audio floor indicators, and the applicable spatial requirements. All publically accessible floors should be provided with an elevator along the accessible path.

Section 405 (Ramps) of the ADAAG requires that any part of an accessible route with a slope greater than 1:20 shall be considered a ramp.

Section 308 (Space Allowance and Reach Ranges) of the ADAAG requires that a minimum clear width for single wheelchair passage shall be 32-inches, the minimum width for two wheelchairs to pass is 60-inches, the space required for a wheelchair to make a 180-degree turn is a clear space of 60-inches, and the minimum clear floor or ground space required to accommodate a single, stationary wheelchair occupant is 30-inches by 48-inches.

Section 307 (Protruding Objects) of the ADAAG requires that objects projecting from walls (e.g. drinking fountains) with their leading edges between 27-inches and 80-inches above the finished floor shall protrude no more than 4-inches into walks, halls, corridors, passageways, or aisles. Objects mounted with their leading edges at or below 27-inches above the finished floor may protrude any amount. Freestanding objects mounted on posts or pylons may overhang 12-inches maximum from 27-inches to 80-inches above the ground or finished floor. Protruding objects shall not reduce the clear width of an accessible route or maneuvering space.

Section 302 (Floor or Ground Surfaces) of the ADAAG requires that ground and floor surfaces along accessible routes and in accessible rooms and spaces, including floors, walks, ramps, stairs, and curb ramps, be stable, firm and slip-resistant. Flooring within the Property generally complied with this requirement.

This section also requires that changes in level between ¼-inches to ½-inches be beveled with a slope no greater than 1:2, and that changes in level greater than ½-inches be accomplished by means of a ramp. The section also states that carpet or carpet tile used on a ground or floor surface be securely attached; have a firm cushion, pad or backing or no cushion or pad; and have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Where gratings are located on walking surfaces, then they shall have spaces no greater than ½-inches wide in one direction.

ON-SITE CONDITIONS

Generally, the Property complies with these requirements as no protruding objects were noted. However, we did note that the circulation desk was standard height across its entire length. We recommend budgeting for the modification of the circulation desk to accommodate disabled individuals.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Install ADA Compliant Circulation Counter	III	Code Compliance	2016	$5,400

DOORS AND SIGNAGE

REQUIREMENTS

The ADAAG states that signs that identify permanent rooms and spaces such as those identifying restrooms and exits or providing room numbers must have Braille and raised letters or numbers to allow them be read visually or tactilely. The ADAAG also states that signs must also meet specific requirements for mounting location, color contrast and non-glare surface. Signs that provide direction to or information about functional spaces must only comply with requirements for character proportion, character height and finish, and with contrast between the characters and background.

Letters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10. The letters and numbers on signs shall be raised 1/32-inches minimum and shall be sans serif. The characters or symbols on signs shall be at least 5/8-inches high, but no higher than 2-inches. Symbols or pictographs on signs shall be raised 1/32-inches minimum. The ADAAG also requires that doors to hazardous areas be equipped with tactile warnings.

Section 404 (Doors, Doorways and Gates) states that doorways and gates, including security entrance gates shall have a minimum clear opening of 32-inches and that the respective maneuvering clearances are maintained.

This section of the ADAAG also states that the threshold at doorways shall not exceed ½-inches in height, and that door hardware (handles, pulls, latches, locks, etc.) on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching or twisting of the wrist to operate.

ON-SITE CONDITIONS

The doorways at each building entrance and at the book sensor met the requirements with a typical clear opening width of 33 to 34-inches. The limited signage used to identify offices and other permanent rooms and spaces within the building generally meet these requirements. Signs at each restroom also appear to meet the physical requirements and positioning requirement of the GAC and ADA standards.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

ACCESSIBLE AMENITIES AND FUNCTION SPACES

REQUIREMENTS

The ADA requires that all primary function areas are readily accessible for all. Confirmation should be sought that all such facilities and equipment is readily accessible in line with the respective section of the ADAAG.

ADAAG requires that where provided, at least one of each type of depository, vending machine and change machine shall comply with Section 309. Such requirements including that operable parts are located no more than 48" above finishes floor level and that operable parts shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist.

Drinking fountains should meet the requirements set out in Section 211 – Drinking Fountains, including the requirement for a minimum of two drinking fountains. Section 602.4 (Spout Height) of the ADA requires that the spout height of drinking fountains not exceed 36-inches. Additionally, they should have a clear floor space in line with Section 602.2 and a minimum of 27" knee clearance.

ON-SITE CONDITIONS

The Property generally met these requirements.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

USABILITY OF RESTROOMS

REQUIREMENTS

The third priority emphasizes those measures that will provide individuals with disabilities with access to restroom facilities. A clear approach should be provided to one of each fixture type within an accessible restroom and a minimum of a 60" diameter turning space should be provided.

The ADAAG requires that the minimum width of the standard accessible stall shall be 60" and the minimum depth of floor mounted standard accessible stall shall be 59" (or 56" if wall mounted). The height of water closets shall be 17" to 19", measured to the top of the toilet seat. A 36" minimum length grab bar is required behind the water closet, extending 24" from the centerline of the toilet on the open side. A 42" minimum length grab bar is required on the sidewall, which should extend at least 54" from the rear wall. All grab bars should be mounted between 33" and 36" above the finished floor.

The ADAAG requires that urinals shall be stall-type or wall-hung with an elongated rim at a maximum of 17-inches above the finish floor. The ADAAG also requires that a clear floor space of 30-inches x 48-inches shall be provided in front of urinals to allow for a forward approach. Flush controls shall be hand operated or automatic, and shall be mounted no more than 44-inches above the finish floor.

The ADAAG requires that lavatories shall be mounted with the rim or counter surface no higher than 34-inches above the finish floor and a minimum of 27" knee clearance should be provided beneath a lavatory. Faucets are required to be operable with a closed fist. Lever-operated, push-type and electronically controlled mechanisms are examples of acceptable designs. Hot water and drain pipes under lavatories shall be insulated or otherwise configured to protect against contact.

Mirrors located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface 40 inches maximum above the finish floor or ground. Mirrors not located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface no more than 35 inches maximum above the finish floor or ground.

ON-SITE CONDITIONS

Restrooms were generally compliant with the requirements of the GAC and ADA.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

APPENDICES

APPENDIX A: Capital Expenditures

APPENDIX B: Photographic Record

APPENDIX C: Other Documentation

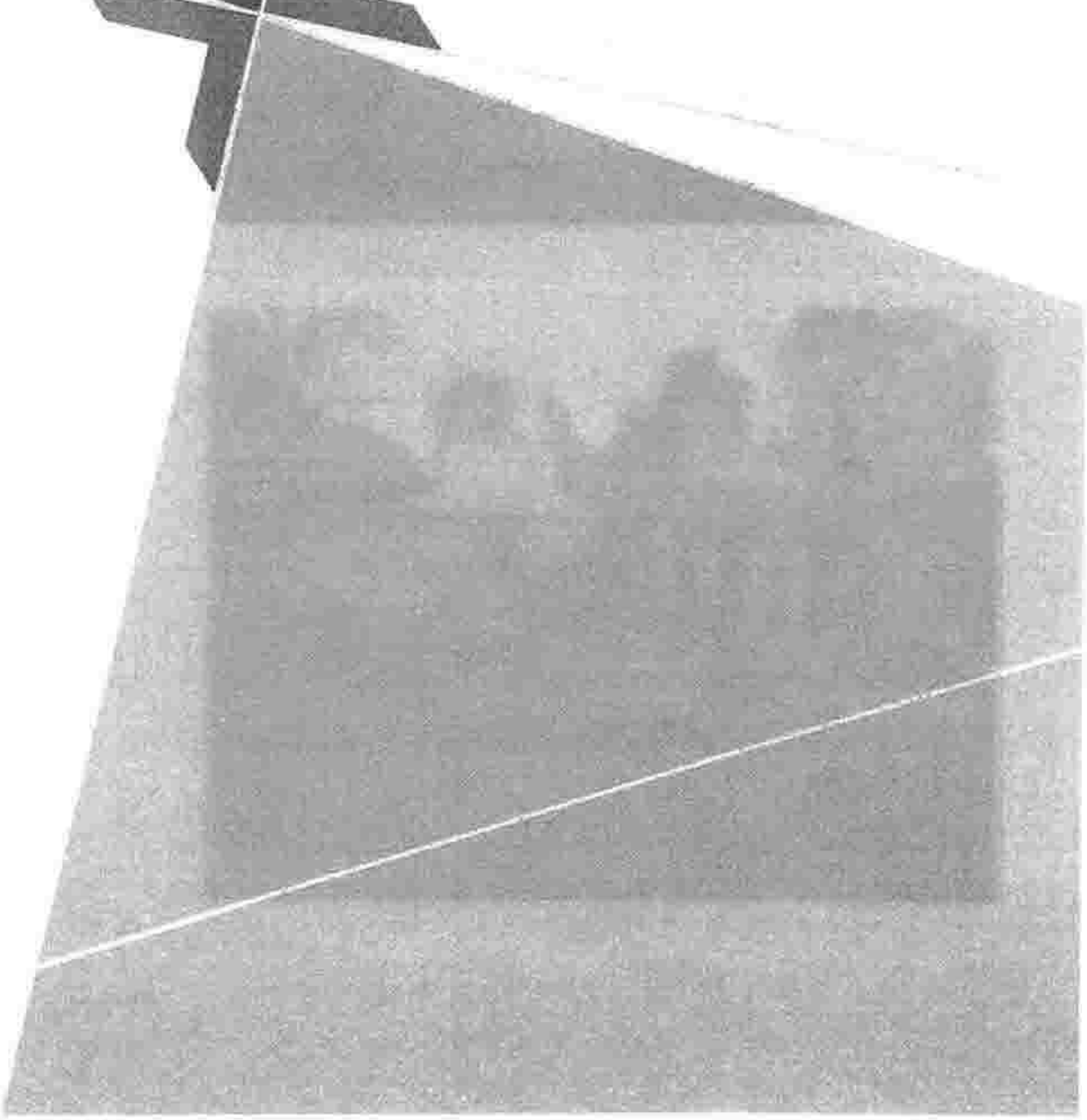
APPENDIX A:
CAPITAL EXPENDITURES

Five Year Capital Expenditure Forecast
Fairburn Hobgood - Palmer Branch Library
60 Valley View Drive
Fairburn, Georgia 30213

FAITHFUL + GOULD

Component No.	Component	Priority Category	Deficiency Category	Impact of Failure	Condition	Probability of Failure	Frequency of Failure	Risk Score	Risk Category	Estimated Useful Life or Replacement Cycle (Yrs)	Remaining Useful Life (Yrs)	Cost Multiplier	Quantity	Unit of Measurement	Unit Cost	2016	2017	2018	2019	2020	Required
															Year	1	2	3	4	5	
Site Systems																					
Required																					
1	Partial Asphalt Pavement Resurfacing/Repair at Parking Lot	III	DM	4	3	4	4	15	Medium	5	1	1.15	200	SY	$20.00	$4,600					$4,600
2	Sealcoat and Stripe Parking Lot and Remark ADA Spaces	III	DM	4	4	4	5	17	Low	5	1	1.10	967	SY	$3.90	$4,148					$4,148
3	Backfill Drainage Structure to Minimize Erosion	III	DM	5	4	4	5	18	Low	5	1	1.05	1	Allowance	$3,500.00	$3,675					$3,675
Structural Systems																					
Required																					
No Expenditures Required At This Time																					
Roofing Systems																					
Required																					
1	Investigate, Locate and Patch Roof Leaks (Determine If Historical)	II	DM	3	3	3	3	12	High	20	1	1.05	50	Hour	$85.00	$4,463					$4,463
Exterior Elements																					
Required																					
1	Surface Cleaning and Painting Exterior Elements	III	RM	3	4	4	4	15	Medium	15	1	1.15	1	Allowance	$7,500.00	$8,625					$8,625
2	Renew Exterior Sealant and Mortar Joints	III	DM	3	3	4	4	14	Medium	15	1	1.25	1	Allowance	$6,500.00	$8,125					$8,125
3	Replace Failed Glazing Units	II	DM	5	4	4	5	18	Low	15	1	1.15	4	Allowance	$500.00	$2,300					$2,300
HVAC Systems																					
Required																					
1	Replace Rooftop Carrier Unit	III	CR	3	3	3	3	12	High	20	1	1.15	15	Ton	$1,800.00	$31,050					$31,050
2	Replace Split System Unit	IV	CR	4	4	4	5	17	Low	15	5	1.10	7.5	Ton	$1,800.00					$14,850	$14,850
Electrical																					
Required																					
1	Upgrade Lighting (Main and Administration Area)	V	CI	4	4	4	5	17	Low	25	4	1.15	32	EA	$500.00				$18,400		$18,400
Plumbing																					
Required																					
1	Replace Water Heater	III	RM	4	4	4	4	16	Medium	20	2	1.05	1	Each	$1,200.00		$1,260				$1,260
Fire & Life Safety																					
Required																					
1	Replace Fire Alarm Control Panel	III	CR	4	4	4	5	17	Low	15	2	1.50	1	EA	$5,500.00		$8,250				$8,250
Conveyance Systems																					
Required																					
No Expenditures Required At This Time																					
Interiors																					
Required																					
1	Replace Carpet	V	CR	4	4	4	5	17	Low	10	5	1.20	535	SY	$30.00					$33,660	$33,660
2	Replace Floor Tile	V	CR	4	4	4	5	17	Low	20	5	1.08	200	SF	$5.00					$1,080	$1,080
3	Replace Suspended Acoustical Ceiling	V	CR	4	4	4	5	17	Low	20	5	1.08	3,000	SF	$5.75					$18,630	$18,630
4	Renovate Restrooms (Public & Employee)	V	CR	4	4	4	5	17	Low	20	2	1.25	6	FXT	$5,000.00		$37,500				$37,500
5	Renovate Multipurpose Room	III	DR	4	3	4	5	16	Medium	20	2	1.25	500	SF	$12.00		$7,500				$7,500
Accessibility																					
Required																					
1	Install ADA Compliant Circulation Counter	III	CC	5	5	5	5	20	Low	30	1	1.08	1	EA	$5,000.00	$5,400					$5,400
														Required Cost (2016 Dollars)		$72,386	$54,510	$0	$18,400	$68,220	$213,516

APPENDIX B:
PHOTOGRAPHIC RECORD

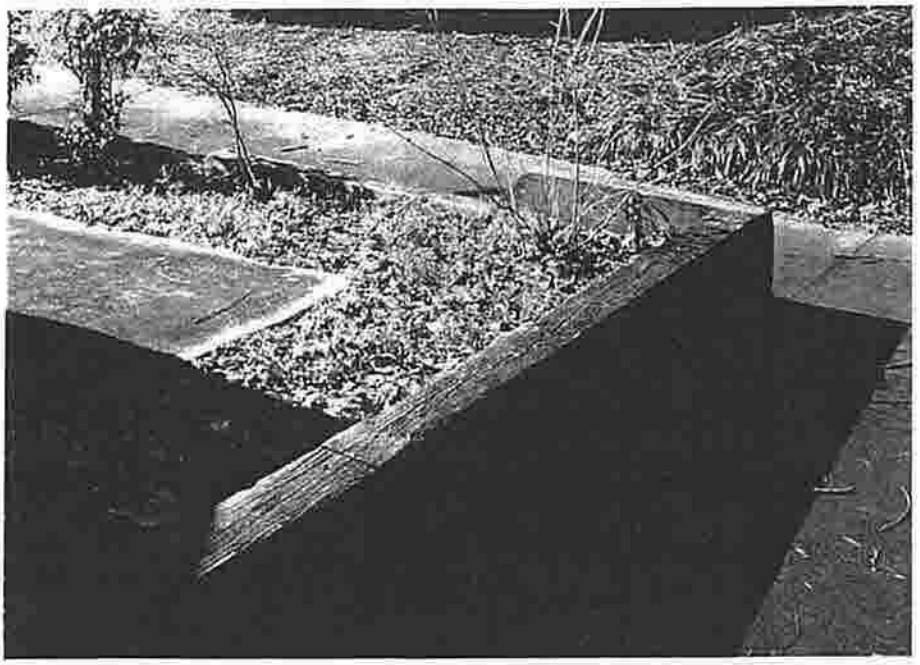


Photograph No. 1

Library (East) entrance

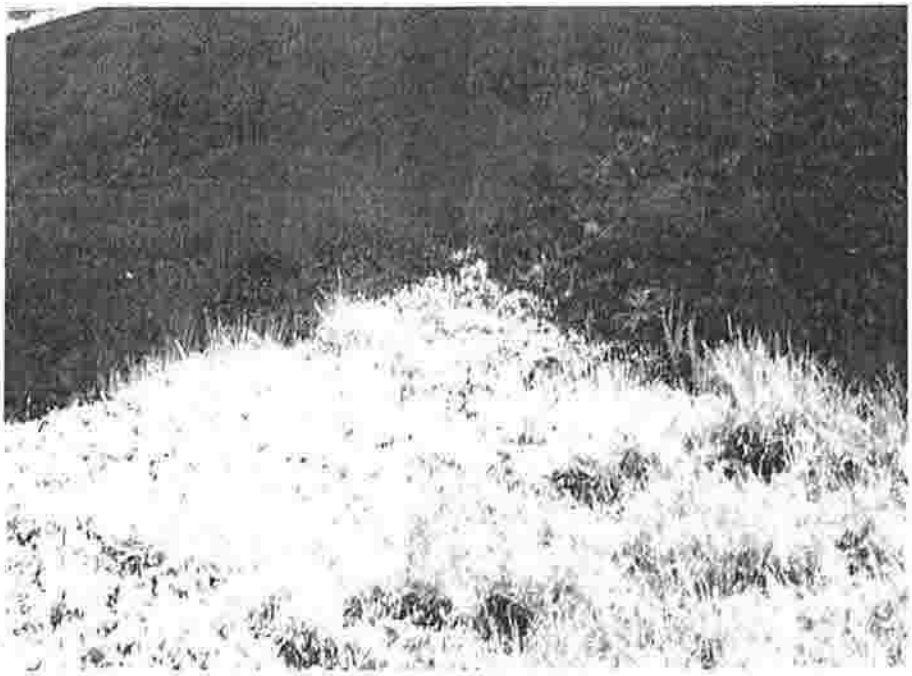
Photograph No. 2

No stripe on parking lot



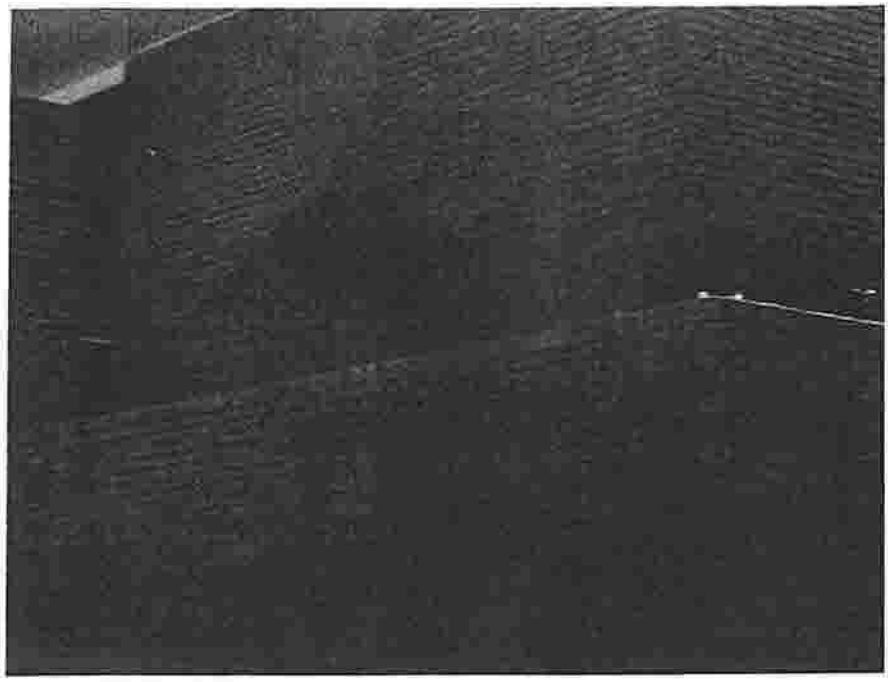
Photograph No. 3

Retaining block



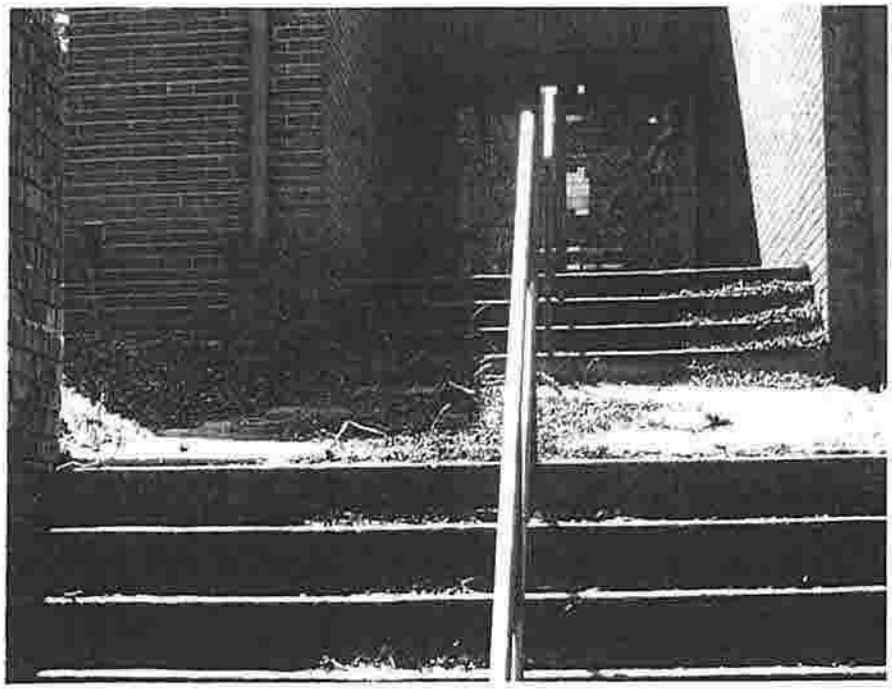
Photograph No. 4

Sparse landscaping



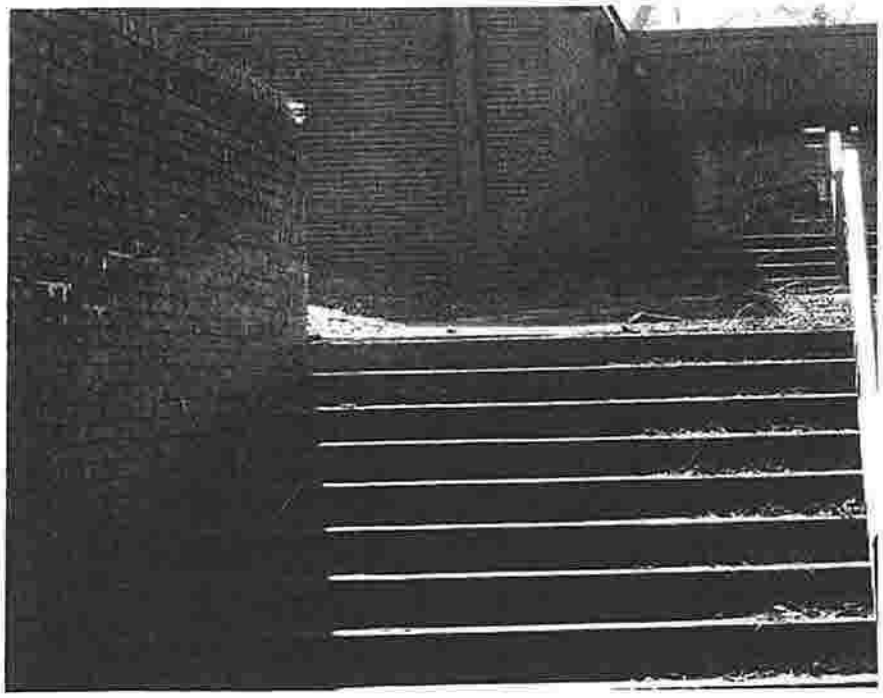
Photograph No. 5

Dirt build-up on exterior masonry



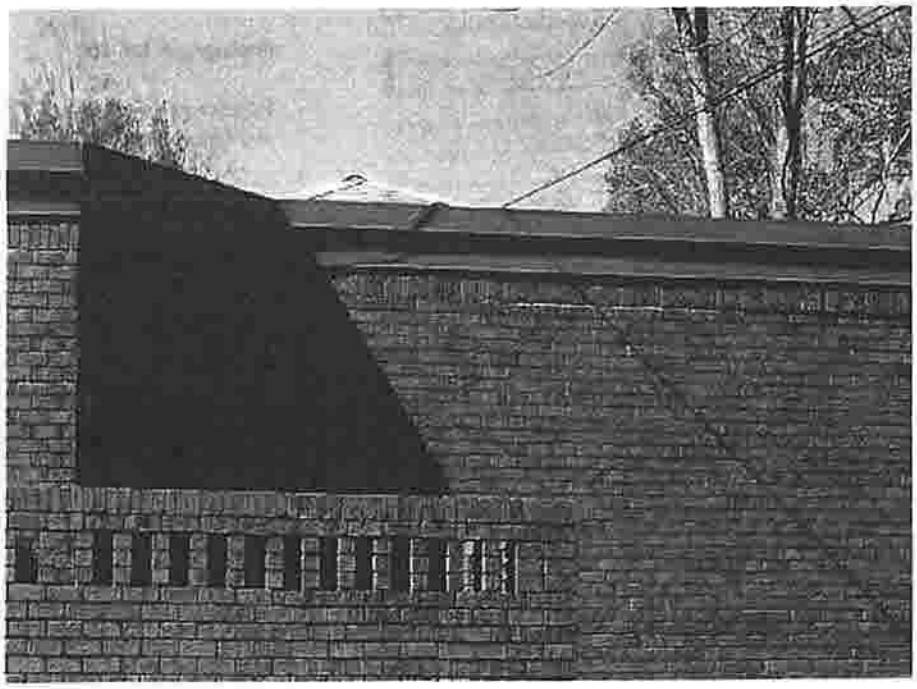
Photograph No. 6

Front entrance, north side, excess debris



Photograph No. 7

Dirt build-up and mortar repair required on exterior retaining wall

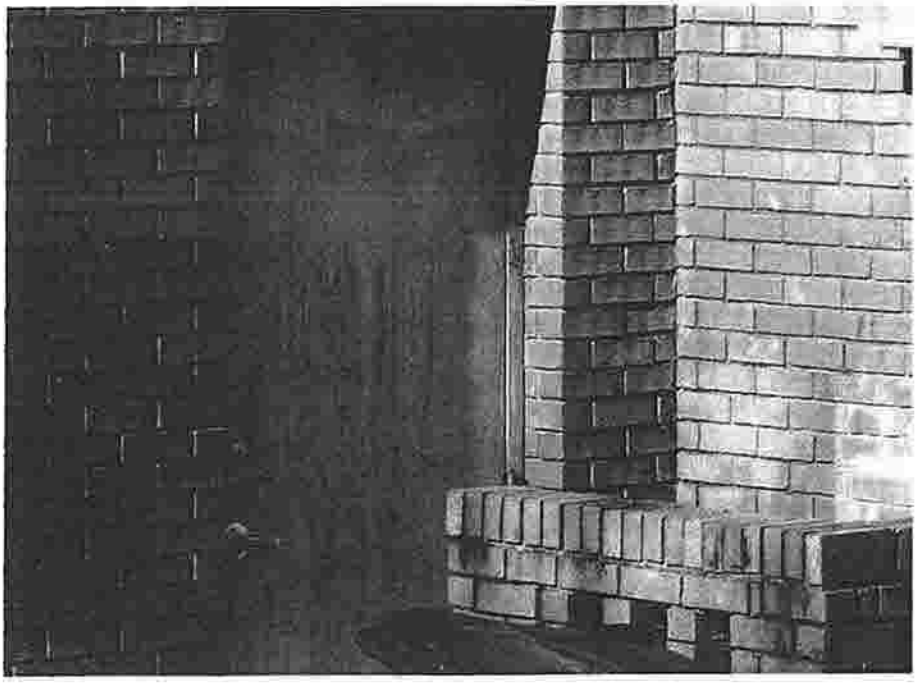


Photograph No. 8

Renew exterior sealant and mortar joints on west side of library

Photograph No. 9

Rooftop Carrier HVAC



Photograph No. 10

Exterior exit door dirty and faded paint

Photograph No. 11

York HVAC area has not been maintained

Photograph No. 12

Power source for HVAC

Photograph No. 13

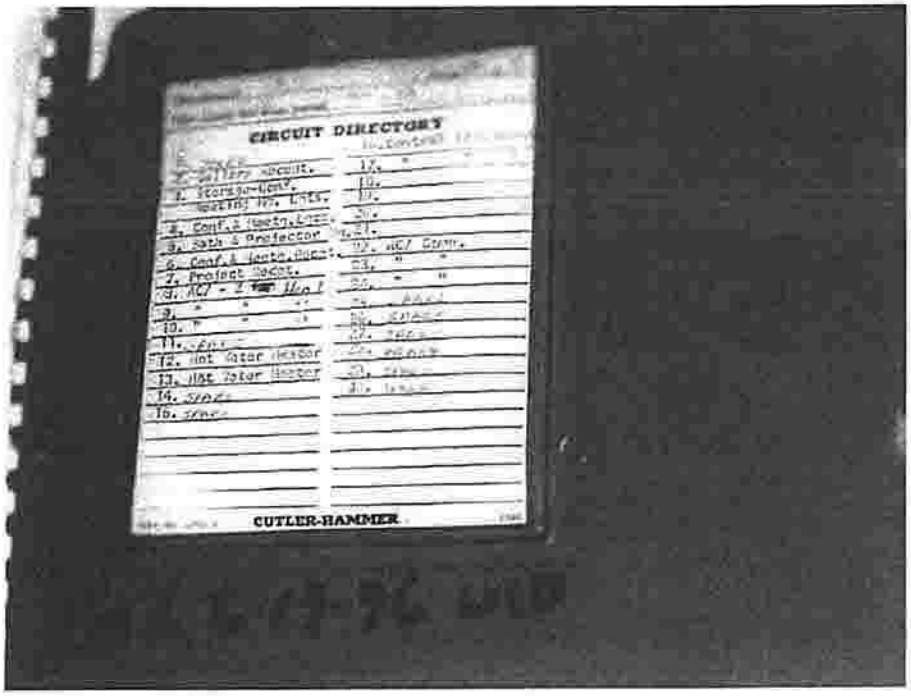
Stains of water leak in maintenance room interior

Photograph No. 14

Dedication of library plaque

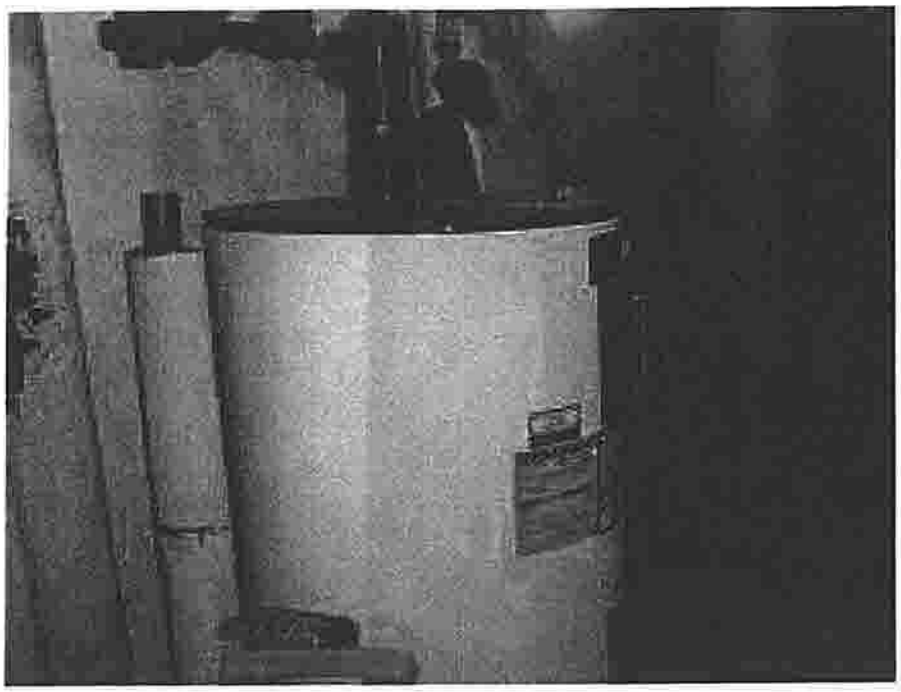
Photograph No. 15

Light fixture damaged and signs of water leaks from roof



Photograph No. 16

Electrical power circuit director

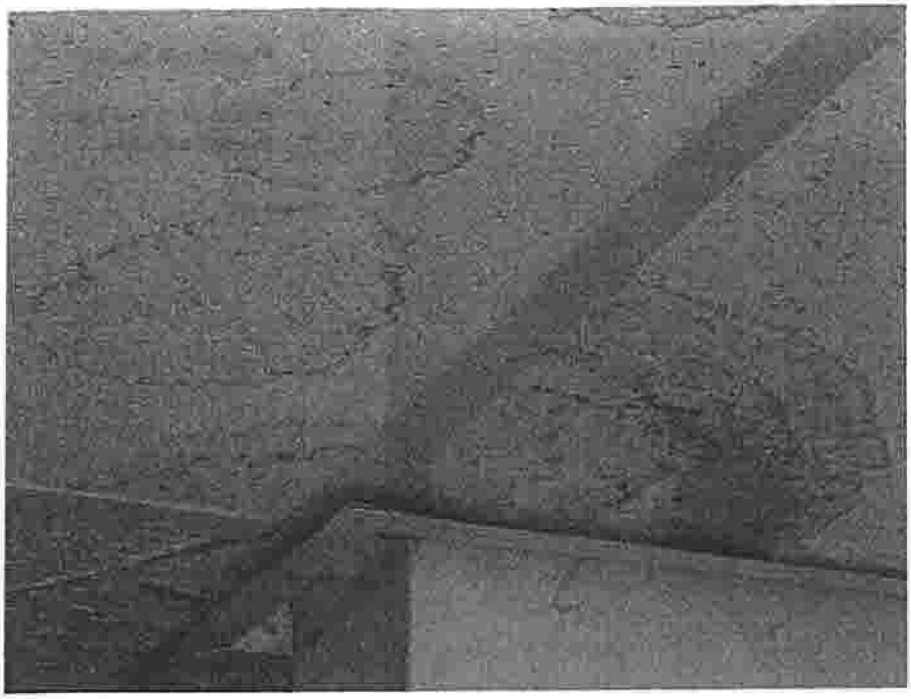


Photograph No. 17

Water heater and label located in mechanical room

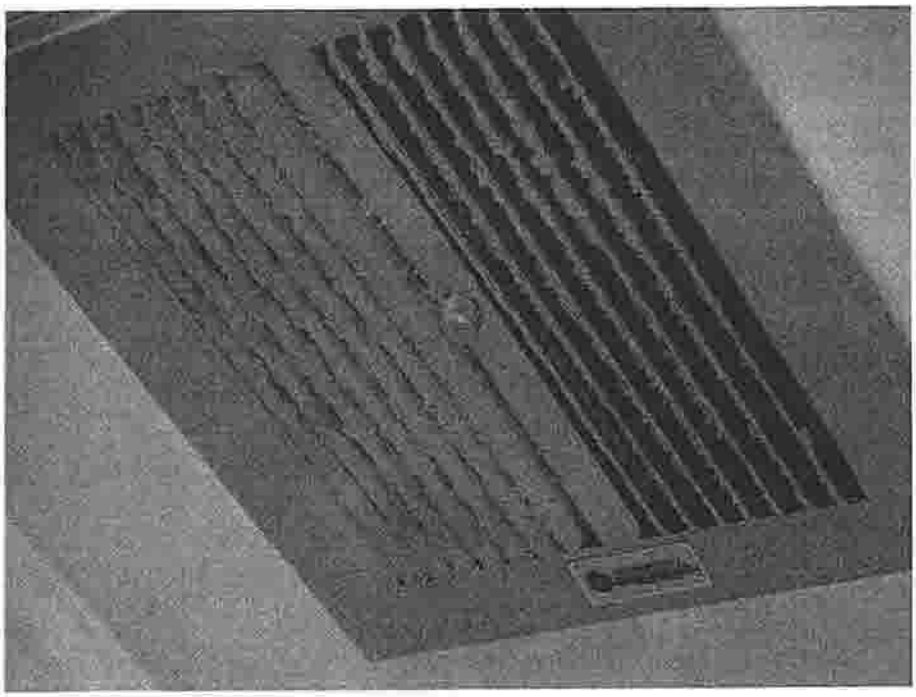
Photograph No. 18

Fire alarm



Photograph No. 19

Interior ceiling water stains in mechanical room



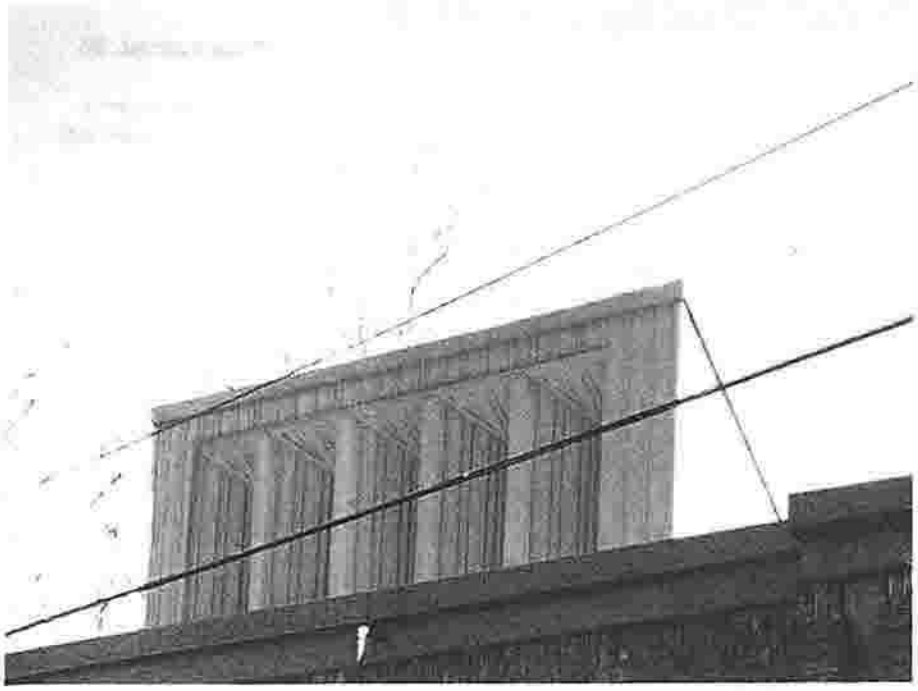
Photograph No. 20

Interior air return in conference room lack maintenance

Need this Photo

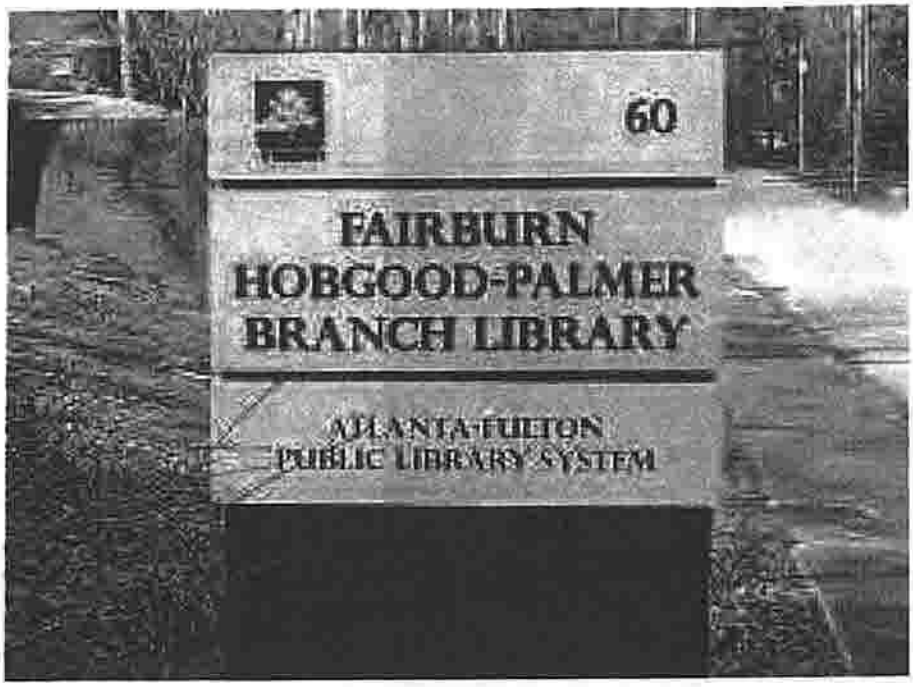
Photograph No. 21

Electrical control panel
in electrical room



Photograph No. 22

Sky-light view



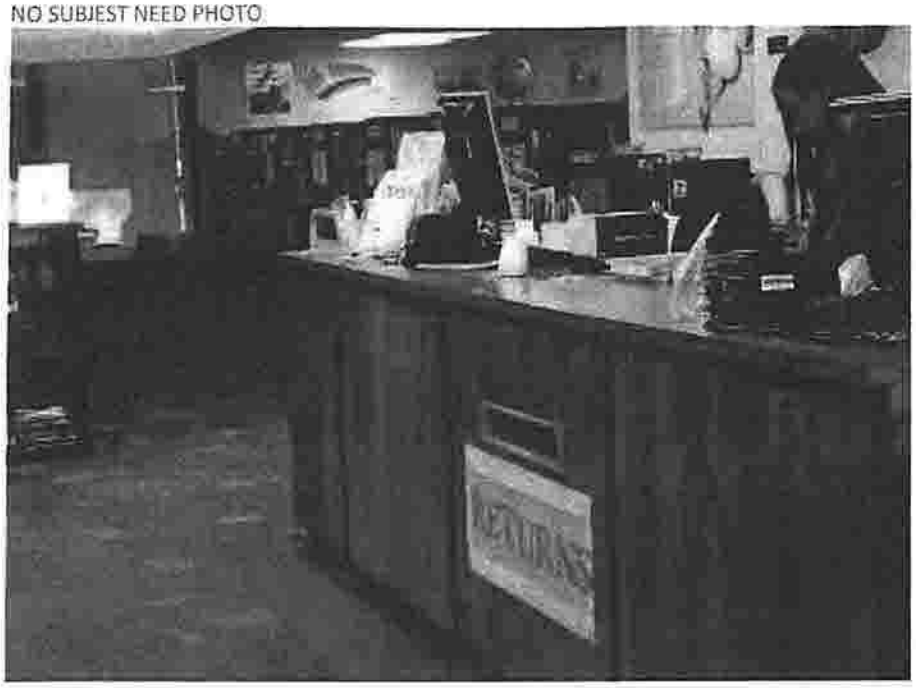
Photograph No. 23

Library sign

Photograph No. 24

Entrance to library by way of ADA non-compliant access through sensor

NO SUBJEST NEED PHOTO



Photograph No. 25

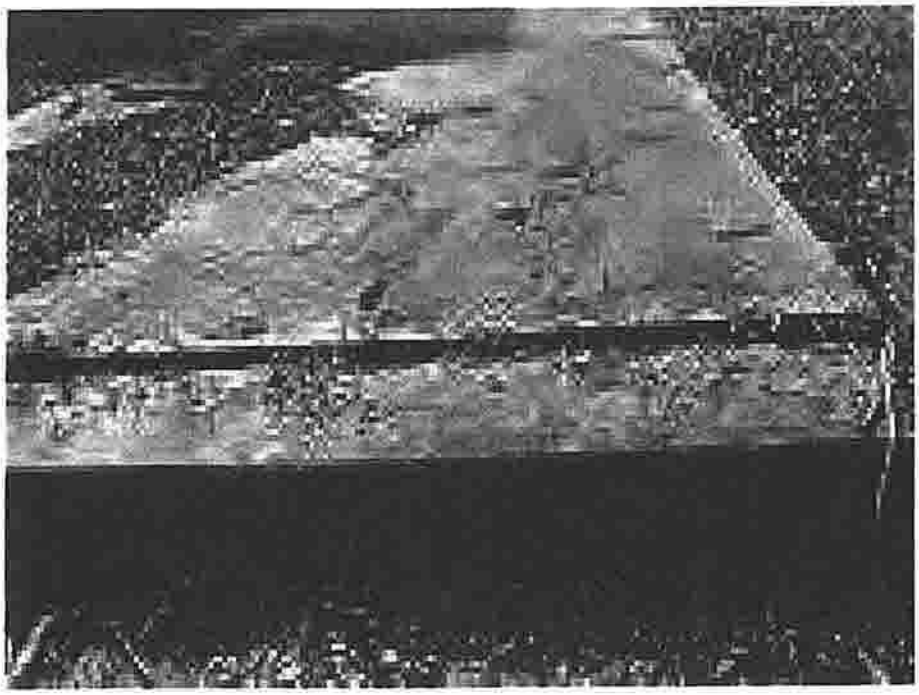
Non-compliant to Ada
at circulation desk

Photograph No. 26

Faded sign

Photograph No. 27

Deteriorated asphalt

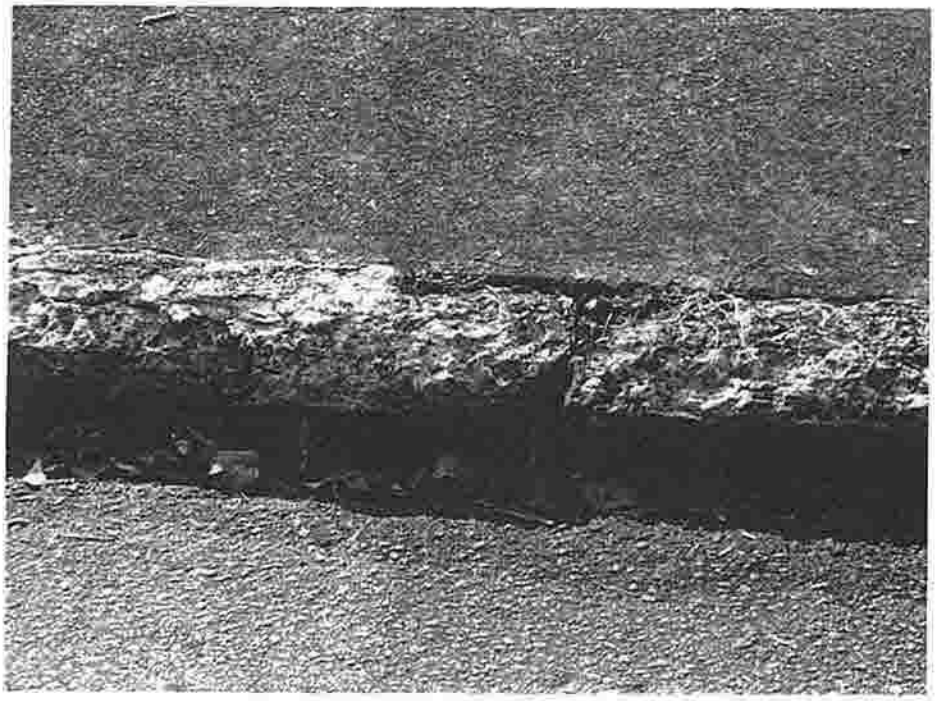


Photograph No. 28

Sidewalk uneven

Photograph No. 29

Gas meter on building's west side

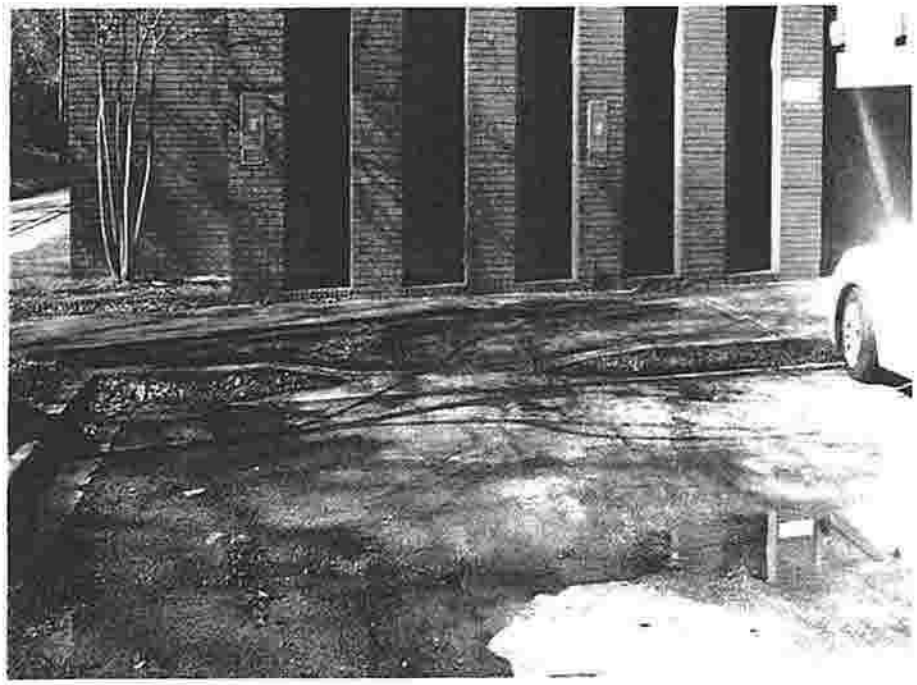


Photograph No. 30

Damaged concrete curb

Photograph No. 31

Handicapped parking sign



Photograph No. 32

Worn asphalt and faded ADA symbols

APPENDIX C:
OTHER DOCUMENTATION

Preventative Maintenance Budget

Building Name	Uniformat Level 2	Title	Quantity	Total Labor Hours per Year	Cost In-House	Cost Contract
Roofing Systems						
Fairburn Library	Roofing Systems	Preventative maintenance of roof coverings.	2.0	1.91	$221.93	$332.90
Subtotal:			2.00	1.91	$ 221.93	$ 332.90
Mechanical						
Fairburn Library	Mechanical	Package unit, up to 24 tons, with natural gas furnace	1.0	6.21	$641.55	$962.33
Fairburn Library	Mechanical	Heat pump, air cooled, over 5 tons	1.0	5.79	$443.34	$665.01
Subtotal:			2.00	12.00	$ 1,084.89	$ 1,627.34
Electrical						
Fairburn Library	Electrical	Lighting system, emergency w/ battery backup	8.0	19.04	$1,167.20	$1,750.80
Fairburn Library	Electrical	Preventative maintenance of electrical panels	3.0	3.45	$264.75	$397.13
Subtotal:			11.00	22.49	$ 1,431.95	$ 2,147.93
Fire & Life Safety						
Fairburn Library	Fire & Life Safety	Fire Alarm System Testing and Maintenance, 50 devices or less	1.0	4.56	$375.80	$563.70
Subtotal:			1.00	4.56	$ 375.80	$ 563.70
Total:			16.00	40.96	$ 3,114.57	$ 4,671.87

Count: 6

Section 23 09 23

Instrumentation and Control for HVAC

Phase 2 Libraries Equipment Upgrade
0021

Prepared By:

Fulton County HVAC/BAS Department

Contents

23 09 23 Direct-Digital Control System for HVAC
PART 1: GENERAL

1.1 Products Furnished but Not Installed under This Section

A. Section 23 09 13.23 - Sensors and Transmitters
   1. Airflow stations
   2. Flow meters
   3. Flow switches
B. Section 23 09 13.33 - Control Valves
   1. Control valves
C. Section 23 09 13.43 - Control Dampers
   1. Automated Dampers
D. Section 23 70 00 - Central HVAC Equipment
   1. AHU, heating, and ventilating unit controls
E. Section 23 80 00 - Decentralized HVAC Equipment
   1. Terminal unit controls

1.2 Products Installed but Not Furnished under This Section

A. Section 23 09 13.23 - Sensors and Transmitters
   1. Duct static pressure sensors
B. Section 28 31 00 - Fire Detection and Alarm
   1. Smoke Detectors/Fire Stats

1.3 Products Not Furnished or Installed under but Integrated with the Work of This Section

A. Section - General
   1. Coordination Meeting
B. Section 26 29 00 - Low-Voltage Controllers
   1. Variable frequency drives
C. Section 23 36 00 - Air Terminal Units
   1. VAV boxes
D. Section 23 52 00 - Heating Boilers
   1. Boiler controls
E. Section 23 60 00 - Central Cooling Equipment
   1. Chiller controls
F. Section 23 70 00 - Central HVAC Equipment
   1. Packaged AHU or evaporative cooler controls
G. Section 23 80 00 - Decentralized HVAC Equipment
   1. Unit ventilators, unit heaters, fan coils, etc.

1.4 Related Sections

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are part of this specification and shall be used in conjunction with this section as part of the contract documents.
B. The following sections constitute related work:
   1. Section 01 30 00 - Administrative Requirements

2. Section 01 60 00 - Product Requirements
3. Section 01 80 00 - Performance Requirements
4. Section 01 90 00 - Life Cycle Activities
5. Section 23 05 00 - Common Work Results for HVAC
6. Section 23 20 00 - HVAC Piping and Pumps
7. Section 23 30 00 - HVAC Air Distribution
8. Section 23 40 00 - HVAC Air Cleaning Devices
9. Section 23 50 00 - Central Heating Equipment
10. Section 23 60 00 - Central Cooling Equipment
11. Section 23 70 00 - Central HVAC Equipment
12. Section 23 80 00 - Decentralized HVAC Equipment
13. Section 26 05 00 - Common Work Results for Electrical
14. Section 26 06 00 - Schedules for Electrical
15. Section 26 09 00 - Instrumentation and Control for Electrical Systems
16. Section 26 20 00 - Low Voltage Electrical Transmission
17. Section 26 29 00 - Low-Voltage Controllers (Motor Controllers and VFD Drives)
18. Section 26 30 00 - Facility Electrical Power Generating and Storing Equipment (UPS, Backup Generators)
19. Section 26 50 00 - Lighting
20. Section 28 00 00 - Electronic Safety and Security (includes Fire and Smoke)

1.5 Description

A. General: The control system shall consist of a high-speed, peer-to-peer network of DDC controllers, a control system server, and a web-based operator interface.

B. System software shall be based on a server/thin client architecture, designed around the open standards of web technology. The control system server shall be accessed using a Web browser over the control system network, the owner's local area network, and (at the owner's discretion) over the Internet. The intent of the thin-client architecture is to provide operators complete access to the control system via a Web browser. No special software other than a web browser shall be required to access graphics, point displays, and trends, configure trends, configure points and controllers, or to download programming into the controllers.

C. System shall use the BACnet protocol for communication to the operator workstation or web server and for communication between control modules. I/O points, schedules, setpoints, trends and alarms specified in 23 09 93 – "Sequence of Operations for HVAC Controls" shall be BACnet objects.

1.6 Approved Control system Manufacturers

A. The following are approved control system suppliers, manufacturers, and product lines:

Supplier	Manufacturer	Product Line

ALC	Automated Logic Corporation	WebCTRL
Trane	Trane	Tracer SC
CCI	Siemens	Niagara 4
Siemens	Desigo	Apogee
Johnson Controls	Metasys	Metasys

The above list does not indicate order of preference. Inclusion on this list does not guarantee acceptance of products or installation. Control systems shall comply with the terms of this specification.

1. The Contractor shall use only operator workstation software, controller software, custom application programming language, and controllers from the corresponding manufacturer and product line unless Owner approves use of multiple manufacturers.
2. Other products specified herein (such as sensors, valves, dampers, and actuators) need not be manufactured by the above manufacturers.

1.7 Quality Assurance

A. Installer and Manufacturer Qualifications
   1. Installer shall have an established working relationship with Control System Manufacturer.
   2. Installer shall have successfully completed Control System Manufacturer's control system training. Upon request, Installer shall present record of completed training including course outlines.

1.8 Codes and Standards

A. Work, materials, and equipment shall comply with the most restrictive of local, state, and federal authorities' codes and ordinances or these plans and specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to the receipt of bids of the following codes:
   1. National Electric Code (NEC)
   2. International Building Code (IBC)
      a. Section 719 Ducts and Air Transfer Openings
      b. Section 907 Fire Alarm and Detection Systems
      c. Section 909 Smoke Control Systems
      d. Chapter 28 Mechanical
   3. International Mechanical Code (IMC)
   4. ANSI/ASHRAE Standard 135, BACnet - A Data Communication Protocol for Building Automation and Control Systems

1.9 System Performance

A. Performance Standards. System shall conform to the following minimum standards over network connections. Systems shall be tested using

manufacturer's recommended hardware and software for operator workstation (server and browser for web-based systems).

1. Graphic Display. A graphic with 20 dynamic points shall display with current data within 10 sec.
2. Graphic Refresh. A graphic with 20 dynamic points shall update with current data within 8 sec.and shall automatically refresh every 15 sec.
3. Configuration and Tuning Screens. Screens used for configuring, calibrating, or tuning points, PID loops, and similar control logic shall automatically refresh within 6 sec.
4. Object Command. Devices shall react to command of a binary object within 2 sec. Devices shall begin reacting to command of an analog object within 2 sec.
5. Alarm Response Time. An object that goes into alarm shall be annunciated at the workstation within 45 sec.
6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 sec. Select execution times consistent with the mechanical process under control.
7. Performance. Programmable controllers shall be able to completely execute DDC PID control loops at a frequency adjustable down to once per sec. Select execution times consistent with the mechanical process under control.
8. Multiple Alarm Annunciation. Each workstation on the network shall receive alarms within 5 sec of other workstations.
9. Reporting Accuracy. System shall report values with minimum end-to-end accuracy listed in Table 1.
10. Control Stability and Accuracy. Control loops shall maintain measured variable at setpoint within tolerances listed in Table 2.

Table-1
Reporting Accuracy

Measured Variable	Reported Accuracy
Space Temperature	±0.5°C (±1°F)
Ducted Air	±0.5°C (±1°F)
Outside Air	±1.0°C (±2°F)
Dew Point	±1.5°C (±3°F)
Water Temperature	±0.5°C (±1°F)
Delta-T	±0.15° (±0.25°F)
Relative Humidity	±5% RH
Water Flow	±2% of full scale
Airflow (terminal)	±10% of full scale (see Note 1)
Airflow (measuring stations)	±5% of full scale
Airflow (pressurized spaces)	±3% of full scale
Air Pressure (ducts)	±25 Pa (±0.1 in. w.g.)
Air Pressure (space)	±3 Pa (±0.01 in. w.g.)
Water Pressure	±2% of full scale (see Note 2)
Electrical	±1% of reading (see Note 3)
Carbon Monoxide (CO)	±5% of reading
Carbon Dioxide (CO2)	±50 ppm

Note 1: Accuracy applies to 10%–100% of scale
Note 2: For both absolute and differential pressure
Note 3: Not including utility-supplied meters

Table 2
Control Stability and Accuracy

Controlled Variable	Control Accuracy	Range of Medium
Air Pressure	±50 Pa (±0.2 in. w.g.) ±3 Pa (±0.01 in. w.g.)	0–1.5 kPa (0–6 in. w.g.) -25 to 25 Pa (-0.1 to 0.1 in. w.g.)
Airflow	±10% of full scale	
Space Temperature	±1.0°C (±2.0°F)	
Duct Temperature	±1.5°C (±3°F)	
Humidity	±5% RH	
Fluid Pressure	±10 kPa (±1.5 psi) ±250 Pa (±1.0 in. w.g.)	MPa (1–150 psi) 0–12.5 kPa (0–50 in. w.g.) differential

1.10 Submittals

A. Product Data and Shop Drawings: Meet requirements of Section 01 30 00 on Shop Drawings, Product Data, and Samples. In addition, the contractor shall provide shop drawings or other submittals on hardware, software, and equipment to be installed or provided. No work may begin on any segment of this project until submittals have been approved for conformity with design intent. Provide drawings as AutoCAD 2006 (or newer) compatible files on magnetic or optical disk (file format: .DWG, .DXF, .VSD, or comparable) and three 11" x 17" prints of each drawing. When manufacturer's cutsheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawing shall clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cutsheets to fulfill submittal requirements. Select and show submittal quantities appropriate to scope of work. Submittal approval does not relieve Contractor of responsibility to supply sufficient quantities to complete work. Submittals shall be provided within 12 weeks of contract award. Submittals shall include:
   1. DDC System Hardware
      a. A complete bill of materials to be used indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.
      b. Manufacturer's description and technical data such as performance curves, product specifications, and installation and maintenance instructions for items listed below and for relevant items not listed below:
         i. Direct digital controllers (controller panels)
         ii. Transducers and transmitters
         iii. Sensors (including accuracy data)
         iv. Actuators
         v. Valves
         vi. Relays and switches
         vii. Control panels
         viii. Power supplies
         ix. Batteries
         x. Operator interface equipment
         xi. Wiring
      c. Wiring diagrams and layouts for each control panel. Show termination numbers.
      d. Schematic diagrams for all field sensors and controllers. Provide floor plans of all sensor locations and control hardware. Riser diagrams showing control network layout, communication protocol, and wire types.
   2. Central System Hardware and Software
      a. A complete bill of material of equipment used indicating quantity, manufacturer, model number, and relevant technical.

b. Manufacturer's description and technical data such as product specifications and installation and maintenance instructions for items listed below and for relevant items furnished under this contract not listed below:
   i. Central Processing Unit (CPU) or web server
   ii. Monitors
   iii. Keyboards
   iv. Power supplies
   v. Battery backups
   vi. Interface equipment between CPU or server and control panels
   vii. Operating System software
   viii. Operator interface software
   ix. Color graphic software
   x. Third-party software
c. Schematic diagrams for all control, communication, and power wiring. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers and functions. Show interface wiring to control system.
d. Network riser diagrams of wiring between central control unit and control panels.

3. Controlled Systems
   a. Riser diagrams showing control network layout, communication protocol, and wire types.
   b. A schematic diagram of each controlled system. The schematics shall have all control points labeled with point names shown or listed. The schematics shall graphically show the location of all control elements in the system.
   c. A schematic wiring diagram of each controlled system. Label control elements and terminals. Where a control element is also shown on control system schematic, use the same name.
   d. An instrumentation list (Bill of Materials) for each controlled system. List each control system element in a table. Show element name, type of device, manufacturer, model number, and product data sheet number.
   e. A mounting, wiring, and routing plan-view drawing. The design shall take into account HVAC, electrical, and other systems' design and elevation requirements. The drawing shall show the specific location of all concrete pads and bases and any special wall bracing for panels to accommodate this work.
   f. A complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system.
   g. A point list for each control system. List I/O points and software points specified in Section 23 09 93. Indicate alarmed and trended points.
4. Quantities of items submitted shall be reviewed but are the responsibility of the Contractor.

5. Description of process, report formats, and checklists to be used in Section 23 09 23 Article 3.17 (Control System Demonstration and Acceptance).
6. BACnet Protocol Implementation Conformance Statement (PICS) for each submitted type of controller and operator interface.

B. Schedules
1. Within one month of contract award, provide a schedule of the work indicating the following:
   a. Intended sequence of work items
   b. Start date of each work item
   c. Duration of each work item
   d. Planned delivery dates for ordered material and equipment and expected lead times
   e. Milestones indicating possible restraints on work by other trades or situations
2. Monthly written status reports indicating work completed and revisions to expected delivery dates. Include updated schedule of work.

C. Project Record Documents. Upon completion of installation, submit three copies of record (as-built) documents of the documents shall be submitted for approval prior to final completion and shall include:
1. Project Record Drawings. As-built versions of submittal shop drawings provided as AutoCAD 2006 (or newer) compatible files on magnetic or optical media (file format: .DWG, .DXF, .VSD, or comparable) and as 11" x 17" prints.
2. Testing and Commissioning Reports and Checklists. Completed versions of reports, checklists, and trend logs used to meet requirements of Section 23 09 23 Article 3.17 (Control System Demonstration and Acceptance).
3. Operation and Maintenance (O&M) Manual.
4. As-built versions of submittal product data.
5. Names, addresses, and telephone numbers of installing contractors and service representatives for equipment and control systems.
6. Operator's manual with procedures for operating control systems: logging on and off, handling alarms, producing point reports, trending data, overriding computer control, and changing setpoints and variables.
7. Programming manual or set of manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.
8. Engineering, installation, and maintenance manual or set of manuals that explains how to design and install new points, panels, and other hardware; how to perform preventive maintenance and calibration; how to debug hardware problems; and how to repair or replace hardware.
9. Documentation of programs created using custom programming language including setpoints, tuning parameters, and object database. Electronic copies of programs shall meet this requirement if control logic, setpoints, tuning parameters, and objects can be viewed using furnished programming tools.
10. Graphic files, programs, and database on magnetic or optical media.

11. List of recommended spare parts with part numbers and suppliers.
12. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.
13. Complete original-issue copies of furnished software, including operating systems, custom programming language, operator workstation or web server software, and graphics software.
14. Licenses, guarantees, and warranty documents for equipment and systems.
15. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.

D. Training Materials: Provide course outline and materials for each class at least six weeks before first class. Training shall be furnished via instructor-led sessions, computer-based training, or web-based training. Engineer will modify course outlines and materials if necessary to meet Owner's needs. Engineer will review and approve course outlines and materials at least three weeks before first class.

1.11 Warranty

A. Warrant work as follows:
1. Warrant labor and materials for specified control system free from defects for a period of 12 months after final acceptance. Control system failures during warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to Owner. Respond during normal business hours within 24 hours of Owner's warranty service request.
2. Work shall have a single warranty date, even if Owner receives beneficial use due to early system start-up. If specified work is split into multiple contracts or a multi-phase contract, each contract or phase shall have a separate warranty start date and period.
3. If the engineer determines that equipment and systems operate satisfactorily at the end of final start-up, testing, and commissioning phase, the engineer will certify in writing that control system operation has been tested and accepted in accordance with the terms of this specification. Date of acceptance shall begin warranty period.
4. Provide updates to operator workstation or web server software, project-specific software, graphic software, database software, and firmware that resolve the contractor-identified software deficiencies at no charge during warranty period. If available, Owner can purchase in-warranty service agreement to receive upgrades for functional enhancements associated with above-mentioned items. Do not install updates or upgrades without Owner's written authorization.
5. Exception: Contractor shall not be required to warrant reused devices except those that have been rebuilt or repaired. Installation labor and

materials shall be warranted. Demonstrate operable condition of reused devices at time of Engineer's acceptance.

1.12 Ownership of Proprietary Material

A. Project-specific software and documentation shall become Owner's property. This includes, but is not limited to:
   1. Graphics
   2. Record drawings
   3. Database
   4. Application programming code
   5. Documentation

1.13 Definitions

Term	Definition
BACnet Interoperability Building Blocks (BIBB)	A BIBB defines a small portion of BACnet functionality that is needed to perform a particular task. BIBBS are combined to build the BACnet functional requirements for a device in a specification.
BACnet/BACnet Standard	BACnet communication requirements as defined by the latest version of ASHRAE/ANSI 135 and approved addenda.
Control Systems Server	A computer(s) that maintain(s) the systems configuration and programming database.
Controller	Intelligent stand-alone control device. Controller is a generic reference to building controllers, custom application controllers, and application specific controllers.
Direct Digital Control	Microprocessor-based control including Analog/Digital conversion and program logic.
Gateway	Bi-directional protocol translator connecting control systems that use different communication protocols.
Local Area Network	Computer or control system communications network limited to local building or campus.
Master-Slave/Token Passing	Data link protocol as defined by the BACnet standard.
Point-to-Point	Serial communication as defined in the BACnet standard.
Primary Controlling LAN	High speed, peer-to-peer controller LAN connecting BCs and optionally AACs and ASCs. Refer to System Architecture below.
Protocol Implementation Conformance Statement	A written document that identifies the particular options specified by BACnet that are implemented in a device.
Router	A device that connects two or more networks at the network layer.
Wiring	Raceway, fittings, wire, boxes and related items.

PART 2: PRODUCTS

2.0 Section Includes
2.1 Materials
2.2 Communication
2.3 Operator Interface
2.4 Controller Software
2.5 Controllers
2.6 Input and Output Interfaces
2.7 Power Supplies and Line Filtering
2.8 Auxiliary Control Devices
2.9 Wiring and Raceways
2.10 Fiber Optic Cable System
2.11 Compressed Air Supply - Pneumatic

2.1 Materials

A. Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least five years after completion of this contract.

2.2 Communication

A. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135, BACnet.
B. Install new wiring and network devices as required to provide a complete and workable control network.
C. Use existing Ethernet backbone for network segments marked "existing" on project drawings.
D. Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.
E. Internetwork operator interface and value passing shall be transparent to internetwork architecture.
    1. An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, status, and control algorithms shall be viewable and editable from each internetwork controller.
    2. Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. Program and test all cross-controller links required to execute control strategies specified in Section 23 09 93. An authorized operator shall be able to edit cross-controller links by typing a standard object address or by using a point-and-click interface.
F. Workstations, Building Control Panels, and Controllers with real-time clocks shall use the BACnet Time Synchronization service. System shall automatically synchronize system clocks daily from an operator-designated device via the internetwork. The system shall automatically adjust for daylight saving and standard time as applicable.
G. System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring.
H. System shall support Web services data exchange with any other system that complies with XML (extensible markup language) and SOAP (simple object

access protocol) standards specified by the Web Services Interoperability Organization(WS-I) Basic Profile 1.0 or higher. Web services support shall as a minimum be provided at the workstation or web server level and shall enable data to be read from or written to the system.

1. System shall support Web services read data requests by retrieving requested trend data or point values (I/O hardware points, analog value software points, or binary value software points) from any system controller or from the trend history database.
2. System shall support Web services write data request to each analog and binary object that can be edited through the system operator interface by downloading a numeric value to the specified object.
3. For read or write requests, the system shall require user name and password authentication and shall support SSL (Secure Socket Layer) or equivalent data encryption.
4. System shall support discovery through a Web services connection or shall provide a tool available through the Operator Interface that will reveal the path/identifier needed to allow a third party Web services device to read data from or write data to any object in the system which supports this service.

2.3 Operator Interface

A. The Operator Workstation or server shall conform to the BACnet Operator Workstation (B-OWS) or BACnet Advanced Workstation (B-AWS) device profile as specified in ASHRAE/ANSI 135 BACnet Annex L.

B. Operator Interface. Web server shall reside on high-speed network with building controllers. Each standard browser connected to server shall be able to access all system information.

C. In addition to the primary operator interface, the system shall include a secondary interface compatible with a locally available commercial wireless network and viewable on a commercially available wireless device such as a Wireless Access Protocol (WAP) enabled cellular telephone. This secondary interface may be text-based and shall provide a summary of the most important data. As a minimum, the following capabilities shall be provided through this interface:

1. An operator authentication system that requires an operator to log in before viewing or editing any data, and which can be configured to limit the privileges of an individual operator.
2. The ability to view and acknowledge any alarm in the system. Alarms or links to alarms shall be provided on a contiguous list so the operator can quickly view all alarms.

3. A summary page or pages for each piece of equipment in the system. This page shall include the current values of all critical I/O points and shall allow the operator to lock binary points on or off and to lock analog points to any value within their range.
4. Navigation links that allow the operator to quickly navigate from the home screen to any piece of equipment in the system, and then return to the home screen. These links may be arranged in a hierarchical fashion, such as navigating from the home screen to a particular building, then to a specific floor in the building, and then to a specific room or piece of equipment.

D. Communication. Web server or workstation and controllers shall communicate using BACnet protocol. Web server or workstation and control network backbone shall communicate using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing as specified in ANSI/ASHRAE 135, BACnet Annex J.

E. Hardware. Each workstation or web server shall consist of the following:
   1. Computer. Industry-standard hardware shall meet or exceed DDC system manufacturer's recommended specifications and shall meet response times specified elsewhere in this document. The following hardware requirements also apply:
      a. The hard disk shall have sufficient memory to store:
         i. All required operator workstation software.
         ii. A DDC database at least twice the size of the delivered system database.
         iii. One year of trend data based on the points specified to be trended at their specified trend intervals.
      b. Provide additional hardware (communication ports, video drivers, network interface cards, cabling, etc.) to facilitate all control functions and software requirements specified for the DDC system.
      c. Minimum hardware configuration shall include the following:
         i. Dual or Quad Core Processor
         ii. 6 GB RAM
         iii. 500 GB hard disk providing data at 3.0 Gb/sec
         iv. 16x DVD-RW drive
         v. Serial, parallel, and network communication ports and cables as required for proper DDC system operation

F. System Software.
   1. Operating System. Web server or workstation shall have an industry-standard professional-grade operating system. Operating system shall meet or exceed the DDC System manufacturers minimum

requirements for their software. Typically acceptable systems include Microsoft Windows7,Microsoft Vista, Microsoft Windows XP Pro, Windows Server 2003 or 2008, Red Hat Enterprise Linux, or Ubuntu Desktop 10.04.

2. System Graphics. The operator interface software shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using dynamic colors to represent zone temperature relative to zone setpoint.
    a. Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point-and-click navigation between zones or equipment, and to edit setpoints and other specified parameters.
    b. Animation. Graphics shall be able to animate by displaying different image files for changed object status.
    c. Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.
    d. Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only require widely available no-cost plug-ins (such as Active-X and Adobe Flash).
3. Custom Graphics. Custom graphic files shall be created with the use of a graphics generation package furnished with the system. The graphics generation package shall be a graphically based system that uses the mouse to create and modify graphics that are saved in the same formats as are used for system graphics.
4. Graphics Library. Furnish a complete library of standard HVAC equipment graphics such as chillers, boilers, air handlers, terminals, fan coils, and unit ventilators. This library also shall include standard symbols for other equipment including fans, pumps, coils, valves, piping, dampers, and ductwork. The library shall be furnished in a file format compatible with the graphics generation package program.

G. System Applications. System shall provide the following functionality to authorized operators as an integral part of the operator interface or as stand-alone software programs. If furnished as part of the interface, the tool shall be

available from each workstation or web browser interface. If furnished as a stand-alone program, software shall be installable on standard IBM-compatible PCs with no limit on the number of copies that can be installed under the system license.

1. Automatic System Database Configuration. Each workstation or web server shall store on its hard disk a copy of the current system database, including controller firmware and software. Stored database shall be automatically updated with each system configuration or controller firmware or software change.
2. Manual Controller Memory Download. Operators shall be able to download memory from the system database to each controller.
3. System Configuration. The workstation software shall provide a method of configuring the system. This shall allow for future system changes or additions by users under proper password protection. Operators shall be able to configure the system.
4. On-Line Help. Provide a context-sensitive, on-line help system to assist the operator in operating and editing the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext.
5. Security. Each operator shall be required to log on to the system with user name and password in order to view, edit, add, or delete data.
    a. Operator Access. The user name and password combination shall define accessible viewing, editing, adding, and deleting privileges for that operator. Users with system administrator rights shall be able to create new users and edit the privileges of all existing users.
    b. Automatic Log Out. Automatically log out each operator if no keyboard or mouse activity is detected. This auto logoff time shall be user adjustable.
    c. Encrypted Security Data. Store system security data including operator passwords in an encrypted format. System shall not display operator passwords.
6. System Diagnostics. The system shall automatically monitor the operation of all building management panels and controllers. The failure of any device shall be annunciated to the operator.
7. Alarm Processing. System input and status objects shall be configurable to alarm on departing from and on returning to normal state. Operator shall be able to enable or disable each alarm and to configure alarm limits, alarm limit differentials, alarm states, and alarm reactions for each system object. Configure and enable alarm points as

specified in Section 23 09 93 (Sequences of Operation). Alarms shall be BACnet alarm objects and shall use BACnet alarm services.

8. Alarm Messages. Alarm messages shall use the English language descriptor for the object in alarm in such a way that the operator will be able to recognize the source, location, and nature of the alarm without relying on acronyms.
9. Alarm Reactions. Operator shall be able to configure (by object) what, if any actions are to be taken during an alarm. As a minimum, the workstation or web server shall be able to log, print, start programs, display messages, send e-mail, send page, and audibly annunciate.
10. Alarm and Event log. Operators shall be able to view all system alarms and changes of state from any location in the system. Events shall be listed chronologically. An operator with the proper security level may acknowledge and delete alarms, and archive closed alarms to the workstation or web server hard disk.
11. Trend Logs. The operator shall be able to configure trend sample or change of value (COV) interval, start time, and stop time for each system data object and shall be able to retrieve data for use in spreadsheets and standard database programs. Controller shall sample and store trend data and shall be able to archive data to the hard disk. Configure trends as specified in Section 23 09 93 (Sequences of Operation). Trends shall be BACnet trend objects.
12. Object and Property Status and Control. Provide a method for the operator to view, and edit if applicable, the status of any object or property in the system. The status shall be available by menu, on graphics, or through custom programs.
13. Reports and Logs. Operator shall be able to select, to modify, to create, and to print reports and logs. Operator shall be able to store report data in a format accessible by standard spreadsheet and word processing programs.
14. Standard Reports. Furnish the following standard system reports:
    a. Objects. System objects and current values filtered by object type, by status (in alarm, locked, normal), by equipment, by geographic location, or by combination of filter criteria.
    b. Alarm Summary. Current alarms and closed alarms. System shall retain closed alarms for an adjustable period.
    c. Logs. System shall log the following to a database or text file and shall retain data for an adjustable period:
        i. Alarm History.
        ii. Trend Data. Operator shall be able to select trends to be logged.

iii. Operator Activity. At a minimum, system shall log operator log in and log out, control parameter changes, schedule changes, and alarm acknowledgment and deletion. System shall date and time stamp logged activity.

15. Energy Reports. System shall include an easily configured energy reporting tool that provides the capabilities described in this section.
    a. The energy reporting tool shall be accessible through the same user interface (Web browser or operator workstation software) as is used to manage the BAS.
    b. The energy reporting tool shall be preconfigured by the Contractor to gather and store energy demand and consumption data from each energy source that provides metered data to the BAS. Meter data shall be stored at 5 minute intervals unless otherwise specified in the Sequence of Operation provided in section 23 09 93. This data shall be maintained in an industry standard SQL database for a period of not less than five years.
    c. The energy reporting tool shall allow the operator to select an energy source and a time period of interest (day, week, month, year, or date range) and shall provide options to view the data in a table, line graph, bar graph, or pie chart. The tool shall also allow the operator to select two or more data sources and display a comparison of the energy used over this period in any of the listed graph formats, or to total the energy used by the selected sources and display that data in the supported formats.
    d. The energy reporting tool shall allow the operator to select and energy source and two time periods of interest (day, week, month, year, or date range) and display a graph that compares the energy use over the two time periods in any of the graph formats listed in the previous paragraph. The tool shall also allow the operator to select multiple energy sources and display a graph that compares the total energy used by these sources over the two time periods.
    e. The energy reporting tool shall allow the operator to easily generate the previously described graphs "on the fly," and shall provide an option to store the report format so the operator can select that format to regenerate the graph at a future date. The tool shall also allow the user to schedule these reports to run on a recurring basis using relative time periods, such as automatically generating a consumption report on the first Monday of each month showing consumption over the previous month. Automatically generated reports shall be archived on the

server in a common industry format such as Adobe PDF or Microsoft Excel with copies e-mailed to a user editable list of recipients.

f. The energy reporting tool shall be capable of collecting and displaying data from the following types of meters:
   i. Electricity
   ii. Gas
   iii. Oil
   iv. Steam
   v. Chilled Water
   vi. Potable Water
   vii. Heating and cooling degree days. (May be calculated from sensor data rather than metered.)

g. The user shall have the option of using Kw (Kwh) or Btu/hr (Btu) as the units for demand and consumption reports. Multiples of these units (MWH, kBtu, etc.) shall be used as appropriate. All selected sources shall be automatically converted to the selected units. The user shall similarly have the option of entering facility area and occupancy hours and creating reports that are normalized on an area basis, an annual use basis, or an occupied hour basis.

h. The user shall have the option of entering benchmark data for an individual facility or a group of facilities.

i. The user shall have the option of displaying any or all of the following data on any chart, line, or bar graph generated by the energy reporting tool:
   i. Low/High/Average value of the metered value being displayed.
   ii. Heating and/or Cooling Degree Days for the time period(s) being displayed.
   iii. The Environmental Index for the facilities and time periods being displayed.

16. Environmental Index. System shall monitor all occupied zones and compile an index that provides a numerical indication of the environmental comfort within the zone. As a minimum, this indication shall be based upon the deviation of the zone temperature from the heating or cooling setpoint. If humidity is being measured within the zone then the environmental index shall be adjusted to reflect a lower comfort level for high or low humidity levels. Similarly, if carbon dioxide levels are being measured as an indication of ventilation effectiveness then the environmental index shall be adjusted to indicate degraded

comfort at high carbon dioxide levels. Other adjustments may be made to the environmental index based upon additional measurements. The system shall maintain a trend of the environmental index for each zone in the trend log. The system shall also compute an average comfort index for every building included in this contract and maintain trendlogs of these building environmental indices. Similarly, the system shall compute the percentage of occupied time that comfortable conditions were maintained within the zones. Through the UI the user shall be able to add a weighting factor to adjust the contribution of each zone to the average index based upon the floor area of the zone, importance of the zone, or other static criteria.

17. Custom Reports. Operator shall be able to create custom reports that retrieve data, including archived trend data, from the system, that analyze data using common algebraic calculations, and that present results in tabular or graphical format. Reports shall be launched from the operator interface.

H. Workstation Application Editors. Each PC or browser workstation shall support editing of all system applications. The applications shall be downloaded and executed at one or more of the controller panels.
   1. Controller. Provide a full-screen editor for each type of application that shall allow the operator to view and change the configuration, name, control parameters, and set points for all controllers.
   2. Scheduling. An editor for the scheduling application shall be provided at each workstation. Provide a method of selecting the desired schedule and schedule type. Exception schedules and holidays shall be shown clearly on the calendar. The start and stop times for each object shall be adjustable from this interface.
   3. Custom Application Programming. Provide the tools to create, edit, debug, and download custom programs. System shall be fully operable while custom programs are edited, compiled, and downloaded. Programming language shall have the following features:
      a. Language. Language shall be graphically based and shall use function blocks arranged in a logic diagram that clearly shows control logic flow. Function blocks shall directly provide functions listed below, and operators shall be able to create custom or compound function blocks.
      b. Programming Environment. Tool shall provide a full-screen, cursor-and-mouse-driven programming environment that incorporates word processing features such as cut and paste. Operators shall be able to insert, add, modify, and delete custom

programming code, and to copy blocks of code to a file library for reuse in other control programs.

c. Independent Program Modules. Operator shall be able to develop independently executing program modules that can disable, enable and exchange data with other program modules.
d. Debugging and Simulation. Operator shall be able to step through the program observing intermediate values and results. Operator shall be able to adjust input variables to simulate actual operating conditions. Operator shall be able to adjust each step's time increment to observe operation of delays, integrators, and other time-sensitive control logic. Debugger shall provide error messages for syntax and for execution errors.
e. Conditional Statements. Operator shall be able to program conditional logic using compound Boolean (AND, OR, and NOT) and relational (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
f. Mathematical Functions. Language shall support floating-point addition, subtraction, multiplication, division, and square root operations, as well as absolute value calculation and programmatic selection of minimum and maximum values from a list of values.
g. Variables. Operator shall be able to use variable values in program conditional statements and mathematical functions.
    i. Time Variables. Operator shall be able to use predefined variables to represent time of day, day of the week, month of the year, and date. Other predefined variables or simple control logic shall provide elapsed time in seconds, minutes, hours, and days. Operator shall be able to start, stop, and reset elapsed time variables using the program language.
    ii. System Variables. Operator shall be able to use predefined variables to represent status and results of Controller Software and shall be able to enable, disable, and change setpoints of Controller Software as described in Controller Software section.

l. Portable Operator's Terminal. Provide all necessary software to configure an IBM-compatible laptop computer for use as a Portable Operator's Terminal. Operator shall be able to connect configured Terminal to the system network or directly to each controller for programming, setting up, and troubleshooting.

2.4 Controller Software

A. Furnish the following applications for building and energy management. All software application shall reside and operate in the system controllers. Applications shall be editable through operator workstation, web browser interface, or engineering workstation.
B. System Security. See Paragraph 2.3.E.5 (Security) and Paragraph 2.3.E.14.c.iii (Operator Activity).
C. Scheduling. Provide the capability to execute control functions according to a user created or edited schedule. Each schedule shall provide the following schedule options as a minimum:
    1. Weekly Schedule. Provide separate schedules for each day of the week. Each schedule shall be able to include up to 5 occupied periods (5 start-stop pairs or 10 events).
    2. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. Exception schedules may be defined up to a year in advance. Once an exception schedule has executed, the system shall discard and replace the exception schedule with the standard schedule for that day of the week.
    3. Holiday Schedules. Provide the capability for the operator to define up to 24 special or holiday schedules. These schedules will be repeated each year. The operator shall be able to define the length of each holiday period.
D. System Coordination. Operator shall be able to group related equipment based on function and location and to use these groups for scheduling and other applications.
E. Binary Alarms. Each binary object shall have the capability to be configured to alarm based on the operator-specified state. Provide the capability to automatically and manually disable alarming.
F. Analog Alarms. Each analog object shall have both high and low alarm limits. The operator shall be able to enable or disable these alarms.
G. Alarm Reporting. The operator shall be able to determine the action to be taken in the event of an alarm. An alarm shall be able to start programs, print, be logged in the event log, generate custom messages, and display on graphics.
H. Remote Communication. System shall automatically contact operator workstation or server on receipt of critical alarms. If no network connection is available, system shall use a modem connection.
I. Demand Limiting.
    1. The demand-limiting program shall monitor building power consumption from a building power meter (provided by others) which generates pulse signals or a BACnet communications interface. An

acceptable alternative is for the system to monitor a watt transducer or current transformer attached to the building feeder lines.

2. When power consumption exceeds adjustable levels, system shall automatically adjust setpoints, de-energize low-priority equipment, and take other programmatic actions to reduce demand as specified in Section 23 09 93 (Sequences of Operation). When demand drops below adjustable levels, system shall restore loads as specified.

J. Maintenance Management. The system shall be capable of generating maintenance alarms when equipment exceeds adjustable runtime, equipment starts, or performance limits. Configure and enable maintenance alarms as specified in 23 09 93 (Sequences of Operation).

K. Sequencing. Application software shall sequence chillers, boilers, and pumps as specified in Section 23 09 93 (Sequences of Operation).

L. PID Control. System shall provide direct- and reverse-acting PID (proportional-integral-derivative) algorithms. Each algorithm shall have anti-windup and selectable controlled variable, setpoint, and PID gains. Each algorithm shall calculate a time-varying analog value that can be used to position an output or to stage a series of outputs. The calculation interval, PID gains, and other tuning parameters shall be adjustable by a user with the correct security level.

M. Staggered Start. System shall stagger controlled equipment restart after power outage. Operator shall be able to adjust equipment restart order and time delay between equipment restarts.

N. Energy Calculations.

1. The system shall accumulate and convert instantaneous power (kW) or flow rates (L/s [gpm]) to energy usage data.
2. The system shall calculate a sliding-window average (rolling average). Operator shall be able to adjust window interval to 15 minutes, 30 minutes, or 60 minutes.

O. Anti-Short Cycling. All binary output objects shall be protected from short cycling by means of adjustable minimum on-time and off-time settings.

P. On and Off Control with Differential. Provide an algorithm that allows a binary output to be cycled based on a controlled variable and a setpoint. The algorithm shall be direct-acting or reverse-acting.

Q. Runtime Totalization. Provide software to totalize runtime for each binary input and output. Operator shall be able to enable runtime alarm based on exceeded adjustable runtime limit. Configure and enable runtime totalization and alarms as specified in Section 23 09 93 (Sequence of Operations).

2.5 Controllers

A. General. Provide an adequate number of Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), Smart Actuators (SA), and Smart Sensors (SS) as required to achieve performance specified in Section 23 09 23 Article 1.9 (System Performance). Every device in the system which executes control logic and directly controls HVAC equipment must conform to a standard BACnet Device profile as specified in ANSI/ASHRAE 135, BACnet Annex L. Unless otherwise specified, hardwired actuators and sensors may be used in lieu of BACnet Smart Actuators and Smart Sensors.

B. BACnet.
   1. Building Controllers (BCs). Each BC shall conform to BACnet Building Controller (B-BC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L, and shall be listed as a certified B-BC in the BACnet Testing Laboratories (BTL) Product Listing.
   2. Advanced Application Controllers (AACs). Each AAC shall conform to BACnet Advanced Application Controller (B-AAC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-AAC in the BACnet Testing Laboratories (BTL) Product Listing.
   3. Application Specific Controllers (ASCs). Each ASC shall conform to BACnet Application Specific Controller (B-ASC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-ASC in the BACnet Testing Laboratories (BTL) Product Listing.
   4. Smart Sensors (SSs). Each SS shall conform to BACnet Smart Sensor (B-SS) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-SS in the BACnet Testing Laboratories (BTL) Product Listing.
   5. BACnet Communication.
      a. Each BC shall reside on or be connected to a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing.
      b. BACnet routing shall be performed by BCs or other BACnet device routers as necessary to connect BCs to networks of AACs and ASCs.
      c. Each AAC shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
      d. Each ASC shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.

e. Each SA shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
f. Each SS shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using ARCNET or MS/TP Data Link/Physical layer protocol.

C. Communication
1. Service Port. Each controller shall provide a service communication port for connection to a Portable Operator's Terminal. Connection shall be extended to space temperature sensor ports where shown on drawings.
2. Signal Management. BC and ASC operating systems shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and to allow for central monitoring and alarms.
3. Data Sharing. Each BC and AAC shall share data as required with each networked BC and AAC.
4. Stand-Alone Operation. Each piece of equipment specified in Section 23 09 93 shall be controlled by a single controller to provide stand-alone control in the event of communication failure. All I/O points specified for a piece of equipment shall be integral to its controller. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network such as outdoor air conditions, supply air or water temperature coming from source equipment, etc.

D. Environment. Controller hardware shall be suitable for anticipated ambient conditions.
1. Controllers used outdoors or in wet ambient conditions shall be mounted in waterproof enclosures and shall be rated for operation at -29°C to 60°C (-20°F to 140°F).
2. Controllers used in conditioned space shall be mounted in dust-protective enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).

E. Keypad. Provide a local keypad and display for each BC and AAC. Operator shall be able to use keypad to view and edit data. Keypad and display shall require password to prevent unauthorized use. If the manufacturer does not normally provide a keypad and display for each BC and AAC, provide the software and any interface cabling needed to use a laptop computer as a Portable Operator's Terminal for the system.

F. Real-Time Clock. Controllers that perform scheduling shall have a real-time clock.

G. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to a field-removable modular terminal strip or to a termination card connected by a ribbon cable. Each BC and AAC shall continually check its processor and memory circuit status and shall generate an alarm on abnormal operation. System shall continuously check controller network and generate alarm for each controller that fails to respond.
H. Memory.
    1. Controller memory shall support operating system, database, and programming requirements.
    2. Each BC and AAC shall retain BIOS and application programming for at least 72 hours in the event of power loss.
    3. Each ASC and SA shall use nonvolatile memory and shall retain BIOS and application programming in the event of power loss. System shall automatically download dynamic control parameters following power loss.
I. Immunity to Power and Noise. Controllers shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).
J. Transformer. ASC power supply shall be fused or current limiting and shall be rated at a minimum of 125% of ASC power consumption.

2.6 Input and Output Interface

A. General. Hard-wire input and output points to BCs, AACs, ASCs, or SAs.
B. Protection. All input points and output points shall be protected such that shorting of the point to itself, to another point, or to ground shall cause no damage to the controller. All input and output points shall be protected from voltage up to 24 V of any duration, such that contact with this voltage will cause no controller damage.
C. Binary Inputs. Binary inputs shall allow the monitoring of ON/OFF signals from remote devices. The binary inputs shall provide a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against contact bounce and noise. Binary inputs shall sense dry contact closure without application of power external to the controller.
D. Pulse Accumulation Inputs. Pulse accumulation inputs shall conform to binary input requirements and shall also accumulate up to 10 pulses per second.
E. Analog Inputs. Analog inputs shall monitor low-voltage (0–10 Vdc), current (4–20 mA), or resistance (thermistor or RTD) signals. Analog inputs shall be compatible with and field configurable to commonly available sensing devices.
F. Binary Outputs. Binary outputs shall provide for ON/OFF operation or a pulsed low-voltage signal for pulse width modulation control. Binary outputs on Building Controllers shall have three-position (on-off-auto) override switches and status lights. Outputs shall be selectable for normally open or normally closed operation.

G. Analog Outputs. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0–10 Vdc or a 4–20 mA signal as required to properly control output devices. Each Building Controller analog output shall have a two-position (auto-manual) switch, a manually adjustable potentiometer, and status lights. Analog outputs shall not drift more than 0.4% of range annually.

H. Tri-State Outputs. Control three-point floating electronic actuators without feedback with tri-state outputs (two coordinated binary outputs). Tri-State outputs may be used to provide analog output control in zone control and terminal unit control applications such as VAV terminal units, duct-mounted heating coils, and zone dampers.

I. System Object Capacity. The system size shall be expandable to at least twice the number of input/ output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The operator interfaces installed for this project shall not require any hardware additions or software revisions in order to expand the system

2.7 Power Supplies and Line Filtering

A. Power Supplies. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish over-current protection in primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.

1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in over-voltage and over-current protection and shall be able to withstand 150% current overload for at least three seconds without trip-out or failure.
    a. Unit shall operate between 0°C and 50°C (32°F and 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MILSTD 810C for shock and vibration.
    b. Line voltage units shall be UL recognized and CSA listed.

B. Power Line Filtering.

1. Provide internal or external transient voltage and surge suppression for workstations and controllers. Surge protection shall have:
    a. Dielectric strength of 1000 V minimum
    b. Response time of 10 nanoseconds or less
    c. Transverse mode noise attenuation of 65 dB or greater
    d. Common mode noise attenuation of 150 dB or greater at 40–100 Hz

2.8 Auxiliary Control Devices

A. Motorized Control Dampers, unless otherwise specified elsewhere, shall be as follow.

1. Type. Control dampers shall be the parallel or opposed-blade type as specified below or as scheduled on drawings.
    a. Outdoor and return air mixing dampers and face-and-bypass dampers shall be parallel-blade and shall direct airstreams toward each other.
    b. Other modulating dampers shall be opposed-blade.
    c. Two-position shutoff dampers shall be parallel- or opposed-blade with blade and side seals.
2. Frame. Damper frames shall be 2.38 mm (13 gauge) galvanized steel channel or 3.175 mm (⅛ in.) extruded aluminum with reinforced corner bracing.
3. Blades. Damper blades shall not exceed 20 cm (8 in.) in width or 125 cm (48 in.) in length. Blades shall be suitable for medium velocity (10 m/s [2000 fpm]) performance. Blades shall be not less than 1.5875 mm (16 gauge).
4. Shaft Bearings. Damper shaft bearings shall be as recommended by manufacturer for application, oil impregnated sintered bronze, or better.
5. Seals. Blade edges and frame top and bottom shall have replaceable seals of butyl rubber or neoprene. Side seals shall be spring-loaded stainless steel. Blade seals shall leak no more than 50 L/s·m^2(10 cfm per ft^2) at 1000 Pa (4 in. w.g.) differential pressure. Blades shall be airfoil type suitable for wide-open face velocity of 7.5 m/s (1500 fpm).
6. Sections. Individual damper sections shall not exceed 125 cm × 150 cm (48 in. × 60 in.). Each section shall have at least one damper actuator.
7. Modulating dampers shall provide a linear flow characteristic where possible.
8. Linkages. Dampers shall have exposed linkages.

B. Electric Damper and Valve Actuators.
1. Stall Protection. Mechanical or electronic stall protection shall prevent actuator damage throughout the actuator's rotation.
2. Spring-return Mechanism. Actuators used for power-failure and safety applications shall have an internal mechanical spring-return mechanism or an uninterruptible power supply (UPS).
3. Signal and Range. Proportional actuators shall accept a 0–10 Vdc or a 0–20 mA control signal and shall have a 2–10 Vdc or 4–20 mA operating range. (Floating motor actuators may be substituted for proportional actuators in terminal unit applications as described in paragraph 2.6H.)
4. Wiring. 24 Vac and 24 Vdc actuators shall operate on Class 2 wiring.
5. Manual Positioning. Operators shall be able to manually position each actuator when the actuator is not powered. Non-spring-return actuators shall have an external manual gear release. Spring-return actuators with more than 7 N·m (60 in.-lb) torque capacity shall have a manual crank.

C. Control Valves.
1. Control valves shall be two-way or three-way type for two-position or modulating service as shown.
2. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
    a. Water Valves:

i. Two-way: 150% of total system (pump) head.
ii. Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.

b. Steam Valves: 150% of operating (inlet) pressure.

3. Water Valves.
   a. Body and trim style and materials shall be in accordance with manufacturer's recommendations for design conditions and service shown, with equal percentage ports for modulating service.
   b. Sizing Criteria:
      i. Two-position service: Line size.
      ii. Two-way modulating service: Pressure drop shall be equal to twice the pressure drop through heat exchanger (load), 50% of the pressure difference between supply and return mains, or 5 psi, whichever is greater.
      iii. Three-way modulating service: Pressure drop equal to twice the pressure drop through the coil exchanger (load), 35 kPa (5 psi) maximum.
      iv. Valves ½ in. through 2 in. shall be bronze body or cast brass ANSI Class 250, spring-loaded, PTFE packing, quick opening for two-position service. Two-way valves to have replaceable composition disc or stainless steel ball.
      v. Valves 2½ in. and larger shall be cast iron ANSI Class 125 with guided plug and PTFE packing.
   c. Water valves shall fail normally open or closed, as scheduled on plans, or as follows:
      i. Water zone valves—normally open preferred.
      ii. Heating coils in air handlers—normally open.
      iii. Chilled water control valves—normally closed.
      iv. Other applications—as scheduled or as required by sequences of operation.
4. Steam Valves.
   a. Body and trim materials shall be in accordance with manufacturer's recommendations for design conditions and service with linear ports for modulating service.
   b. Sizing Criteria:
      i. Two-position service: pressure drop 10% to 20% of inlet psig.
      ii. Modulating service: 100 kPa (15 psig) or less; pressure drop 80% of inlet psig.
      iii. Modulating service: 101 to 350 kPa (16 to 50 psig); pressure drop 50% of inlet psig.
      iv. Modulating service: over 350 kPa (50 psig); pressure drop as scheduled on plans.

D. Binary Temperature Devices.
1. Low-Voltage Space Thermostats. Low-voltage space thermostats shall be 24 V, bimetal-operated, mercury-switch type, with adjustable or fixed

anticipation heater, concealed setpoint adjustment, 13°C–30°C (55°F–85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.

2. Line-Voltage Space Thermostats. Line-voltage space thermostats shall be bimetal-actuated, open-contact type or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type, with heat anticipator, UL listing for electrical rating, concealed setpoint adjustment, 13°C–30°C (55°F–85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
3. Low-Limit Thermostats. Low-limit airstream thermostats shall be UL listed, vapor pressure type. Element shall be at least 6 m (20 ft) long. Element shall sense temperature in each 30 cm (1 ft) section and shall respond to lowest sensed temperature. Low-limit thermostat shall be manual reset only.

E. Temperature Sensors.
1. Type. Temperature sensors shall be Resistance Temperature Device (RTD) or thermistor.
2. Duct Sensors. Duct sensors shall be single point or averaging as shown. Averaging sensors shall be a minimum of 1.5 m (5 ft) in length per 1 m^2(10 ft^2) of duct cross-section.
3. Immersion Sensors. Provide immersion sensors with a separable stainless steel well. Well pressure rating shall be consistent with system pressure it will be immersed in. Well shall withstand pipe design flow velocities.
4. Space Sensors. Space sensors shall have setpoint adjustment, override switch, display, and communication port as shown.
5. Differential Sensors. Provide matched sensors for differential temperature measurement.

F. Humidity Sensors.
1. Duct and room sensors shall have a sensing range of 20%–80%.
2. Duct sensors shall have a sampling chamber.
3. Outdoor air humidity sensors shall have a sensing range of 20%–95% RH and shall be suitable for ambient conditions of -40°C–75°C (-40°F–170°F).
4. Humidity sensors shall not drift more than 1% of full scale annually.

G. Flow Switches. Flow-proving switches shall be paddle (water service only) or differential pressure type (air or water service) as shown. Switches shall be UL listed, SPDT snap-acting, and pilot duty rated (125 VA minimum).
1. Paddle switches shall have adjustable sensitivity and NEMA 1 enclosure unless otherwise specified.
2. Differential pressure switches shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.

H. Relays.
1. Control Relays. Control relays shall be plug-in type, UL listed, and shall have dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage shall be suitable for application.
2. Time Delay Relays. Time delay relays shall be solid-state plug-in type, UL listed, and shall have adjustable time delay. Delay shall be adjustable ±100%

from setpoint shown. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure for relays not installed in local control panel.

I. Override Timers.
   1. Unless implemented in control software, override timers shall be spring-wound line voltage, UL Listed, with contact rating and configuration required by application. Provide 0–6 hour calibrated dial unless otherwise specified. Flush mount timer on local control panel face or where shown.

J. Current Transmitters.
   1. AC current transmitters shall be self-powered, combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 4–20 mA two-wire output. Full-scale unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A, with internal zero and span adjustment. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
   2. Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized.
   3. Unit shall be split-core type for clamp-on installation on existing wiring.

K. Current Transformers.
   1. AC current transformers shall be UL/CSA recognized and shall be completely encased (except for terminals) in approved plastic material.
   2. Transformers shall be available in various current ratios and shall be selected for ±1% accuracy at 5 A full-scale output.
   3. Use fixed-core transformers for new wiring installation and split-core transformers for existing wiring installation.

L. Voltage Transmitters.
   1. AC voltage transmitters shall be self-powered single-loop (two-wire) type, 4–20 mA output with zero and span adjustment.
   2. Adjustable full-scale unit ranges shall be 100–130 Vac, 200–250 Vac, 250–330 Vac, and 400–600 Vac. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
   3. Transmitters shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized at 600 Vac rating.

M. Voltage Transformers.
   1. AC voltage transformers shall be UL/CSA recognized, 600 Vac rated, and shall have built-in fuse protection.
   2. Transformers shall be suitable for ambient temperatures of 4°C–55°C (40°F–130°F) and shall provide ±0.5% accuracy at 24 Vac and 5 VA load.
   3. Windings (except for terminals) shall be completely enclosed with metal or plastic.

N. Power Monitors.
   1. Selectable rate pulse output for kWh reading, 4–20 mA output for kW reading, N.O. alarm contact, and ability to operate with 5.0 amp current inputs or 0–0.33 volt inputs.
   2. 1.0% full-scale true RMS power accuracy, +0.5 Hz, voltage input range 120–600 V, and auto range select.

3. Under voltage/phase monitor circuitry.
4. NEMA 1 enclosure.
5. Current transformers having a 0.5% FS accuracy, 600 VAC isolation voltage with 0–0.33 V output. If 0–5 A current transformers are provided, a three-phase disconnect/shorting switch assembly is required.

O. Hydronic Flowmeters
1. Insertion-Type Turbine Meter
   a. Dual counter-rotating axial turbine elements, each with its own rotational sensing system, and an averaging circuit to reduce measurement errors due to swirl and flow profile distortion. Single turbine for piping 2 inches and smaller. Flow sensing turbine rotors shall be non-metallic and not impaired by magnetic drag.
   b. Insertion type complete with 'hot-tap' isolation valves to enable sensor removal without water supply system shutdown.
   c. Sensing method shall be impedance sensing (non magnetic and non photoelectric)
   d. Volumetric accuracy
      i. ± 0.5% of reading at calibrated velocity
      ii. ± 1% of reading from 3 to 30 ft/s (10:1 range)
      iii. ± 2% of reading from 0.4 to 20 ft/s (50:1 range)
   e. Each sensor shall be individually calibrated and tagged accordingly against the manufacturer's primary standards which must be accurate to within 0.1% of flow rate and traceable to the National Institute of Standards and Technology (NIST).
   f. Maximum operating pressure of 400 psi and maximum operating temperature of 200°F continuous (220°F peak).
   g. All wetted metal parts shall be constructed of 316 stainless steel.
   h. Analog outputs shall consist of non interactive zero and span adjustments, a DC linearly of 0.1% of span, voltage output of 0-10 Vdc, and current output of 4-20 mA.
2. Magnetic Flow-Tube Type Flowmeter
   a. Sensor shall be a magnetic flowmeter, which utilizes Faraday's Law to measure volumetric fluid flow through a pipe. The flowmeter shall consist of two elements, the sensor and the electronics. The sensor shall generate a measuring signal proportional to the flow velocity in the pipe. The electronics shall convert this EMF into a standard current output.
   b. Electronic replacement shall not affect meter accuracy (electronic units are not matched with specific sensors).
   c. Four-wire, externally powered, magnetic type flow transmitter with adjustable span and zero, integrally mounted to flow tube. Output signal shall be a digital pulse proportional to the flow rate (to provide maximum accuracy and to handle abrupt changes in flow). Standard 4-20 mA or 0-10 Vdc outputs may be used provided accuracy is as specified.

d. Flow Tube:
    i. ANSI class 150 psig steel
    ii. ANSI flanges
    iii. Protected with PTFE, PFA, or ETFE liner rated for 245°F minimum fluid temperature
e. Electrode and grounding material
    i. 316L Stainless steel or Hastelloy C
    ii. Electrodes shall be fused to ceramic liner and not require o-rings.
f. Electrical Enclosure: NEMA 4, 7
g. Approvals:
    i. UL or CSA
    ii. NSF Drinking Water approval for domestic water applications
h. Performance
    i. Accuracy shall be ±0.5% of actual reading from 3 to 30 ft/s flow velocities, and 0.015 ft/s from 0.04 to 3 ft/s.
    ii. Stability: 0.1% of rate over six months.
    iii. Meter repeatability shall be ±0.1% of rate at velocities > 3 ft/s.

3. Magnetic Insertion-Type Flowmeter
    a. Magnetic Faraday point velocity measuring device.
    b. Insertion type complete with hot-tap isolation valves to enable sensor removal without water supply system shutdown.
    c. 4-20 mA transmitter proportional to flow or velocity.
    d. Accuracy: larger of 1% of reading and 0.2 ft/s.
    e. Flow range: 0.2 to 20 ft/s, bidirectional.
    f. Each sensor shall be individually calibrated and tagged accordingly against the manufacturer's primary standards which must be accurate to within 0.1% of flow rate and traceable to the National Institute of Standards and Technology (NIST).
4. Vortex Shedding Flowmeter
    a. Output: 4-20 mA, 0-10 Vdc, 0-5 Vdc.
    b. Maximum Fluid Temperature: 800ºF (427 °C).
    c. Wetted Parts: Stainless Steel.
    d. Housing: NEMA 4X.
    e. Turndown: 25:1 minimum.
    f. Accuracy: 0.5% of calibrated span for liquids, 1% of calibrated span for steam and gases.
    g. Body: Wafer style or ANSI flanged to match piping specification.
5. Transit-Time Ultrasonic Flowmeter
    a. Clamp-On transit-time ultrasonic flowmeter
    b. Wide-Beam transducer technology
    c. 4-20 mA transmitter proportional to flow or velocity.
    d. Accuracy: 0.5% of reading in range 1 to 30 ft/s, 0.001 ft/s sensitivity.

P. Thermal Energy Meters

1. Matched RTD, solid state, or thermistor temperature sensors with a differential temperature accuracy of ±0.15°F.
2. Flow meter : See "Hydronic Flowmeters" section.
3. Unit accuracy of ±1% factory calibrated, traceable to NIST with certification.
4. NEMA 1 enclosure.
5. Panel mounted display.
6. UL listed.
7. Isolated 4–20 ma signals for energy rate and supply and return temperatures and flow.

Q. Current Switches.
1. Current-operated switches shall be self-powered, solid-state with adjustable trip current. Select switches to match application current and DDC system output requirements.

R. Pressure Transducers.
1. Transducers shall have linear output signal and field-adjustable zero and span.
2. Transducer sensing elements shall withstand continuous operating conditions of positive or negative pressure 50% greater than calibrated span without damage.
3. Water pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Transducer shall have 4–20 mA output, suitable mounting provisions, and block and bleed valves.
4. Water differential pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Over-range limit (differential pressure) and maximum static pressure shall be 2000 kPa (300 psi.)Transducer shall have 4–20 mA output, suitable mounting provisions, and 5-valve manifold.

S. Differential Pressure Switches. Differential pressure switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum) and shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.

T. Pressure-Electric (PE) Switches.
1. Shall be metal or neoprene diaphragm actuated, operating pressure rated for 0–175 kPa (0–25 psig), with calibrated scale minimum setpoint range of 14–125 kPa (2–18 psig) minimum, UL listed.
2. Provide one- or two-stage switch action (SPDT, DPST, or DPDT) as required by application Electrically rated for pilot duty service (125 VA minimum) and/or for motor control.
3. Switches shall be open type (panel-mounted) or enclosed type for remote installation. Enclosed type shall be NEMA 1 unless otherwise specified.
4. Each pneumatic signal line to PE switches shall have permanent indicating gauge.

U. Occupancy Sensors. Occupancy sensors shall utilize Passive Infrared (PIR) and/or Microphonic Passive technology to detect the presence of people within a room. Sensors shall be mounted as indicated on the approved drawings. The sensor

output shall be accessible by any lighting and/or HVAC controller in the system. Occupancy sensors shall be capable of being powered from the lighting or HVAC control panel, as shown on the drawings. Occupancy sensor delay shall be software adjustable through the user interface and shall not require manual adjustment at the sensor.

V. Local Control Panels.
   1. All indoor control cabinets shall be fully enclosed NEMA 1 construction with (hinged door) key-lock latch and removable subpanels. A single key shall be common to all field panels and subpanels.
   2. Interconnections between internal and face-mounted devices shall be prewired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL listed for 600 volt service, individually identified per control/ interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.
   3. Provide ON/OFF power switch with overcurrent protection for control power sources to each local panel.

2.9 Wiring and Raceways

A. General. Provide copper wiring, plenum cable, and raceways as specified in applicable sections of Division 26.
B. Insulated wire shall use copper conductors and shall be UL listed for 90°C (200°F) minimum service.

2.10 Fiber Optic Cable System

A. Optical Cable. Optical cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. Sheath shall be UL listed OFNP in accordance with NEC Article 770. Optical fiber shall meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125mm.
B. Connectors. Field terminate optical fibers with ST type connectors. Connectors shall have ceramic ferrules and metal bayonet latching bodies.

PART 3: EXECUTION

3.0 Section Includes
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3.2 Protection
3.3 Coordination
3.4 General Workmanship
3.5 Field Quality Control
3.6 Existing Equipment
3.7 Wiring
3.8 Communication Wiring
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3.11 Installation of Sensors
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3.21 Training
3.22 Sequences of Operation
3.23 Control Valve Installation
3.24 Control Damper Installation
3.25 Smoke Damper Installation
3.26 Duct Smoke Detection
3.27 Controls Communication Protocol
3.28 Start-Up and Checkout Procedures

3.1 Examination

A. The contractor shall inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the engineer for resolution before rough-in work is started.
B. The contractor shall examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate—or if any discrepancies occur between the plans and the contractor's work and the plans and the work of others—the contractor shall report these discrepancies to the engineer and shall obtain written instructions for any changes necessary to accommodate the contractor's work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the contractor to report such discrepancies shall be made by—and at the expense of—this contractor.

3.2 Protection

A. The contractor shall protect all work and material from damage by his/her work or employees and shall be liable for all damage thus caused.
B. The contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted. The contractor shall protect any material that is not immediately installed. The contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.3 Coordination

A. Site
    1. Where the mechanical work will be installed in close proximity to, or will interfere with, work of other trades, the contractor shall assist in working out space conditions to make a satisfactory adjustment. If the contractor installs his/her work before coordinating with other trades, so as to cause any interference with work of other trades, the contractor shall make the necessary changes in his/her work to correct the condition without extra charge.
    2. Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.
B. Submittals. See Section 23 09 23 Article 1.10 (Submittals).
C. Test and Balance.
    1. The contractor shall furnish a single set of all tools necessary to interface to the control system for test and balance purposes.
    2. The contractor shall provide training in the use of these tools. This training will be planned for a minimum of 4 hours.
    3. In addition, the contractor shall provide a qualified technician to assist in the test and balance process, until the first 20 terminal units are balanced.
    4. The tools used during the test and balance process will be returned at the completion of the testing and balancing.

D. Life Safety.
   1. Duct smoke detectors required for air handler shutdown are provided under Division 28. Interlock smoke detectors to air handlers for shutdown as specified in Section 23 09 93 (Sequences of Operation).
   2. Smoke dampers and actuators required for duct smoke isolation are provided under Division 23. Interlock smoke dampers to air handlers as specified in Section 23 09 93 (Sequences of Operation).
   3. Fire and smoke dampers and actuators required for fire-rated walls are provided under Division 23. Fire and smoke damper control is provided under Division 28.

E. Coordination with controls specified in other sections or divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the contractor as follows:
   1. All communication media and equipment shall be provided as specified in Section 23 09 23 Article 2.2 (Communication).
   2. Each supplier of a controls product is responsible for the configuration, programming, start up, and testing of that product to meet the sequences of operation described in Section 23 09 93.
   3. The contractor shall coordinate and resolve any incompatibility issues that arise between control products provided under this section and those provided under other sections or divisions of this specification.
   4. The contractor is responsible for providing all controls described in the contract documents regardless of where within the contract documents these controls are described.
   5. The contractor is responsible for the interface of control products provided by multiple suppliers regardless of where this interface is described within the contract documents.

3.4 General Workmanship

A. Install equipment, piping, and wiring/raceway parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.
B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.
C. Install equipment in readily accessible locations as defined by Chapter 1 Article 100 Part A of the National Electrical Code (NEC).
D. Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.
E. All equipment, installation, and wiring shall comply with industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.5 Field Quality Control

A. All work, materials, and equipment shall comply with rules and regulations of applicable local, state, and federal codes and ordinances as identified in Section 23 09 23 Article 1.8 (Codes and Standards).
B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship.
C. Contractor shall have work inspection by local and/or state authorities having jurisdiction over the work.

3.6 Existing Equipment

A. Wiring. The contractor may reuse any abandoned wires. The integrity of the wire and its proper application to the installation are the responsibility of the contractor. The wire shall be properly identified and tested in accordance with this specification. Unused or redundant wiring must be properly identified as such.
B. Local Control Panels. The contractor may reuse any existing local control panel to locate new equipment. All redundant equipment within these panels must be removed. Panel face cover must be patched to fill all holes caused by removal of unused equipment or replaced with new.
C. Repair. Unless otherwise directed, the contractor is not responsible for repair or replacement of existing energy equipment and systems, valves, dampers, or actuators. Should the contractor find existing equipment that requires maintenance, the engineer is to be notified immediately.
D. Temperature Sensor Wells. The contractor may reuse any existing wells in piping for temperature sensors. These wells shall be modified as required for proper fit of new sensors.
E. Indicator Gauges. Where these devices remain and are not removed, they must be made operational and recalibrated to ensure reasonable accuracy.
F. Room Thermostats. Room thermostats may be reused. Remove and deliver unnecessary thermostats to Owner unless otherwise noted. Patch and finish holes and marks left by removal to match existing walls.
G. Electronic Sensors and Transmitters. Unless specifically noted otherwise, existing sensors and transmitters may be reused. Remove and deliver unnecessary sensors and transmitters to Owner.
H. Controllers and Auxiliary Electronic Devices. Existing controllers and auxiliary electronic devices may be reused unless specifically noted otherwise. Recondition as necessary. Remove unnecessary sensors and transmitters.
I. Damper Actuators, Linkages, and Appurtenances. Existing damper actuators, linkages, and appurtenances may be reused unless specifically noted otherwise. Recondition as necessary. Remove and deliver unnecessary equipment to Owner.
J. Control Valves. Existing control valves may be reused unless specifically noted otherwise. Recondition as necessary.
K. Control Compressed Air Systems. Existing control compressed air systems may be reused unless specifically noted otherwise. Recondition as necessary.
L. Existing System Operating Schedule. The mechanical system must remain in operation and shall maintain space comfort at all times between the hours of 6 a.m. and 9 p.m., Monday through Sunday. No modifications to the system shall cause

mechanical system to be shut down for more than 15 minutes or to fail to maintain space comfort conditions during any such period. Perform cut-over of controls that cannot meet these conditions outside of operational hours.

M. The scheduling of fans through existing or temporary time clocks or control system shall be maintained throughout the DDC system installation
N. Install control panels where shown.
O. Modify existing starter control circuits, if necessary, to provide hand-off-auto control of each controlled starter. If new starters or starter control packages are required, these shall be included as part of this contract.
P. Patch holes and finish to match existing walls.

3.7 Wiring

A. All control and interlock wiring shall comply with national and local electrical codes, and Division 26 of this specification, Where the requirements of this section differ from Division 26, the requirements of this section shall take precedence.
B. All NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway according to NEC and Division 26 requirements.
C. All low-voltage wiring shall meet NEC Class 2 requirements. Low-voltage power circuits shall be subfused when required to meet Class 2 current limit.
D. Where NEC Class 2 (current-limited) wires are in concealed and accessible locations, including ceiling return air plenums, approved cables not in raceway may be used provided that cables are UL listed for the intended application.
E. All wiring in mechanical, electrical, or service rooms – or where subject to mechanical damage – shall be installed in raceway at levels below 3 m (10ft).
F. Do not install Class 2 wiring in raceways containing Class 1 wiring. Boxes and panels containing high-voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two (e.g. relays and transformers).
G. Do not install wiring in raceway containing tubing.
H. Where Class 2 wiring is run exposed, wiring is to be run parallel along a surface or perpendicular to it and neatly tied at 3 m (10 ft) intervals.
I. Where plenum cables are used without raceway, they shall be supported from or anchored to structural members. Cables shall not be supported by or anchored to ductwork, electrical raceways, piping, or ceiling suspension systems.
J. All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to-wire connections shall be at a terminal block.
K. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.
L. Maximum allowable voltage for control wiring shall be 120 V. If only higher voltages are available, the contractor shall provide step-down transformers.
M. All wiring shall be installed as continuous lengths, with no splices permitted between termination points.
N. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations.

O. Size of raceway and size and type of wire type shall be the responsibility of the contractor in keeping with the manufacturer's recommendations and NEC requirements, except as noted elsewhere.
P. Include one pull string in each raceway 2.5 cm (1 in.) or larger.
Q. Use color-coded conductors throughout with conductors of different colors.
R. Control and status relays are to be located in designated enclosures only. These enclosures include packaged equipment control panel enclosures unless they also contain Class 1 starters.
S. Conceal all raceways except within mechanical, electrical, or service rooms. Install raceway to maintain a minimum clearance of 15 cm (6 in.) from high-temperature equipment (e.g. steam pipes or flues).
T. Secure raceways with raceway clamps fastened to the structure and spaced according to code requirements. Raceways and pull boxes may not be hung on flexible duct strap or tie rods. Raceways may not be run on or attached to ductwork.
U. Adhere to this specification's Division 26 requirements where raceway crosses building expansion joints.
V. Install insulated bushings on all raceway ends and openings to enclosures. Seal top end of vertical raceways.
W. The contractor shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.
X. Flexible metal raceways and liquid-tight flexible metal raceways shall not exceed 1 m (3 ft) in length and shall be supported at each end. Flexible metal raceway less than ½ in. electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal raceways shall be used.
Y. Raceway must be rigidly installed, adequately supported, properly reamed at both ends, and left clean and free of obstructions. Raceway sections shall be joined with couplings (according to code). Terminations must be made with fittings at boxes, and ends not terminating in boxes shall have bushings installed.

3.8 Communication Wiring

A. The contractor shall adhere to the items listed in the "Wiring" article in Part 3 of the specification.
B. All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling
C. Do not install communication wiring in raceways and enclosures containing Class 1 or other Class 2 wiring.
D. Maximum pulling, tension, and bend radius for the cable installation, as specified by the cable manufacturer, shall not be exceeded during installation.
E. Contractor shall verify the integrity of the entire network following cable installation. Use appropriate test measures for each particular cable.
F. When a cable enters or exits a building, a lightning arrestor must be installed between the lines and ground. The lighting arrestor shall be installed according to manufacturer's instructions.
G. All runs of communication wiring shall be unspliced length when that length is commercially available.

H. All communication wiring shall be labeled to indicate origination and destination data.
I. All communication wiring shall be labeled to indicate origination and destination data.
J. Grounding of coaxial cable shall be in accordance with NEC regulations article on "Communications Circuits, Cable, and Protector Grounding."
K. BACnet MS/TP communications wiring shall be installed in accordance with ASHRAE/ANSI Standard 135. This includes but is not limited to:
    1. The network shall use shielded, twisted-pair cable with characteristic impedance between 100 and 120 ohms. Distributed capacitance between conductors shall be less than 100 pF per meter (30 pF per foot.)
    2. The maximum length of an MS/TP segment is 1200 meters (4000 ft) with AWG 18 cable. The use of greater distances and/or different wire gauges shall comply with the electrical specifications of EIA-485.
    3. The maximum number of nodes per segment shall be 32, as specified in the EIA 485 standard. Additional nodes may be accommodated by the use of repeaters.
    4. An MS/TP EIA-485 network shall have no T connections.

3.9 Fiber Optic Cable

A. Maximum pulling tensions as specified by the cable manufacturer shall not be exceeded during installation. Post-installation residual cable tension shall be within cable manufacturer's specifications.
B. All cabling and associated components shall be installed in accordance with manufacturers' instructions. Minimum cable and unjacketed fiber bend radii, as specified by cable manufacturer, shall be maintained.

3.10 Installation of Sensors

A. Install sensors in accordance with the manufacturer's recommendations.
B. Mount sensors rigidly and adequately for environment within which the sensor operates.
C. Room temperature sensors shall be installed on concealed junction boxes properly supported by wall framing.
D. All wires attached to sensors shall be sealed in their raceways or in the wall to stop air transmitted from other areas from affecting sensor readings.
E. Sensors used in mixing plenums and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner vertically across the duct. Each bend shall be supported with a capillary clip.
F. Low-limit sensors used in mixing plenums shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Provide 3 m (1 ft) of sensing element for each 1 m^2(1 ft^2) of coil area.
G. Do not install temperature sensors within the vapor plume of a humidifier. If installing a sensor downstream of a humidifier, install it at least 3 m (10 ft) downstream.

H. All pipe-mounted temperature sensors shall be installed in wells. Install liquid temperature sensors with heat-conducting fluid in thermal wells.
I. Install outdoor air temperature sensors on north wall, complete with sun shield at designated location.
J. Differential Air Static Pressure.
    1. Supply Duct Static Pressure. Pipe the high-pressure tap to the duct using a pitot tube. Pipe the low-pressure port to a tee in the height-pressure tap tubing of the corresponding building static pressure sensor (if applicable) or to the location of the duct high-pressure tap and leave open to the plenum.
    2. Return Duct Static Pressure. Pipe high-pressure tap to duct using a pitot tube. Pipe the low-pressure port to a tee in the low-pressure tap tubing of the corresponding building static pressure sensor.
    3. Building Static Pressure. Pipe the low-pressure port of the pressure sensor to the static pressure port located on the outside of the building through a high-volume accumulator. Pipe the high-pressure port to a location behind a thermostat cover.
    4. The piping to the pressure ports on all pressure transducers shall contain a capped test port located adjacent to the transducer.
    5. All pressure transducers, other than those controlling VAV boxes, shall be located in field device panels, not on the equipment monitored or on ductwork. Mount transducers in a location accessible for service without use of ladders or special equipment.
    6. All air and water differential pressure sensors shall have gauge tees mounted adjacent to the taps. Water gauges shall also have shut-off valves installed before the tee.
K. Smoke detectors, freezestats, high-pressure cut-offs, and other safety switches shall be hard-wired to de-energize equipment as described in the sequence of operation. Switches shall require manual reset. Provide contacts that allow DDC software to monitor safety switch status.
L. Install humidity sensors for duct mounted humidifiers at least 3 m (10 ft) downstream of the humidifier. Do not install filters between the humidifier and the sensor.

3.11 Flow Switch Installation

A. Use correct paddle for pipe diameter.
B. Adjust flow switch according to manufacturer's instructions.

3.12 Actuators

A. General. Mount and link control damper actuators according to manufacturer's instructions.
    1. To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately 5° open position, manually close the damper, and then tighten the linkage.

2. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.
3. Provide all mounting hardware and linkages for actuator installation.

B. Electric/Electronic
1. Dampers: Actuators shall be direct mounted on damper shaft or jackshaft unless shown as a linkage installation. For low-leakage dampers with seals, the actuator shall be mounted with a minimum 5° travel available for tightening the damper seal. Actuators shall be mounted following manufacturer's recommendations.
2. Valves: Actuators shall be connected to valves with adapters approved by the actuator manufacturer. Actuators and adapters shall be mounted following the actuator manufacturer's recommendations.

C. Pneumatic Actuators.
1. Size pneumatic damper actuator to operate the related control damper(s) with sufficient reserve power to provide smooth modulating action or two-position action. Actuator also shall be sized for proper speed of response at the velocity and pressure conditions to which the control damper is subject.
2. Pneumatic damper actuators shall produce sufficient torque to close off against the maximum system pressures encountered. Size the pneumatic damper actuator to close off against the fan shutoff pressure, as a minimum.
3. Where two or more pneumatic damper actuators are installed for interrelated operation in unison, such as dampers used for mixing, provide the dampers with a positive pilot positioner. The positive pilot positioner shall be directly mounted to the pneumatic damper actuator and have pressure gauges for supply input and output pressures.
4. The total damper area operated by an actuator shall not exceed 80% of the manufacturer's maximum area rating. Provide at least one actuator for each damper section. Each damper actuator shall not power more than 2 m^2(20 ft^2) of damper.
5. Use line shafting or shaft couplings (jackshafting) in lieu of blade-to-blade linkages or shaft coupling when driving axially aligned damper sections.

3.13 Warning Labels

A. Permanent warning labels shall be affixed to all equipment that can be automatically started by the control system.
1. Labels shall use white lettering (12-point type or larger) on a red background.
2. Warning labels shall read as follows.

C A U T I O N

This equipment is operating under automatic control and may start or stop at any time without warning. Switch disconnect to"Off"position before servicing.

B. Permanent warning labels shall be affixed to all motor starters and control panels that are connected to multiple power sources utilizing separate disconnects.

1. Labels shall use white lettering (12-point type or larger) on a red background.
2. Warning labels shall read as follows.

CAUTION
This equipment is fed from more than one power source with separate disconnects. Disconnect all power sources before servicing.

3.14 Identification of Hardware and Wiring

A. All wiring and cabling, including that within factory-fabricated panels shall be labeled at each end within 5 cm (2 in.) of termination with control system address or termination number.
B. All pneumatic tubing shall be labeled at each end within 5 cm (2 in.) of termination with a descriptive identifier.
C. Permanently label or code each point of field terminal strips to show the instrument or item served.
D. Identify control panels with minimum 1 cm (½ in.) letters on laminated plastic nameplates.
E. Identify all other control components with permanent labels. All plug-in components shall be labeled such that label removal of the component does not remove the label.
F. Identify room sensors related to terminal boxes or valves with nameplates.
G. Manufacturers' nameplates and UL or CSA labels shall be visible and legible after equipment is installed.
H. Identifiers shall match record documents.

3.15 Controllers

A. Provide a separate controller for each AHU or other HVAC system. A DDC controller may control more than one system provided that all points associated with the system are assigned to the same DDC controller. Points used for control loop reset, such as outside air or space temperature, are exempt from this requirement.
B. Building Controllers and Custom Application Controllers shall be selected to provide the required I/O point capacity required to monitor all of the hardware points listed in Section 23 09 93 (Sequences of Operation).

3.16 Programming

A. Provide sufficient internal memory for the specified sequences of operation and trend logging.
B. Point Naming. Name points as shown on the equipment points list provided with each sequence of operation. See Section 23 09 93 (Sequences of Operation). If character limitations or space restrictions make it advisable to shorten the name, the abbreviations given in Appendix B to Section 23 09 93 may be used. Where multiple points with the same name reside in the same controller, each point name

may be customized with its associated Program Object number. For example, "Zone Temp 1" for Zone 1, "Zone Temp 2" for Zone 2.

C. Software Programming.
   1. Provide programming for the system and adhere to the sequences of operation provided. All other system programming necessary for the operation of the system, but not specified in this document, also shall be provided by the contractor. Embed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequences of operation. Use the appropriate technique based on the following programming types:
      a. Text-based:
         i. Must provide actions for all possible situations
         ii. Must be modular and structured
         iii. Must be commented
      b. Graphic-based:
         i. Must provide actions for all possible situations
         ii. Must be documented
      c. Parameter-based:
         i. Must provide actions for all possible situations
         ii. Must be documented.

D. Operator Interface.
   1. Standard Graphics. Provide graphics for all mechanical systems and floor plans of the building. This includes each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. Point information on the graphic displays shall dynamically update. Show on each graphic all input and output points for the system. Also show relevant calculated points such as setpoints. As a minimum, show on each equipment graphic the input and output points and relevant calculated points as indicated on the applicable Points List in Section 23 09 93.
   2. The contractor shall provide all the labor necessary to install, initialize, start up, and troubleshoot all operator interface software and its functions as described in this section. This includes any operating system software, the operator interface database, and any third-party software installation and integration required for successful operation of the operator interface.

3.17 Control System Checkout and Testing

A. Startup Testing. All testing listed in this article shall be performed by the contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the owner's representative is notified of the system demonstration.
   1. The contractor shall furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification.

2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
3. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures according to manufacturers' recommendations.
4. Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct.
5. Verify that all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The contractor shall check all control valves and automatic dampers to ensure proper action and closure. The contractor shall make any necessary adjustments to valve stem and damper blade travel.
6. Verify that the system operation adheres to the sequences of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops.
7. Alarms and Interlocks:
    a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
    b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
    c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action

3.18 Control System Demonstration and Acceptance

A. Demonstration.
1. Prior to acceptance, the control system shall undergo a series of performance tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed his/her own tests.
2. The tests described in this section are to be performed in addition to the tests that the contractor performs as a necessary part of the installation, start-up, and debugging process and as specified in the "Control System Checkout and Testing" article in Part 3 of this specification. The engineer will be present to observe and review these tests. The engineer shall be notified at least 10 days in advance of the start of the testing procedures.
3. The demonstration process shall follow that approved in Part 1, "Submittals." The approved checklists and forms shall be completed for all systems as part of the demonstration.
4. The contractor shall provide at least two persons equipped with two-way communication and shall demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover, and power failure modes. The purpose is to demonstrate the calibration, response, and action

of every point and system. Any test equipment required to prove the proper operation shall be provided by and operated by the contractor.

5. As each control input and output is checked, a log shall be completed showing the date, technician's initials, and any corrective action taken or needed.
6. Demonstrate compliance with Part 1, "System Performance."
7. Demonstrate compliance with sequences of operation through all modes of operation.
8. Demonstrate complete operation of operator interface.
9. Additionally, the following items shall be demonstrated:
    a. DDC loop response. The contractor shall supply trend data output in a graphical form showing the step response of each DDC loop. The test shall show the loop's response to a change in set point, which represents a change of actuator position of at least 25% of its full range. The sampling rate of the trend shall be from 10 seconds to 3 minutes, depending on the speed of the loop. The trend data shall show for each sample the set point, actuator position, and controlled variable values. Any loop that yields unreasonably under-damped or over-damped control shall require further tuning by the Contractor.
    b. Demand limiting. The contractor shall supply a trend data output showing the action of the demand limiting algorithm. The data shall document the action on a minute-by-minute basis over at least a 30-minute period. Included in the trend shall be building kW, demand limiting set point, and the status of sheddable equipment outputs.
    c. Optimum start/stop. The contractor shall supply a trend data output showing the capability of the algorithm. The change-of-value or change-of-state trends shall include the output status of all optimally started and stopped equipment, as well as temperature sensor inputs of affected areas.
    d. Interface to the building fire alarm system.
    e. Operational logs for each system that indicate all set points, operating points, valve positions, mode, and equipment status shall be submitted to the architect/engineer. These logs shall cover three 48-hour periods and have a sample frequency of not more than 10 minutes. The logs shall be provided in both printed and disk formats.
10. Any tests that fail to demonstrate the operation of the system shall be repeated at a later date. The contractor shall be responsible for any necessary repairs or revisions to the hardware or software to successfully complete all tests.

B. Acceptance.

1. All tests described in this specification shall have been performed to the satisfaction of both the engineer and owner prior to the acceptance of the control system as meeting the requirements of completion. Any tests that cannot be performed due to circumstances beyond the control of the contractor may be exempt from the completion requirements if stated as

such in writing by the engineer. Such tests shall then be performed as part of the warranty.

2. The system shall not be accepted until all forms and checklists completed as part of the demonstration are submitted and approved as required in Part 1, "Submittals."

3.19 Cleaning

A. The contractor shall clean up all debris resulting from his/her activities daily. The contractor shall remove all cartons, containers, crates, etc., under his/her control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.

B. At the completion of work in any area, the contractor shall clean all work, equipment, etc., keeping it free from dust, dirt, and debris, etc.

C. At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.20 Training

A. Provide training for a designated staff of Owner's representatives. Training shall be provided via self-paced training, web-based or computer-based training, classroom training, or a combination of training methods.

B. Training shall enable students to accomplish the following objectives.

1. Day-to-day Operators:
    a. Proficiently operate the system
    b. Understand control system architecture and configuration
    c. Understand DDC system components
    d. Understand system operation, including DDC system control and optimizing routines (algorithms)
    e. Operate the workstation and peripherals
    f. Log on and off the system
    g. Access graphics, point reports, and logs
    h. Adjust and change system set points, time schedules, and holiday schedules
    i. Recognize malfunctions of the system by observation of the printed copy and graphical visual signals
    j. Understand system drawings and Operation and Maintenance manual
    k. Understand the job layout and location of control components
    l. Access data from DDC controllers and ASCs
    m. Operate portable operator's terminals
2. Advanced Operators:
    a. Make and change graphics on the workstation

b. Create, delete, and modify alarms, including annunciation and routing of these
c. Create, delete, and modify point trend logs and graph or print these both on an ad-hoc basis and at user-definable time intervals
d. Create, delete, and modify reports
e. Add, remove, and modify system's physical points
f. Create, modify, and delete programming
g. Add panels when required
h. Add operator interface stations
i. Create, delete, and modify system displays, both graphical and others
j. Perform DDC system field checkout procedures
k. Perform DDC controller unit operation and maintenance procedures
l. Perform workstation and peripheral operation and maintenance procedures
m. Perform DDC system diagnostic procedures
n. Configure hardware including PC boards, switches, communication, and I/O points
o. Maintain, calibrate, troubleshoot, diagnose, and repair hardware
p. Adjust, calibrate, and replace system components

3. System Managers/Administrators:
   a. Maintain software and prepare backups
   b. Interface with job-specific, third-party operator software
   c. Add new users and understand password security procedures

C. Organize the training into sessions or modules for the three levels of operators listed above. (Day-to-Day Operators, Advanced Operators, System Managers and Administrators). Students will receive one or more of the training packages, depending on knowledge level required.
D. Provide course outline and materials according to the "Submittals" article in Part 1 of this specification. Provide one copy of training material per student.
E. The instructor(s) shall be factory-trained and experienced in presenting this material.
F. Classroom training shall be done using a network of working controllers representative of installed hardware.

3.21 Sequences of Operation

See Section 23, Appendix A (Sequences of Operation, With Points Lists).

3.22 Control Valve Installation

A. Valve submittals shall be coordinated for type, quantity, size, and piping configuration to ensure compatibility with pipe design.
B. Slip-stem control valves shall be installed so that the stem position is not more than 60 degrees from the vertical up position. Ball type control valves shall be installed with the stem in the horizontal position.
C. Valves shall be installed in accordance with the manufacturer's recommendations.

D. Control valves shall be installed so that they are accessible and serviceable and so that actuators may be serviced and removed without interference from structure or other pipes and/or equipment.
E. Isolation valves shall be installed so that the control valve body may be serviced without draining the supply/return side piping system. Unions shall be installed at all connections to screw-type control valves.
F. Provide tags for all control valves indicating service and number. Tags shall be brass, 1.5 inch in diameter, with ¼ inch high letters. Securely fasten with chain and hook. Match identification numbers as shown on approved controls shop drawings.

3.23 Control Damper Installation

A. Damper submittals shall be coordinated for type, quantity, and size to ensure compatibility with sheet metal design.
B. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure ¼ in. larger than damper dimensions and shall be square, straight, and level.
C. Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be within 0.3 cm (1/8 in.) of each other.
D. Follow the manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal.
E. Install extended shaft or jackshaft according to manufacturer's instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade.)
F. Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to ensure proper operation. On multiple section assemblies, all sections must open and close simultaneously.
G. Provide a visible and accessible indication of damper position on the drive shaft end.
H. Support ductwork in area of damper when required to prevent sagging due to damper weight.
I. After installation of low-leakage dampers with seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.

3.24 Smoke Damper Installation

A. The contractor shall coordinate all smoke and smoke/fire damper installation, wiring, and checkout to ensure that these dampers function properly and that they respond to the proper fire alarm system general, zone, and/or detector trips. The contractor shall immediately report any discrepancies to the engineer no less than two weeks prior to inspection by the code authority having jurisdiction.
B. Provide complete submittal data to controls system subcontractor for coordination of duct smoke detector interface to HVAC systems.

3.25 Duct Smoke Detection

A. Submit data for coordination of duct smoke detector interface to HVAC systems as required in Part 1, "Submittals."
B. This Contractor shall provide a dry-contact alarm output in the same room as the HVAC equipment to be controlled.

3.26 Controls Communication Protocol

A. General. The electronic controls packaged with this equipment shall communicate with the building direct digital control (DDC) system. The DDC system shall communicate with these controls to read the information and change the control setpoints as shown in the points list, sequences of operation, and control schematics. The information to be communicated between the DDC system and these controls shall be in the standard object format as defined in ANSI/ASHRAE Standard 135 (BACnet). Controllers shall communicate with other BACnet objects on the internetwork using the Read (Execute) Property service as defined in Clause 15.5 of Standard 135.
B. Distributed Processing. The controller shall be capable of stand-alone operation and shall continue to provide control functions if the network connection is lost.
C. I/O Capacity. The controller shall contain sufficient I/ O capacity to control the target system.
D. The Controller shall have a physical connection for a laptop computer or a portable operator's tool.
E. Environment. The hardware shall be suitable for the anticipated ambient conditions.
    1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures and shall be rated for operation at 40°C to 60°C (40°F to 140°F).
    2. Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).
F. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field removable, modular terminal strips or to a termination card connected by a ribbon cable.
G. Memory. The Controller shall maintain all BIOS and programming information in the event of a power loss for at least 30 days.
H. Power. Controller shall be able to operate at 90% to 110% of nominal voltage rating.
I. Transformer. Power supply for the Controller must be rated at minimum of 125% of ASC power consumption and shall be fused or current limiting type.

3.27 Start-Up and Checkout Procedures

A. Start up, check out, and test all hardware and software and verify communication between all components.
    1. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
    2. Verify that all analog and binary input/output points read properly.
    3. Verify alarms and interlocks.

4. Verify operation of the integrated system.

23 09 93 Sequence of Operations for HVAC Controls

PART 1: GENERAL

1.0 Section Includes
1.1 Fan Coil Units
1.2 Zone Reheat
1.3 Multizone - AHU
1.4 Single Air Cooled Chiller
1.5 Chiller Interface
1.6 Boiler Interface
1.7 Power Monitoring Interface
1.8 Variable Air Volume - Terminal Unit
1.9 Chilled Water Loop Pumps
1.10 Single Boiler System
1.11 Indoor Lighting
1.12 Outdoor Lighting
1.13 Hot Water Loop Pumps
1.14 Electric Meter
1.15 Outside Air Conditions
1.16 HVAC Split-Systems
1.17 Point Summary

1.1 Fan Coil Units (typical of 0)

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:

- Occupied Mode: The unit shall maintain
  - A 74°F (adj.) cooling setpoint
  - A 70°F (adj.) heating setpoint.

- Unoccupied Mode (night setback): The unit shall maintain
  - A 85°F (adj.) cooling setpoint.
  - A 55°F (adj.) heating setpoint.

Alarms shall be provided as follows:

- High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).

Demand Limiting - Zone Setpoint Optimization:
To lower power consumption, the zone setpoints shall automatically relax when the facility power consumption exceeds definable thresholds. The amount of relaxation shall be individually configurable for each zone. The zone setpoints shall automatically return to their previous settings when the facility power consumption drops below the thresholds.

Zone Setpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize

the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.

Smoke Detection:
The unit shall shut down and generate an alarm upon receiving a smoke detector status.

Fan:
The fan shall run anytime the unit is commanded to run, unless shutdown on safeties.

Cooling Stages:
The controller shall measure the zone temperature and stage the cooling to maintain its cooling setpoint. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.

The cooling shall be enabled whenever:

- Outside air temperature is greater than 60°F (adj.).
- AND the zone temperature is above cooling setpoint.
- AND the fan is on.

Electric Heating Stages:
The controller shall measure the zone temperature and stage the heating to maintain its heating setpoint. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.

The heating shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).

- AND the zone temperature is below heating setpoint.
- AND the fan is on.

Heating - High Discharge Air Temperature Limit:
The controller shall measure the discharge air temperature and, on rising temperature, limit the heating as follows:

- As the discharge air temperature rises from 90°F to 120°F (adj.),
- The controller shall limit the heating output from 100% to 0% (adj.).

Economizer:
The controller shall measure the zone temperature and modulate the mixed air dampers in sequence to maintain the zone cooling setpoint. The outside air dampers shall maintain a minimum adjustable position of 20% (adj.) open whenever occupied.

The economizer shall be enabled whenever:

- Outside air temperature is at least 3°F (adj.) less than the Zone Temperature.
- AND the outside air temperature is less than 75°F (adj.)

The economizer shall close whenever the freezestat (if present) is on.

The outside air dampers shall close and the return air damper shall open when the unit is off. If Optimal Start Up is available the mixed air damper shall operate as described in the occupied mode except that the outside air damper shall modulate to fully closed.

Minimum Outside Air Ventilation - Carbon Dioxide (CO2) Control:
When in the occupied mode, the controller shall measure the zone CO2 levels and open the outside air dampers on rising CO2 concentrations, overriding normal damper operation as CO2 concentrations rise from 750ppm to 800ppm (adj.) and above.

Filter Hours:
The controller shall monitor the fan runtime.

Alarms shall be provided as follows:

- Filter Change Required: Filter has been in use for more than 2200 hrs (adj.).

Discharge Air Temperature:
The controller shall monitor the discharge air temperature.

Alarms shall be provided as follows:

- High Discharge Air Temp: If the discharge air temperature is greater than 120°F (adj.).
- Low Discharge Air Temp: If the discharge air temperature is less than 40°F (adj.).

Fan Status:
The controller shall monitor the fan status.

Alarms shall be provided as follows:

- Fan Failure: Commanded on, but the status is off.
- Fan in Hand: Commanded off, but the status is on.
- Fan Runtime Exceeded: Fan status runtime exceeds a user definable limit (adj.).

Zone Carbon Dioxide (CO2) Concentration Monitoring:
The controller shall measure the zone CO2 levels.

Alarms shall be provided as follows:

- High Zone Carbon Dioxide Concentration: If the zone CO2 concentration is greater than 1000ppm (adj.) when in the occupied mode.

Zone Humidity:
The controller shall monitor the zone humidity.

Alarms shall be provided as follows:

- High Zone Humidity: If the zone humidity is greater than 70% (adj.).
- Low Zone Humidity: If the zone humidity is less than 35% (adj.).

Environmental Index:
When the zone is occupied, the controller will monitor the deviation of the zone temperature from the heating or cooling setpoint. The controller will also monitor the humidity and carbon dioxide levels and compare them to comfort conditions. This data will be used to calculate a 0 - 100% Environmental Index which gives an indication of how well the zone is maintaining comfort. The controller will also calculate the percentage of time since occupancy began that the Environmental Index is 70% or higher. Optionally, a weighting factor can be configured to adjust the contribution of the zone to the rollup average index based upon the floor area of the zone, importance of the zone, or other static criteria.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Zone Temp	x								x		x
Zone Setpoint Adjust	x										x
Discharge Air Temp	x								x		x
Zone Carbon Dioxide PPM	x								x		x
Zone Humidity	x								x		x
Mixed Air Dampers		x							x		x
Zone Override			x						x		x
Smoke Detector			x						x	x	x
Fan Status			x								x
Fan Start/Stop				x					x		x
Cooling Stage 1				x					x		x
Cooling Stage 2				x					x		x
Heating Stage 1				x					x		x
Heating Stage 2				x					x		x
Zone Carbon Dioxide PPM Setpoint					x				x		x
Environmental Index					x				x		
Percent of Time Satisfied					x				x		
Schedule								x			
Heating Setpoint									x		x

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Cooling Setpoint									x		x
High Zone Temp										x	
Low Zone Temp										x	
Compressor Runtime Exceeded										x	
Filter Change Required										x	
High Discharge Air Temp										x	
Low Discharge Air Temp										x	
Fan Failure										x	
Fan in Hand										x	
Fan Runtime Exceeded										x	
High Zone Carbon Dioxide Concentration										x	
High Zone Humidity										x	
Low Zone Humidity										x	
Totals	**5**	**1**	**3**	**5**	**3**	**0**	**0**	**1**	**17**	**13**	**17**

Total Hardware (14) **Total Software (34)**

1.2 Zone Reheat (typical of 0)

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:

- Occupied Mode: The unit shall maintain
  - A 74°F (adj.) cooling setpoint
  - A 70°F (adj.) heating setpoint.
- Unoccupied Mode (night setback): The unit shall maintain
  - A 85°F (adj.) cooling setpoint.
  - A 55°F (adj.) heating setpoint.

Alarms shall be provided as follows:

- High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).

Demand Limiting - Zone Setpoint Optimization:
To lower power consumption, the zone setpoints shall automatically relax when the facility power consumption exceeds definable thresholds. The amount of relaxation shall be individually configurable for each zone. The zone setpoints shall automatically return to their previous settings when the facility power consumption drops below the thresholds.

Zone Setpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize

the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.

Electric Reheating Stages:
The controller shall measure the zone temperature and stage the reheating to maintain its setpoint. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.

The reheating shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).
- AND the zone temperature is below setpoint.
- AND sufficient airflow is provided.

Discharge Air Temperature:
The controller shall monitor the discharge air temperature.

Alarms shall be provided as follows:

- High Discharge Air Temp: If the discharge air temperature is greater than 120°F (adj.).
- Low Discharge Air Temp: If the discharge air temperature is less than 40°F (adj.).

Environmental Index:
When the zone is occupied, the controller will monitor the deviation of the zone temperature from the heating or cooling setpoint and calculate a 0 - 100% Environmental Index which gives an indication of how well the zone is maintaining comfort. The controller will also calculate the percentage of time since occupancy began that the Environmental Index is 70% or higher. Optionally, a weighting factor can be configured to adjust the contribution of the zone to the

rollup average index based upon the floor area of the zone, importance of the zone, or other static criteria.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Zone Temp	x								x		x
Zone Setpoint Adjust	x										x
Discharge Air Temp	x								x		x
Zone Override			x						x		x
Reheating Stage 1				x					x		x
Reheating Stage 2				x					x		x
Environmental Index					x				x		
Percent of Time Satisfied					x				x		
Schedule								x			
Heating Setpoint									x		x
Cooling Setpoint									x		x
High Zone Temp										x	
Low Zone Temp										x	
High Discharge Air Temp										x	
Low Discharge Air Temp										x	
Totals	**3**	**0**	**1**	**2**	**2**	**0**	**0**	**1**	**9**	**4**	**8**

Total Hardware (6) **Total Software (16)**

1.3 Multizone - AHU (typical of 0)

Run Conditions - Requested:
The unit shall run whenever:

- Any zone is occupied.
- OR a definable number of unoccupied zones need heating or cooling.

Freeze Protection:
The unit shall shut down and generate an alarm upon receiving a freezestat status.

Supply Air Smoke Detection:
The unit shall shut down and generate an alarm upon receiving a supply air smoke detector status.

Supply Fan:
The supply fan shall run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a user definable (adj.) minimum runtime.

Alarms shall be provided as follows:

- Supply Fan Failure: Commanded on, but the status is off.
- Supply Fan in Hand: Commanded off, but the status is on.
- Supply Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

Cold Deck - Cooling Supply Air Temperature Setpoint - Optimized:
The cooling supply air temperature setpoint shall be reset using a trim and respond algorithm based on zone cooling requirements. If there is a demand for cooling then the setpoint shall be reset to a lower value (adj.). If the demand for cooling decreases then the setpoint shall reset to a higher value (adj.). Once the zones are satisfied then the setpoint shall gradually moderate over time to reduce cooling energy use.

The supply air temperature setpoint shall be reset based on zone cooling requirements as follows:

- The initial supply air temperature setpoint shall be 55°F (adj.).
- As cooling demand increases, the setpoint shall incrementally reset down to a minimum of 53°F (adj.).
- As cooling demand decreases, the setpoint shall incrementally reset up to a maximum of 72°F (adj.).

Cold Deck - Cooling Coil Valve:
The controller shall measure the cooling supply air temperature and and modulate the cooling coil valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:

- Outside air temperature is greater than 60°F (adj.).
- AND the economizer (if present) is disabled or fully open.
- AND the supply fan status is on.

The cooling coil valve shall open to 50% (adj.) whenever the freezestat (if present) is on.

Alarms shall be provided as follows:

- High Cooling Supply Air Temp: If the cooling supply air temperature is 5°F (adj.) greater than setpoint.

Hot Deck - Heating Supply Air Temperature Setpoint - Optimized:
The heating supply air temperature setpoint shall be reset using a trim and respond algorithm based on zone heating requirements. If there is a demand for heating then the setpoint shall be reset to a higher value (adj.). If the demand for heating decreases then the setpoint shall reset to a lower value (adj.). Once the zones are satisfied then the setpoint shall gradually moderate over time to reduce heating energy use.

The supply air temperature setpoint shall be reset based on zone heating requirements as follows:

- The initial supply air temperature setpoint shall be 82°F (adj.).

- As heating demand increases, the setpoint shall incrementally reset up to a maximum of 90°F (adj.).
- As heating demand decreases, the setpoint shall incrementally reset down to a minimum of 72°F (adj.).

Hot Deck - Heating Coil Valve:
The controller shall measure the heating supply air temperature and modulate the heating coil valve to maintain its setpoint.

The heating shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).
- AND the supply fan status is on.

The heating coil valve shall open whenever:

- Heating supply air temperature drops from 40°F to 35°F (adj.).
- OR the freezestat (if present) is on.

Alarms shall be provided as follows:

- High Heating Supply Air Temp: If the heating supply air temperature is greater than 120°F (adj.).
- Low Heating Supply Air Temp: If the heating supply air temperature is 5°F (adj.) less than setpoint.

Economizer:
The controller shall measure the mixed air temperature and modulate the economizer dampers in sequence to maintain a setpoint 2°F less than the cooling supply air temperature setpoint. The outside air dampers shall maintain a minimum adjustable position of 20% (adj.) open whenever occupied.

The economizer shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).

- AND the outside air temperature is less than the return air temperature.
- AND the supply fan status is on.

The economizer shall close whenever:

- Mixed air temperature drops from 40°F to 35°F (adj.).
- OR on loss of supply fan status.
- OR the freezestat (if present) is on.

The outside and exhaust air dampers shall close and the return air damper shall open when the unit is off. If Optimal Start Up is available the mixed air damper shall operate as described in the occupied mode except that the outside air damper shall modulate to fully closed.

Minimum Outside Air Ventilation - Fixed Percentage:
The outside air dampers shall maintain a minimum position (adj.) during building occupied hours and be closed during unoccupied hours.

Mixed Air Temperature:
The controller shall monitor the mixed air temperature and use as required for economizer control (if present) and preheating control (if present).

Alarms shall be provided as follows:

- High Mixed Air Temp: If the mixed air temperature is greater than 90°F (adj.).
- Low Mixed Air Temp: If the mixed air temperature is less than 45°F (adj.).

Return Air Temperature:
The controller shall monitor the return air temperature and use as required for economizer control (if present).

Alarms shall be provided as follows:

- High Return Air Temp: If the return air temperature is greater than 90°F (adj.).

- Low Return Air Temp: If the return air temperature is less than 45°F (adj.).

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Cooling Supply Air Temp	x								x		x
Heating Supply Air Temp	x								x		x
Mixed Air Temp	x								x		x
Return Air Temp	x								x		x
Cooling Valve		x							x		x
Heating Valve		x							x		x
Mixed Air Dampers		x							x		x
Freezestat			x						x	x	x
Supply Air Smoke Detector			x						x	x	x
Supply Fan Status			x						x		x
Supply Fan Start/Stop				x					x		x
Cooling Supply Air Temp Setpoint					x				x		x
Heating Supply Air Temp Setpoint					x				x		x
Economizer Mixed Air Temp Set-point					x				x		x
Supply Fan Failure										x	
Supply Fan in Hand										x	
Supply Fan Runtime Exceeded										x	
High Cooling Supply Air Temp										x	
High Heating Supply Air Temp										x	
Low Heating Supply Air Temp										x	
High Mixed Air Temp										x	
Low Mixed Air Temp										x	
Low Return Air Temp										x	
High Return Air Temp										x	
Totals	**4**	**3**	**3**	**1**	**3**	**0**	**0**	**0**	**14**	**12**	**14**

Total Hardware (11) **Total Software (29)**

1.4 Single Air Cooled Chiller (typical of 0)

Chiller - Run Conditions:
The chiller shall be enabled to run whenever the outside air temperature is greater than 54°F (adj.).

To prevent short cycling, the chiller shall run for and be off for minimum adjustable times (both user definable), unless shutdown on safeties or outside air conditions.

The chiller shall run subject to its own internal safeties and controls.

Chilled Water Pump Lead/Standby Operation:
The two chilled water pumps shall run anytime the chiller is called to run. The chilled water pump shall also run for freeze protection whenever the outside air temperature is less than a user definable setpoint (adj.).

The lead pump shall start prior to the chiller being enabled and shall stop only after the chiller is disabled. The pump(s) shall therefore have:

- A user adjustable delay on start.
- AND a user adjustable delay on stop.

The delay times shall be set appropriately to allow for orderly chilled water system start-up, shutdown and sequencing.

The two pumps shall operate in a lead/standby fashion.

- The lead pump shall run first.
- On failure of the lead pump, the standby pump shall run and the lead pump shall turn off.

The designated lead pump shall rotate upon one of the following conditions (user selectable):

- manually through a software switch

- if pump runtime (adj.) is exceeded
- daily
- weekly
- monthly

Alarms shall be provided as follows:

- Chilled Water Pump 1
  - Failure: Commanded on, but the status is off.
  - Running in Hand: Commanded off, but the status is on.
  - Runtime Exceeded: Status runtime exceeds a user definable limit.

- Chilled Water Pump 2
  - Failure: Commanded on, but the status is off.
  - Running in Hand: Commanded off, but the status is on.
  - Runtime Exceeded: Status runtime exceeds a user definable limit.

Chiller:
The chiller shall be enabled a user adjustable time after pump statuses are proven on. The chiller shall therefore have a user adjustable delay on start.

The delay time shall be set appropriately to allow for orderly chilled water system start-up, shutdown and sequencing.

The chiller shall run subject to its own internal safeties and controls.

Alarms shall be provided as follows:

- Chiller Failure: Commanded on, but the status is off.
- Chiller Running in Hand: Commanded off, but the status is on.

- Chiller Runtime Exceeded: Status runtime exceeds a user definable limit.

Chilled Water Supply Temperature Setpoint:
The chilled water supply temperature setpoint shall reset based on outside air temperature.

As outside air temperature drops from 75°F (adj.) to 50°F (adj.) the chilled water supply temperature setpoint shall reset upwards by adding from 0°F (adj.) to 10°F (adj.) to the current setpoint.

Chilled Water Temperature Monitoring:
The following temperatures shall be monitored:

- Chilled water supply.
- Chilled water return.

Alarms shall be provided as follows:

- High Chilled Water Supply Temp: If the chilled water supply temperature is greater than 55°F (adj.).
- Low Chilled Water Supply Temp: If the chilled water supply temperature is less than 38°F (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Chilled Water Return Temp	x								x		x
Chilled Water Supply Temp	x								x		x
Chilled Water Supply Temp Setpoint Reset		x							x		x
Chilled Water Pump 1 Status			x						x		x
Chilled Water Pump 2 Status			x						x		x
Chiller Status			x						x		x
Chilled Water Pump 1 Start/Stop				x							x
Chilled Water Pump 2 Start/Stop				x							x
Chiller Enable				x							x
Outside Air Temp					x						x
Chilled Water Pump 1 Failure										x	

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Chilled Water Pump 1 Running in Hand										x	
Chilled Water Pump 1 Runtime Exceeded										x	
Chilled Water Pump 2 Failure										x	
Chilled Water Pump 2 Running in Hand										x	
Chilled Water Pump 2 Runtime Exceeded										x	
Chiller Failure										x	
Chiller Running in Hand										x	
Chiller Runtime Exceeded										x	
High Chilled Water Supply Temp										x	
Low Chilled Water Supply Temp										x	
Totals	**2**	**1**	**3**	**3**	**1**	**0**	**0**	**0**	**6**	**11**	**10**

Total Hardware (9) **Total Software (18)**

1.5 Chiller Interface (typical of 1)

Chiller Interface Monitor:
Current chiller status and operating conditions will be monitored through its communications interface port. The interface will monitor and trend the points as shown on the Points List.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Chiller kW					x				x		x
Chilled Water Supply Temp Setpoint					x				x		x
Operating Hours					x						x
Chilled Water Supply Temp					x				x		x
Chilled Water Return Temp					x				x		x
Condenser Water Supply Temp					x				x		x
Condenser Water Return Temp					x				x		x
Evaporator Refrigerant Pressure					x				x		x
Condenser Refrigerant Pressure					x				x		x
Oil Differential Pressure					x				x		x
Oil Temp					x				x		x
Chiller Status						x			x		x
Chilled Water Flow Status						x			x		x
Condenser Water Flow Status						x			x		x
Totals	**0**	**0**	**0**	**0**	**11**	**3**	**0**	**0**	**13**	**0**	**14**

Total Hardware (0) **Total Software (27)**

1.6 Boiler Interface (typical of 1)

Boiler Interface Monitor:
Current boiler status and operating conditions will be monitored through its communications interface port. The interface will monitor and trend the points as shown on the Points List.

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Burner Cycles					x						x
Operating Hours					x						x
Operating Pressure					x				x		x
Operating Temp					x				x		x
Hot Water Supply Temp Setpoint					x				x		x
Hot Water Supply Temp					x				x		x
Hot Water Return Temp					x				x		x
Boiler Status						x			x		x
Hot Water Flow Status						x			x		x
Totals	**0**	**0**	**0**	**0**	**7**	**2**	**0**	**0**	**7**	**0**	**9**

Total Hardware (0) **Total Software (16)**

1.7 Power Monitoring Interface (typical of 0)

Electrical Power Interface Monitor:
Current electrical power status and operating conditions shall be monitored through the device's communications interface port. The interface shall monitor and trend the points as shown on the Points List.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Current Phase A					x				x		x
Current Phase B					x				x		x
Current Phase C					x				x		x
Current Neutral					x				x		x
Voltage A-B					x				x		x
Voltage B-C					x				x		x
Voltage C-A					x				x		x
Voltage A-N					x				x		x
Voltage B-N					x				x		x
Voltage C-N					x				x		x
Real Power - kW					x				x		x
Apparent Power - kVA					x				x		x
Power Factor					x				x		x
Frequency					x				x		x
Real Energy - kWh					x				x		x
Totals	**0**	**0**	**0**	**0**	**15**	**0**	**0**	**0**	**15**	**0**	**15**

Total Hardware (0) **Total Software (30)**

1.8 Variable Air Volume - Terminal Unit (typical of 0)

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:

- Occupied Mode: The unit shall maintain
  - A 74°F (adj.) cooling setpoint
  - A 70°F (adj.) heating setpoint.

- Unoccupied Mode (night setback): The unit shall maintain
  - A 85°F (adj.) cooling setpoint.
  - A 55°F (adj.) heating setpoint.

Alarms shall be provided as follows:

- High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).

Demand Limiting - Zone Setpoint Optimization:
To lower power consumption, the zone setpoints shall automatically relax when the facility power consumption exceeds definable thresholds. The amount of relaxation shall be individually configurable for each zone. The zone setpoints shall automatically return to their previous settings when the facility power consumption drops below the thresholds.

Zone Setpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize

the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.

Reversing Variable Volume Terminal Unit - Flow Control:
The unit shall maintain zone setpoints by controlling the airflow through one of the following:

Occupied:

- When zone temperature is greater than its cooling setpoint, the zone damper shall modulate between the minimum occupied airflow (adj.) and the maximum cooling airflow (adj.) until the zone is satisfied.
- When the zone temperature is between the cooling setpoint and the heating setpoint, the zone damper shall maintain the minimum required zone ventilation (adj.).
- When zone temperature is less than its heating setpoint, the controller shall enable heating to maintain the zone temperature at its heating setpoint. Additionally, if warm air is available from the AHU, the zone damper shall modulate between the minimum occupied airflow (adj.) and the maximum heating airflow (adj.) until the zone is satisfied.

Unoccupied:

- When the zone is unoccupied the zone damper shall control to its minimum unoccupied airflow (adj.).
- When the zone temperature is greater than its cooling setpoint, the zone damper shall modulate between the minimum unoccupied airflow (adj.) and the maximum cooling airflow (adj.) until the zone is satisfied.
- When zone temperature is less than its unoccupied heating setpoint, the controller shall enable heating to maintain the zone temperature at the setpoint. Additionally, if warm air is available from the AHU, the zone damper shall modulate between the

minimum unoccupied airflow (adj.) and the auxiliary heating airflow (adj.) until the zone is satisfied.

Discharge Air Temperature:
The controller shall monitor the discharge air temperature.

Alarms shall be provided as follows:

- High Discharge Air Temp: If the discharge air temperature is greater than 120°F (adj.).
- Low Discharge Air Temp: If the discharge air temperature is less than 40°F (adj.).

Zone Humidity:
The controller shall monitor the zone humidity.

Alarms shall be provided as follows:

- High Zone Humidity: If the zone humidity is greater than 70% (adj.).
- Low Zone Humidity: If the zone humidity is less than 35% (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Zone Temp	x								x		x
Zone Setpoint Adjust	x										x
Airflow	x								x		x
Discharge Air Temp	x								x		x
Zone Humidity	x								x		x
Zone Damper		x									x
Zone Override			x						x		x
Airflow Setpoint					x				x		x
Heating Mode						x			x		
Schedule								x			
Heating Setpoint									x		x
Cooling Setpoint									x		x
High Zone Temp										x	

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Low Zone Temp										x	
High Discharge Air Temp										x	
Low Discharge Air Temp										x	
High Zone Humidity										x	
Low Zone Humidity										x	
Totals	**5**	**1**	**1**	**0**	**1**	**1**	**0**	**1**	**9**	**6**	**10**

Total Hardware (7) **Total Software (18)**

1.9 Chilled Water Loop Pumps (typical of 0)

Chilled Water Pump System - Run Conditions:
The chilled water pumps shall be enabled whenever:

- A definable number of chilled water coils need cooling.
- AND the outside air temperature is greater than 54°F (adj.).

To prevent short cycling, the chilled water pump system shall run for and be off for minimum adjustable times (both user definable).

The pumps shall run for freeze protection anytime the outside air temperature is less than 38°F (adj.).

Chilled Water Pump Lead/Standby Operation:
The two chilled water pumps shall operate in a lead/standby fashion.

- The lead pump shall run first.
- On failure of the lead pump, the standby pump shall run and the lead pump shall turn off.

The designated lead pump shall rotate upon one of the following conditions (user selectable):

- manually through a software switch
- if pump runtime (adj.) is exceeded
- daily
- weekly
- monthly

Alarms shall be provided as follows:

- Chilled Water Pump 1
    - Failure: Commanded on, but the status is off.

- Running in Hand: Commanded off, but the status is on.
- Runtime Exceeded: Status runtime exceeds a user definable limit.

- Chilled Water Pump 2
  - Failure: Commanded on, but the status is off.
  - Running in Hand: Commanded off, but the status is on.
  - Runtime Exceeded: Status runtime exceeds a user definable limit.

Chilled Water Temperature Monitoring:
The following temperatures shall be monitored:

- Chilled water supply.
- Chilled water return.

Alarms shall be provided as follows:

- High Chilled Water Supply Temp: If the chilled water supply temperature is greater than 55°F (adj.).
- Low Chilled Water Supply Temp: If the chilled water supply temperature is less than 38°F (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Chilled Water Supply Temp	x								x		x
Chilled Water Return Temp	x								x		x
Chilled Water Pump 1 Status			x						x		x
Chilled Water Pump 2 Status			x						x		x
Chilled Water Pump 1 Start/Stop				x					x		x
Chilled Water Pump 2 Start/Stop				x					x		x
Outside Air Temp					x						x
Chilled Water Pump 1 Failure										x	
Chilled Water Pump 2 Failure										x	
Chilled Water Pump 1 Running in Hand										x	

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Chilled Water Pump 2 Running in Hand										x	
Chilled Water Pump 1 Runtime Exceeded										x	
Chilled Water Pump 2 Runtime Exceeded										x	
High Chilled Water Supply Temp										x	
Low Chilled Water Supply Temp										x	
Totals	**2**	**0**	**2**	**2**	**1**	**0**	**0**	**0**	**6**	**8**	**7**

Total Hardware (6) **Total Software (15)**

1.10 Single Boiler System (typical of 0)

Boiler System - Run Conditions:
The boiler system shall be enabled to run whenever outside air temperature is less than 65°F (adj.).

To prevent short cycling, the boiler system shall run for and be off for minimum adjustable times (both user definable), unless shutdown on safeties or outside air conditions.

Each boiler shall run subject to its own internal safeties and controls.

The boiler system shall also run for freeze protection whenever outside air temperature is less than 38°F (adj.)

Boiler Safeties:
The following safeties shall be monitored:

- Boiler alarm.
- Low Water Level.

Alarms shall be provided as follows:

- Boiler alarm.
- Low Water Level alarm.

Hot Water Pump Lead/Lag Operation:
The two hot water pumps shall operate in a lead/lag fashion.

- The lead pump shall run first.
- On failure of the lead pump, the lag pump shall run and the lead pump shall turn off.
- On decreasing hot water differential pressure, the lag pump shall stage on and run in unison with the lead pump to maintain hot water differential pressure setpoint.

The designated lead pump shall rotate upon one of the following conditions (user selectable):

- manually through a software switch
- if pump runtime (adj.) is exceeded
- daily
- weekly
- monthly

Alarms shall be provided as follows:

- Hot Water Pump 1
  - Failure: Commanded on, but the status is off.
  - Running in Hand: Commanded off, but the status is on.
  - Runtime Exceeded: Status runtime exceeds a user definable limit.
  - VFD Fault.

- Hot Water Pump 2
  - Failure: Commanded on, but the status is off.
  - Running in Hand: Commanded off, but the status is on.
  - Runtime Exceeded: Status runtime exceeds a user definable limit.
  - VFD Fault.

Hot Water Differential Pressure Control:
The controller shall measure hot water differential pressure and modulate the hot water pump VFDs in sequence to maintain its hot water differential pressure setpoint.

The following setpoints are recommended values. All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions.

The controller shall modulate hot water pump speeds to maintain a hot water differential pressure of 12lbf/in2 (adj.). The VFDs minimum speed shall not drop below 20% (adj.).

On dropping hot water differential pressure, the VFDs shall stage on and run to maintain setpoint as follows:

- The controller shall modulate the lead VFD to maintain setpoint.
- If the lead VFD speed is greater than a setpoint of 90% (adj.), the lag VFD shall stage on.
- The lag VFD shall ramp up to match the lead VFD speed and then run in unison with the lead VFD to maintain setpoint.

On rising hot water differential pressure, the VFDs shall stage off as follows:

- If the VFDs speeds drops back to 60% (adj.) below setpoint, the lag VFD shall stage off.
- The lead VFD shall continue to run to maintain setpoint.

Alarms shall be provided as follows:

- High Hot Water Differential Pressure: If 25% (adj.) greater than setpoint.
- Low Hot Water Differential Pressure: If 25% (adj.) less than setpoint.

Circulation Pump:
The circulation pump shall run anytime the boiler is called to run and shall have a user definable (adj.) delay on stop.

Alarms shall be provided as follows:

- Circulation Pump Failure: Commanded on, but the status is off.
- Circulation Pump Running in Hand: Commanded off, but the status is on.
- Circulation Pump Runtime Exceeded: Status runtime exceeds a user definable limit.

Boiler Enable:
The boiler shall be enabled when the boiler system is commanded on. The boiler shall be enabled after pump status is proven on and shall run subject to its own internal safeties and controls.

Alarms shall be provided as follows:

- Boiler Failure: Commanded on, but the status is off.
- Boiler Running in Hand: Commanded off, but the status is on.
- Boiler Runtime Exceeded: Status runtime exceeds a user definable limit.

Hot Water Supply Temperature Setpoint Reset:
The hot water supply temperature setpoint shall reset based on outside air temperature.

As outside air temperature rises from 0°F (adj.) to 70°F (adj.) the hot water supply temperature setpoint shall reset downwards by subtracting from 0°F (adj.) up to 20°F (adj.) from the current boiler setpoint.

Primary Hot Water Temperature Monitoring:
The following temperatures shall be monitored:

- Primary hot water supply.
- Primary hot water return.

Alarms shall be provided as follows:

- High Primary Hot Water Supply Temp: If greater than 200°F (adj.).
- Low Primary Hot Water Supply Temp: If less than 100°F (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Hot Water Differential Pressure	x								x		x
Primary Hot Water Return Temp	x								x		x
Primary Hot Water Supply Temp	x								x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Hot Water Pump 1 VFD Speed		x							x		x
Hot Water Pump 2 VFD Speed		x							x		x
Boiler Hot Water Supply Temp Set-point Reset		x							x		x
Boiler Alarm Status			x						x	x	x
Low Water Level			x						x	x	x
Hot Water Pump 1 VFD Fault			x							x	x
Hot Water Pump 2 VFD Fault			x							x	x
Hot Water Pump 1 Status			x						x		x
Hot Water Pump 2 Status			x						x		x
Circulation Pump Status			x						x		x
Boiler Status			x						x		x
Hot Water Pump 1 Start/Stop				x							x
Hot Water Pump 2 Start/Stop				x							x
Circulation Pump Start/Stop				x					x		x
Boiler Enable				x							x
Outside Air Temp					x						x
Hot Water Differential Pressure Set-point					x						x
High Hot Water Differential Pressure										x	
Low Hot Water Differential Pressure										x	
Hot Water Pump 1 Failure										x	
Hot Water Pump 1 Running in Hand										x	
Hot Water Pump 1 Runtime Ex-ceeded										x	
Hot Water Pump 2 Failure										x	
Hot Water Pump 2 Running in Hand										x	
Hot Water Pump 2 Runtime Ex-ceeded										x	
Circulation Pump Failure										x	
Circulation Pump Running in Hand										x	
Circulation Pump Runtime Exceed-ed										x	
Boiler Failure										x	
Boiler Running in Hand										x	
Boiler Runtime Exceeded										x	
High Primary Hot Water Supply Temp										x	

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Low Primary Hot Water Supply Temp										x	
Totals	**3**	**3**	**8**	**4**	**2**	**0**	**0**	**0**	**13**	**20**	**20**

Total Hardware (18) **Total Software (35)**

1.11 Indoor Lighting (typical of 0)

Run Conditions - Scheduled:
The lighting shall be turned on or off based on a user definable schedule.

Occupant Override:
A timed local override control will allow an occupant to override the schedule and turn the lighting on for an adjustable period of time. At the expiration of this time, control of the lighting will automatically return to the schedule

Warning Flash:
The output will cycle off (flash) 5 times (adj) to warn occupants when the lights are about to turn off. This flashing will occur 5 minutes (adj) before the the lights turn off.

Alarm shall be provided as follows:

- Output Runtime Exceeded: Lighting runtime exceeds a user definable limit (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
TLO Input			x						x		x
Lighting Output				x					x		x
Schedule								x			
Runtime Alarm										x	
Totals	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**2**	**1**	**2**

Total Hardware (2) **Total Software (4)**

1.12 Outdoor Lighting (typical of 0)

Run Conditions:
The lighting output shall turn on and off based upon the local sunrise and sunset times. The transitions shall be configurable as follows:

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Lighting Output				x					x		x
Totals	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**1**

Total Hardware (1) **Total Software (1)**

1.13 Hot Water Loop Pumps (typical of 0)

Hot Water Pump Run Conditions:
The hot water pumps shall be enabled whenever outside air temperature is less than 54°F (adj.).

The pumps shall run for freeze protection anytime outside air temperature is less than 38°F (adj.).

To prevent short cycling, the pumps shall run for and be off for minimum adjustable times (both user definable).

Hot Water Pump Lead/Lag Operation:
The two variable speed hot water pumps shall operate in a lead/lag fashion.

- The lead pump shall run first.
- On failure of the lead pump, the lag pump shall run and the lead pump shall turn off.
- On decreasing hot water differential pressure, the lag pump shall stage on and run in unison with the lead pump to maintain hot water differential pressure setpoint.

The designated lead pump shall rotate upon one of the following conditions (user selectable):

- manually through a software switch
- if pump runtime (adj.) is exceeded
- daily
- weekly
- monthly

Alarms shall be provided as follows:

- Hot Water Pump 1
    - Failure: Commanded on, but the status is off.
    - Running in Hand: Commanded off, but the status is on.

- Runtime Exceeded: Status runtime exceeds a user definable limit.
- VFD Fault.

- Hot Water Pump 2
  - Failure: Commanded on, but the status is off.
  - Running in Hand: Commanded off, but the status is on.
  - Runtime Exceeded: Status runtime exceeds a user definable limit.
  - VFD Fault.

Hot Water Differential Pressure Control:
The controller shall measure hot water differential pressure and modulate the hot water pump VFDs in sequence to maintain its hot water differential pressure setpoint.

The following setpoints are recommended values. All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions.

The controller shall modulate hot water pump speeds to maintain a hot water differential pressure of 12lbf/in2 (adj.). The VFDs minimum speed shall not drop below 20% (adj.).

On dropping hot water differential pressure, the VFDs shall stage on and run to maintain setpoint as follows:

- The controller shall modulate the lead VFD to maintain setpoint.
- If the lead VFD speed is greater than a setpoint of 90% (adj.), the lag VFD shall stage on.
- The lag VFD shall ramp up to match the lead VFD speed and then run in unison with the lead VFD to maintain setpoint.

On rising hot water differential pressure, the VFDs shall stage off as follows:

- If the VFDs speeds drops back to 60% (adj.) below setpoint, the lag VFD shall stage off.
- The lead VFD shall continue to run to maintain setpoint.

Alarms shall be provided as follows:

- High Hot Water Differential Pressure: If 25% (adj.) greater than setpoint.
- Low Hot Water Differential Pressure: If 25% (adj.) less than setpoint.

Hot Water Temperature Monitoring:
The following temperatures shall be monitored:

- Hot water supply.
- Hot water return.

Alarms shall be provided as follows:

- High Hot Water Supply Temp: If the hot water supply temperature is greater than 200°F (adj.).
- Low Hot Water Supply Temp: If the hot water supply temperature is less than 100°F (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Hot Water Differential Pressure	x								x		x
Hot Water Return Temp	x								x		x
Hot Water Supply Temp	x								x		x
Hot Water Pump 1 VFD Speed		x							x		x
Hot Water Pump 2 VFD Speed		x							x		x
Hot Water Pump 1 Status			x						x		x
Hot Water Pump 2 Status			x						x		x
Hot Water Pump 1 VFD Fault			x							x	x
Hot Water Pump 2 VFD Fault			x							x	x
Hot Water Pump 1 Start/Stop				x					x		x
Hot Water Pump 2 Start/Stop				x					x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temp					x						x
Hot Water Differential Pressure Set-point					x						x
High Hot Water Differential Pressure										x	
Low Hot Water Differential Pressure										x	
Hot Water Pump 1 Failure										x	
Hot Water Pump 2 Failure										x	
Hot Water Pump 1 Running in Hand										x	
Hot Water Pump 2 Running in Hand										x	
Hot Water Pump 1 Runtime Exceeded										x	
Hot Water Pump 2 Runtime Exceeded										x	
High Hot Water Supply Temp										x	
Low Hot Water Supply Temp										x	
Totals	**3**	**2**	**4**	**2**	**2**	**0**	**0**	**0**	**9**	**12**	**13**

Total Hardware (11) **Total Software (23)**

1.14 Electric Meter (typical of 0)

Electric Meter:
The controller shall monitor the electric meter for electric consumption on a continual basis. These values shall be made available to the system at all times.

Alarm shall be generated as follows:

- Meter Failure: Sensor reading indicates a loss of pulse output from the electric meter.

Peak Demand History:
The controller shall monitor and record the peak (high and low) demand readings from the electric meter. Peak readings shall be recorded on a daily, month-to-date, and year-to-date basis.

Usage History:
The controller shall monitor and record electric meter readings so as to provide a power consumption history. Usage readings shall be recorded on a daily, month-to-date, and year-to-date basis.

Demand Levels:
The controller shall set the system demand level (adj.) based on the current power consumption readings from the electric meter. There shall be six daily time periods in which the demand shall be adjusted on three levels. These demand levels shall be available for facility equipment to utilize for demand limiting.

- Demand Level 1: Power consumption has exceeded the first demand level threshold (adj.).
- Demand Level 2: Power consumption has exceeded the second demand level threshold (adj.).
- Demand Level 3: Power consumption has exceeded the third demand level threshold (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
kW Pulse	x										x
Current Demand Level					x						x
kW Demand									x		x
kW Peak Today									x		x
kW Peak Month-to-Date									x		x
kW Peak Year-to-Date									x		x
kWh Today									x		x
MWh Month-to-Date									x		x
MWh Year-to-Date									x		x
Meter Failure										x	
Demand Level 1										x	
Demand Level 2										x	
Demand Level 3										x	
Totals	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**7**	**4**	**9**

Total Hardware (1) **Total Software (12)**

1.15 Outside Air Conditions (typical of 0)

Outside Air Conditions:
The controller shall monitor the outside air temperature and humidity and calculate the outside air enthalpy on a continual basis. These values shall be made available to the system at all times.

Alarm shall be generated as follows:

- Sensor Failure: Sensor reading indicates shorted or disconnected sensor. In the event of a sensor failure, an alternate outside air conditions sensor shall be made available to the system without interruption in sensor readings.

If an OA Temp Sensor cannot be read, a default value of 65°F will be used.

If an OA Humidity Sensor cannot be read, a default value of 50 % will be used.

Outside Air Temperature History:
The controller shall monitor and record the high and low temperature readings for the outside air. These readings shall be recorded on a daily, month-to-date, and year-to-date basis.

Cooling Degree Day:
The controller shall provide a Degree Day history index that reflects the energy consumption for the facilities cooling demand. Computations shall use a mean daily temperature of 65°F (adj.). The Degree Day peak value readings shall be recorded on a daily, month-to-date, and year-to-date basis.

Heating Degree Day:
The controller shall provide a Degree Day history index that reflects the energy consumption for the facilities heating demand. Computations shall use a mean daily temperature of 65°F (adj.). The Degree Day peak value readings shall be recorded on a daily, month-to-date, and year-to-date basis.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temp	x								x		x
Outside Air Humidity	x								x		x
Outside Air Temp (Alternate)	x								x		
Outside Air Humidity (Alternate)	x								x		
Outside Air Enthalpy					x				x		x
High Temp Today									x		x
High Temp Month-to-Date									x		x
High Temp Year-to-Date									x		x
Low Temp Today									x		x
Low Temp Month-to-Date									x		x
Low Temp Year-to-Date									x		x
Sensor Failure										x	
Totals	**4**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**11**	**1**	**9**

Total Hardware (4) **Total Software (13)**

1.16 HVAC Split-Systems (typical of 0)

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Discharge Air Temp	x								x	x	x
Return Air Temp	x								x	x	x
Electric Heaters			x						x	x	x
Supply Fan Operation								x	x	x	x
Totals	**2**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**4**	**4**	**4**

Total Hardware (3) **Total Software (9)**

1.17 Point Summary

		Hardware Points				Software Points						
Point Name	**Qty**	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Fan Coil Units (Typical of 0)	Each	5	1	3	5	3	0	0	1	17	13	17
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Zone Reheat (Typical of 0)	Each	3	0	1	2	2	0	0	1	9	4	8
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Multizone - AHU (Typical of 0)	Each	4	3	3	1	3	0	0	0	14	12	14
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Single Air Cooled Chiller (Typical of 0)	Each	2	1	3	3	1	0	0	0	6	11	10
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Chiller Interface (Typical of 1)	Each	0	0	0	0	11	3	0	0	13	0	14
	Total (x1)	**0**	**0**	**0**	**0**	**11**	**3**	**0**	**0**	**13**	**0**	**14**
Boiler Interface (Typical of 1)	Each	0	0	0	0	7	2	0	0	7	0	9
	Total (x1)	**0**	**0**	**0**	**0**	**7**	**2**	**0**	**0**	**7**	**0**	**9**
Power Monitoring Interface (Typical of 0)	Each	0	0	0	0	15	0	0	0	15	0	15
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Variable Air Volume - Terminal Unit (Typical of 0)	Each	5	1	1	0	1	1	0	1	9	6	10
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Chilled Water Loop Pumps (Typical of 0)	Each	2	0	2	2	1	0	0	0	6	8	7
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Single Boiler System (Typical of 0)	Each	3	3	8	4	2	0	0	0	13	20	20
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Indoor Lighting (Typical of 0)	Each	0	0	1	1	0	0	0	1	2	1	2
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Outdoor Lighting (Typical of 0)	Each	0	0	0	1	0	0	0	0	1	0	1
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hot Water Loop Pumps (Typical of 0)	Each	3	2	4	2	2	0	0	0	9	12	13
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Electric Meter (Typical of 0)	Each	1	0	0	0	1	0	0	0	7	4	9
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Outside Air Conditions (Typical of 0)	Each	4	0	0	0	1	0	0	0	11	1	9
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
HVAC Split-Systems (Typical of 0)	Each	2	0	1	0	0	0	0	1	4	4	4
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Project Totals		**0**	**0**	**0**	**0**	**18**	**5**	**0**	**0**	**20**	**0**	**23**

Hardware Points	Software Points
Total Hardware (0)	Total Software (43)

APPENDIX A: Glossary of Terms

Terms used within the Specification Text:

- **Advanced Application Controller (AAC):**

A fully programmable control module. This control module may be capable of some of the advanced features found in Building Controllers (storing trends, initiating read and write requests, etc.) but it does not serve as a master controller. Advanced Application Controllers may reside on either the Ethernet/IP backbone or on a subnet.

- **Application Specific Controller (ASC):**

A pre-programmed control module which is intended for use in a specific application. ASCs may be configurable, in that the user can choose between various pre-programmed options, but it does not support full custom programming. ASCs are often used on terminal equipment such as VAV boxes or fan coil units. In many vendors' architectures ASCs do not store trends or schedules but instead rely upon a Building Controller to provide those functions.

- **BACnet/IP:**

An approved BACnet network type which uses an Ethernet carrier and IP addressing.

- **BACnet MS/TP:**

An approved BACnet network type which uses a Master-Slave Token Passing configuration. MS/TP networks are unique to BACnet and utilize EIA485 twisted pair topology running at 9600 to 76,800 bps.

- **BACnet over ARCNET:**

An approved BACnet network type which uses an ARCNET (attached resource computer network) carrier. ARCNET is an industry standard that can utilize several speeds and wiring standards. The most common configuration used by BACnet controllers is an EIA485 twisted pair topology running at 156,000 bps.

- **Building Controller (BC):**

A fully programmable control module which is capable of storing trends and schedules, serving as a router to devices on a subnet, and initiating read and write requests to other controllers. Typically this controller is located on the Ethernet/IP backbone of the BAS. In many vendors' architectures a Building Controller will serve as a master controller, storing schedules and

trends for controllers on a subnet underneath the Building Controller.

- **Direct Digital Control (DDC):**

A control system in which a digital computer or microprocessor is directly connected to the valves, dampers, and other actuators which control the system, as opposed to indirectly controlling a system by resetting setpoints on an analog pneumatic or electronic controller.

- **PICS - Protocol Implementation Conformance Statement:**

A written document, created by the manufacturer of a device, which identifies the particular options specified by BACnet that are implemented in the device.

- **Smart Actuator (SA):**

An actuator which is controlled by a network connection rather than a binary or analog signal. (0-10v, 4-20mA, relay, etc.)

- **Smart Sensor (SS):**

A sensor which provides information to the BAS via network connection rather than a binary or analog signal. (0-10000 ohm, 4-20mA, dry contact, etc.)

- **Web services:**

Web services are a standard method of exchanging data between computer systems using the XML (extensible markup language) and SOAP (simple object access protocol) standards. Web services can be used at any level within a Building Automation System (BAS), but most commonly they are used to transfer data between BAS using different protocols or between a BAS and a non-BAS system such as a tenant billing system or a utility management system.

Terms used within the Sequences of Operation:

- **adj.**

Adjustable by the end user, through the supplied user interface.

- **AI, AO, etc. (Column Headings on Points List)**

AI = Analog Input. A physical input to the control module.
AO = Analog Output. A physical output from the control module.
AV = Analog Value. An intermediate (software) point that may be editable or read-only. Editable AVs are typically used to allow the user to set a fixed control parameter, such as a setpoint. Read Only AVs are typically used to display the status of a control operation.
BI = Binary Input. A physical input to the control module.
BO = Binary Output. A physical output from the control module.

BV = Binary Value. An intermediate (software) point that may be editable or read-only. Editable BVs are typically used to allow the user to set a fixed control parameter, such as a setpoint. Read Only BVs are typically used to display the status of a control operation.
Loop = A control loop. Most commonly a PID control loop. Typically a control loop will include a setpoint, an input which is compared to the setpoint, and an output which controls some action based upon the difference between the input and the setpoint. A PID control loop will also include gains for the proportional, integral, and derivative response as well as an interval which controls how frequently the control loop updates its output. These gains may be adjustable by the end user for control loop "tuning," but in self-tuning control loops or loops which have been optimized for a specific application the gains may not be adjustable.
Sched = Schedule. The control algorithm for this equipment shall include a user editable schedule.
Trend. The control system shall be configured to collect and display a trend log of this object. The trending interval shall be no less than one sample every 5 minutes. (Change of Value trending, where a sample is taken every time the value changes by more than a user-defined minimum, is an acceptable alternative.)
Alarm. The control system shall be configured to generate an alarm when this object exceeds user definable limits, as described in the Sequence of Controls.

Note: If the specifications require use of the BACnet protocol, all of the above shall be provided as BACnet objects.

- **KW Demand Limiting: ***

An energy management strategy that reduces energy consumption when a system's electric power meter exceeds an operator-defined threshold.

When power consumption exceeds defined levels, the system automatically adjust setpoints, de-energizes low priority equipment, and takes other pre-programmed actions to avoid peak demand charges. As the demand drops, the system restores loads in a predetermined manner.

- **Occupant Override Switch, or Timed Local Override:**

A control option that allows building occupants to override the programmed HVAC schedule for a limited period of time.

When the override time expires, the zone returns to its unoccupied state.

- **Occupant Setpoint Adjustment:**

A control option that allows building occupants to adjust - within limits set by the HVAC control system - the heating and cooling setpoints of selected zones. Typically the user interface for this function is built into the zone sensor.

- **Optimal Start-Up: ***

A control strategy that automatically starts an HVAC system at the latest possible time yet ensures comfort conditions by the time the building becomes occupied.

In a typical implementation, a controller measures the temperature of the zone and the outside air. Then, using design heating or cooling capacity at the design outside air temperature, the system computes how long a unit must run at maximum capacity to bring the zone temperature to its occupied setpoint.

The optimal start algorithm often includes a self-learning feature to adjust for variations from design capacity.

A distributed system must use Run on Request with Optimal Start. (See below.)

- **Requested, or Run on Request: ***

A control strategy that optimizes the runtime of a source piece of equipment that supplies one or more receiving units - such as an air handler unit supplying zone terminal units with heating, cooling, ventilation, or similar service. Source equipment runs only when needed, not on a fixed schedule.

The source equipment runs when one or more receiving units request its services. An operator determines how many requests are required to start the source equipment.

For example, if all the zones in a building are unoccupied and the zone terminal units do not need heating or cooling, the AHU will shut down. However, if a zone becomes occupied or needs cooling, the terminal unit will send a run request to the AHU to initiate the start-up sequence. If this AHU depends on a central chiller, it can send a run request to the chiller.

The run on request algorithm also allows an operator to schedule occupancy for individual zones based on the needs of the occupants without having to adjust the schedules of related AHUs and chillers.

- **Trim and Respond, or Setpoint Optimization: ***

A control strategy that optimizes the setpoint of a source piece of equipment that supplies one or more receiving units - such as an air handler unit supplying zone terminal units with heating, cooling, ventilation, or similar service.

The source unit communicates with receiving units to determine heating, cooling, and other requirements, and then adjusts its setpoint.

For example, if all zones are comfortable and do not request cooling, the AHU will gradually increase (trim) its supply air setpoint. When a zone requests cooling, the AHU responds by

dropping its setpoint. The more zones that request cooling, the more it drops the setpoint. The AHU repeats this process throughout the day to keep zones cool, but with a supply air setpoint that is no cooler than necessary.

Contracting Terms:

- **Furnished or Provided:**

The act of supplying a device or piece of equipment as required meeting the scope of work specified and making that device or equipment operational. All costs required to furnish the specified device or equipment and make it operational are borne by the division specified to be responsible for providing the device or equipment.

- **Install or Installed:**

The physical act of mounting, piping or wiring a device or piece of equipment in accordance with the manufacturer's instructions and the scope of work as specified. All costs required to complete the installation are borne by the division specified to include labor and any ancillary materials.

- **Interface:**

The physical device required to provide integration capabilities from an equipment vendor's product to the control system. The equipment vendor most normally furnishes the interface device. An example of an interface is the chilled water temperature reset interface card provided by the chiller manufacturer in order to allow the control system to integrate the chilled water temperature reset function into the control system.

- **Integrate:**

The physical connections from a control system to all specified equipment through an interface as required to allow the specified control and monitoring functions of the equipment to be performed via the control system.

APPENDIX B: Abbreviations

The following abbreviations may be used in graphics, schematics, point names, and other UI applications where space is at a premium.

AC - Air Conditioning
ACU - Air Conditioning Unit
AHU - Air Handling Unit
AI - Analog Input
AO - Analog Output
AUTO - Automatic
AUX - Auxiliary
BI -Binary Input
BO -Binary Output
C -Common
CHW - Chilled Water
CHWP - Chilled Water Pump
CHWR - Chilled Water Return
CHWS - Chilled Water Supply
COND - Condenser
CW - Condenser Water
CWP - Condenser Water Pump
CWR - Condenser Water Return
CWS - Condenser Water Supply
DA - Discharge Air
EA - Exhaust Air
EF - Exhaust Fan
EVAP - Evaporators
FCU - Fan Coil Unit
HOA - Hand / Off / Auto
HP - Heat Pump
HRU - Heat Recovery Unit
HTEX - Heat Exchanger
HW - Hot Water
HWP - Hot Water Pump
HWR - Hot Water Return
HWS - Hot Water Supply
MAX - Maximum
MIN - Minimum
MISC - Miscellaneous
NC - Normally Closed
NO - Normally Open
OA - Outdoor Air

PIU - Powered Induction Unit
RA - Return Air
RF - Return Fan
RH - Relative Humidity
RTU - Roof-top Unit
SA - Supply Air
SF - Supply Fan
SP - Static Pressure
TEMP - Temperature
UH - Unit Heater
UV - Unit Ventilator
VAV - Variable Air Volume
VVTU - Variable Volume Terminal Unit
W/ - with
W/O - without
WSHP - Water Source Heat Pump

PIU - Powered Induction Unit
RA - Return Air
RF - Return Fan
RH - Relative Humidity
RTU - Roof-top Unit
SA - Supply Air
SF - Supply Fan
SP - Static Pressure
TEMP - Temperature
UH - Unit Heater
UV - Unit Ventilator
VAV - Variable Air Volume
VVTU - Variable Volume Terminal Unit
W/ - with
W/O - without
WSHP - Water Source Heat Pump

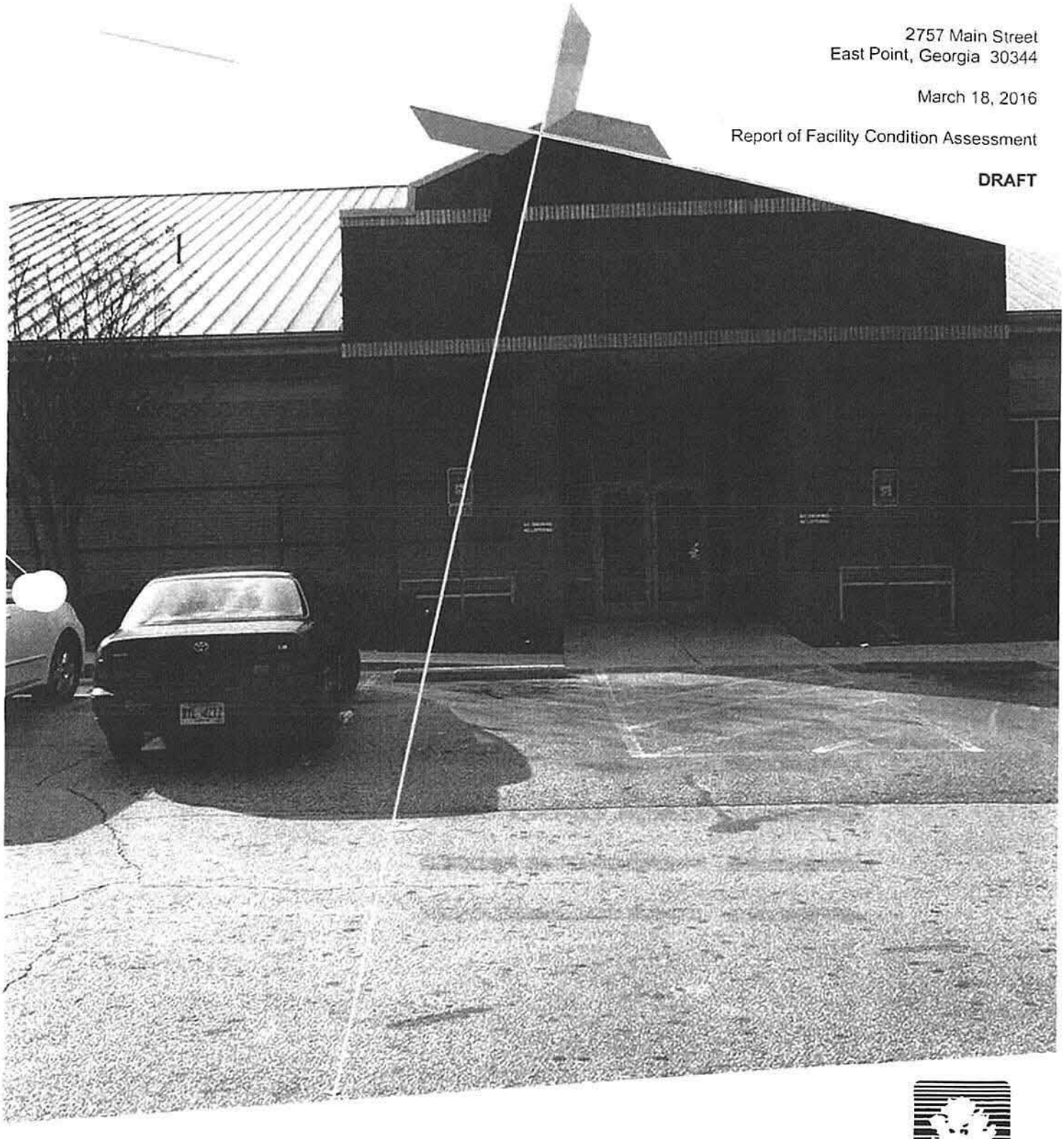
EAST POINT BRANCH LIBRARY

2757 Main Street
East Point, Georgia 30344

March 18, 2016

Report of Facility Condition Assessment

DRAFT



WITHFUL GOULD
CONSTRUCTIVE EXPERTISE

FULTON COUNTY

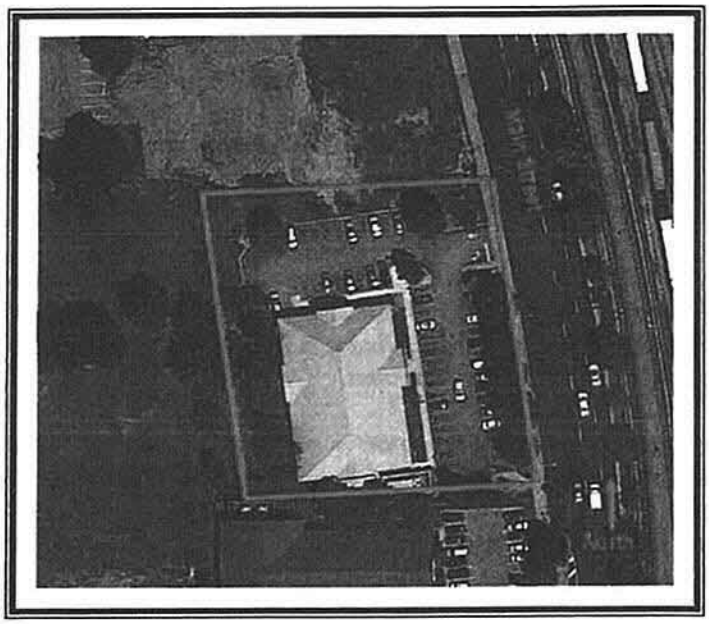
TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

INTRODUCTION

The East Point Branch library ("the Property") located at 2757 Main Street in East point, Georgia consists of a single story structure developed in 1998 and contains a gross floor area of 11,378 square feet. Site features at the property include asphalt paved parking areas and driveways, concrete sidewalks, concrete curb and gutter, and stormwater management features, site lighting, building lighting and landscaping. The Property contains a land area of approximately 2-1/3 acre (102,098 square feet) bounded by railroad tracks to the east, Grady Health Center and Cleveland Avenue to the south, East Point Street to the west, and Ware Avenue to the north. Interior areas of the building consist of a main entry lobby, a public meeting room, public and staff restroom, open stacks and reading spaces, staff offices, work area, and breakroom facilities. Plan 1-1 provides a graphical overview of the Property and indicates site areas considered by this report.

Plan 1-1 – Aerial View of Property



PROJECT DETAILS

On January 15, 2016, Mr. Alexander Morgan, PMP from BuildSmart Enterprises, LLC (a Consultant working under contract from Faithful+Gould, Inc., and hereafter referred to as Faithful+Gould) visited the Property to complete a comprehensive facilities condition assessment of the building and site systems. The objectives of the assessment were to:

1. Identify the condition of the Property and the timing and cost of expenditures required over the next five years. Capital expenditures considered by this report typically have an aggregate value of $1,000 or more and generally exclude minor repair and maintenance items.
2. Determine failure probability of the various systems and components.

3. Determine criticality of system and component failure in relation to the functions served or area supported.
4. Validate existing maintainable equipment inventories and develop preliminary budgets for preventative maintenance activities of the identified equipment.

SCOPE OF SERVICES

Faithful+Gould was requested to complete a Facility Condition Assessment of the site and site improvements of the facility and related site features contained at the East Point Branch Library. The key issues to be addressed by the Facility Condition Assessment include the following:

- Identify the condition of the Property and the prioritization, timing, and cost of expenditures (>$1,000) required over the next 5-years.
- Determine criticality of system and component failure.
- Document the maintainable equipment within each facility and develop preliminary preventative maintenance budgets for equipment maintained by the General Services/Public Works Department.

Strategy Employed to Meet Key Issues

The strategy employed to meet the key issues detailed above (i.e. our scope of services) consisted of performing a visual assessment of the interior, exterior and site components of the subject Property.

The primary purpose of the Facility Condition Assessment was to identify visually apparent deficiencies in the buildings. The evaluation included site visits to observe the buildings and site systems, interviewing building management and maintenance personnel, and reviewing available maintenance systems, design and construction documents and plans, and public records.

This Facility Condition Assessment has been conducted in general accordance with industry standards and the American Society for Testing and Materials (ASTM) Standard E 2018-15 Standard Guide for Property Condition Assessment: Baseline Property Condition Assessment Process and the Contract Documents for 15RFP082615K-DJ Facilities Condition Assessment for the Fulton County General Services/Public Works Department.

We performed a visual non-destructive assessment of the interior, exterior and site components of the Property, including the following major components and systems:

- **Substructure.** We observed the structures for visible signs of distress and reported our findings. We also reviewed available structural drawings for information regarding the design load criteria of the existing structures and the building codes to which the structures were designed. We did not complete a seismic evaluation (PML) of the Property.

- **Shell.** We visually observed the exterior wall system, window and door systems for visible evidence of deficiencies, continuity of seals, and other types of distress and have our findings. We reviewed available flashing and connection details for drainage design and observed the condition and placement of expansion joints. Our visual observations were based on those conditions that can be observed from ground level, roof level and with binoculars. We visually evaluated the condition of accessible roof systems, accessories, and details. In addition, where applicable we discussed existing roof warranties.

- **Interiors.** We visually observed the interior areas of the Property and reported their general condition. Interior finish replacement costs are included if they are significant or if they are part of a repair. Otherwise, interior finish costs are considered part of the interior finish replacement program and are not included in the cost tables.

- **Services.** We observed the age and condition of the Mechanical, HVAC, Electrical, Plumbing (MEP) Systems and related building systems and have commented on their condition and visible deficiencies.

- **Sitework.** We visually observed the exterior areas of the Property and reported their general condition.

- **Accessibility.** We reviewed the Property for conformance with applicable accessibility requirements and reported our findings.

The scope of services under which the Facility Condition Assessment was completed was visual in nature and not intended to be destructive to the Property to gain access to hidden conditions. We did not perform any destructive testing, uncover, or expose any system members. We have documented the type and extent of visually apparent defects in the systems in order to perform the condition assessment.

The scope of services under which the Facility Condition Assessment was completed includes only those items specifically indicated. The evaluation does not include any environmental services such as (without limitation) sampling, testing, or evaluation of asbestos, lead-based paint, lead-in-water, indoor air quality, PCB's, radon, mold, or any other potentially hazardous materials, air-borne toxins or issues not outlined in the previous scope of services. In addition, the assessment does not include identification of underground soils, identification, or quantification of underground contaminants.

Code References

We have considered that the Property holds a grandfathered status in terms of only having to comply with codes in effect at the time of construction or retroactive codes. Codes considered within this report include the following:

- IBC Codes
- Americans with Disabilities Act
- ASHRAE
- National Electrical Code
- EPACT 2005
- NFPA 10 1

Cost Estimates

We have developed cost estimates for completion of the repair and replacement projects recommended over the study period. Cost estimates have been developed on a labor and material basis primarily from data provided by Faithful+Gould project costing group. This data has been amended to reflect the geographic location of the Property. Where the County has supplied us with cost estimate information relating to completed or planned projects we have verified and included this information.

BUILDING DETAILS

Refer to table EX-1 for summary details of the facility.

Table EX-1 Facility Details

Item	Description
Project Name	East Point Branch Library
Property Type	Library
Full Address	2757 Main Street East Point, Georgia 30344
Onsite Date	January 15, 2016
Year Built	1998
Occupancy Status	Occupied
Number of Stories	Single Story
Gross Building Area (SF)	11,378
Current Replacement Value	$3,128,950
ARV/GSF ($/Sq Ft)	$275

SUMMARY OF FINDINGS

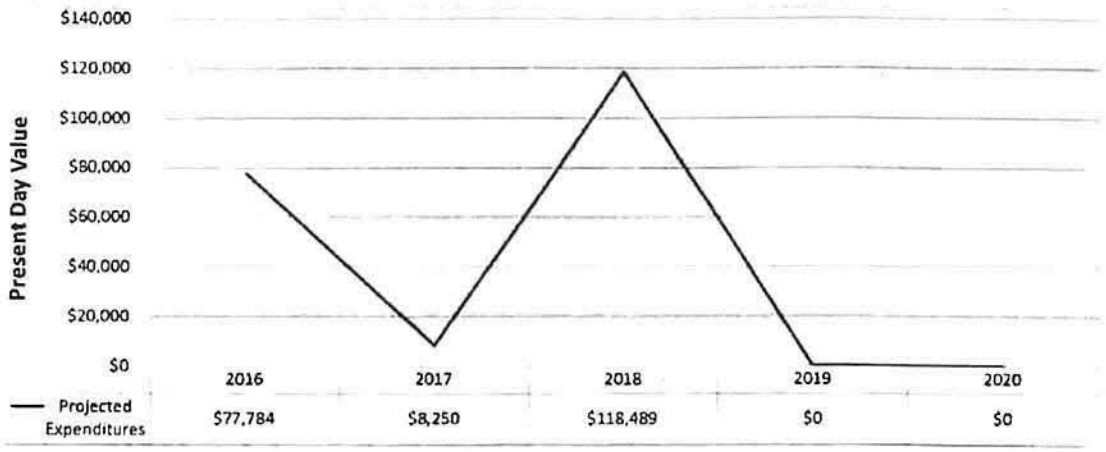
The Property is generally in good condition, well-constructed, and has had a reasonable level of maintenance carried out over the years. However, given the age of the building, we anticipate the following major expenditures over the 5-year study period:

- Site – Fill cracks, seal coat, restripe parking lot and remark ADA spaces
- Mechanical – Upgrade control system
- Electrical – Upgrade lighting (main and administration areas)
- Fire and Life Safety – Replace fire alarm control panel
- Interior – Renovate Restrooms
- Interior – Replace carpet
- Interior – Replace acoustical ceiling as a result of roof leaks

BUILDING EXPENDITURE SUMMARY

The building expenditure summary section provides an executive overview of the findings from the assessment. Chart EX-1 provides a summary of the anticipated expenditures over the **5-year study**. Further details of these expenditures are included within each respective report section and within the expenditure forecast, in Appendix A of this report.

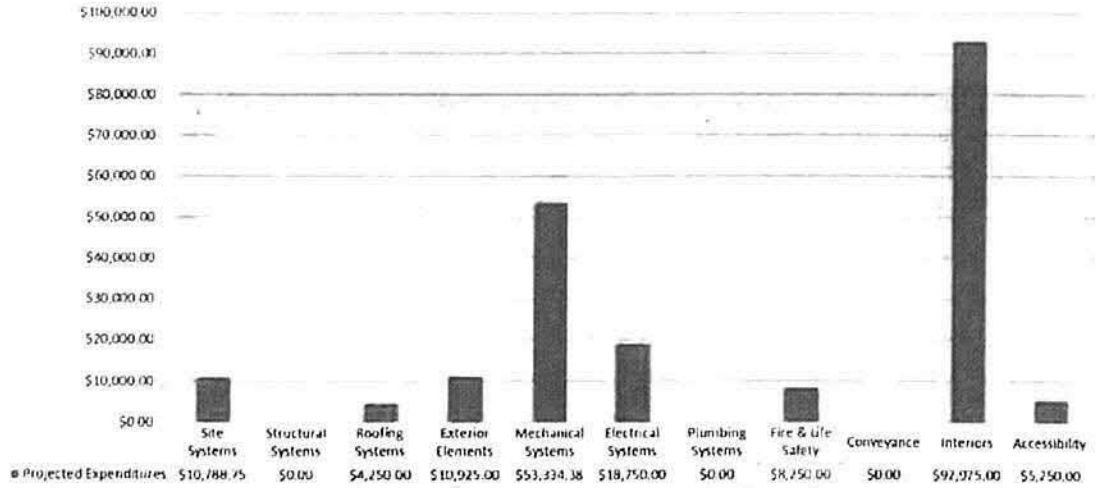
Chart EX-1 Building Expenditure Summary by Year



DISTRIBUTION OF EXPENDITURES BY BUILDING SYSTEM

Chart EX-2 illustrates a summary of the expenditures by building system over the **5-year study**. A more detailed analysis is provided within Appendix A, which provides a breakdown of individual work items as recommended within the main body of the report.

Chart EX-2 Expenditures by Building System over 5-Years



Facility Condition Needs Index

In this report, we have calculated the Facility Condition Needs Index (FCNI), which is used in Facilities Management to provide a benchmark to compare the relative condition of a group of facilities. The FCNI is primarily used to support asset management initiatives of federal, state, and local government facilities organizations.

The FCNI is the ratio of accumulated Total Cost (TC) (Deferred Renewal, Deferred Maintenance, Capital Renewal, and Capital Improvement) to the Current Replacement Value (CRV) for a constructed asset calculated by dividing the TC by the CRV. The range is from zero for a newly constructed asset, to one for a constructed asset with a TC value equal to its CRV. Acceptable ranges vary by "Asset Type', but as a general guideline the FCNI scoring system is as follows:

$$FCNI = \frac{\text{Deferred Maintenance/Renewal + Capital Renewal + Capital Improvement (TC)}}{\text{Current Replacement Value of the Facility(s) (CRV)}}$$

If the FCNI rating is 60% or greater then replacement of the asset/building should be considered instead of renewal.

Condition	Definition	Percentage Value
GOOD	In a new or well-maintained condition, with no visual evidence of wear, soiling or other deficiencies	0% to 5%
FAIR	Subject to wear, and soiling but is still in a serviceable and functioning condition	5% to 10%
POOR	Subjected to hard or long-term wear. Nearing the end of its useful or serviceable life.	Greater than 10%
V-POOR	Subjected to hard or long-term wear. Has reached the end of its useful or serviceable life. Renewal now necessary	Greater than 60%

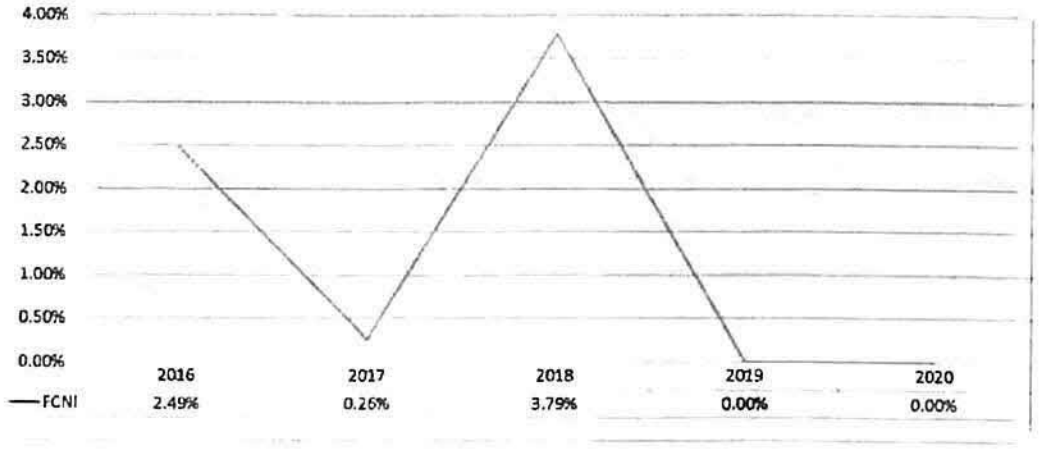
The table below indicates the current FCNI ratio of the East Point Branch Library.

Table EX-3 Facility Condition Needs Index

Key Findings	Metric
Current Year Facility Condition Needs Index	2%
Immediate Capital Needs (included in FCNI)	$77,784
Year 2 to Year 5 Capital Needs	$126,739

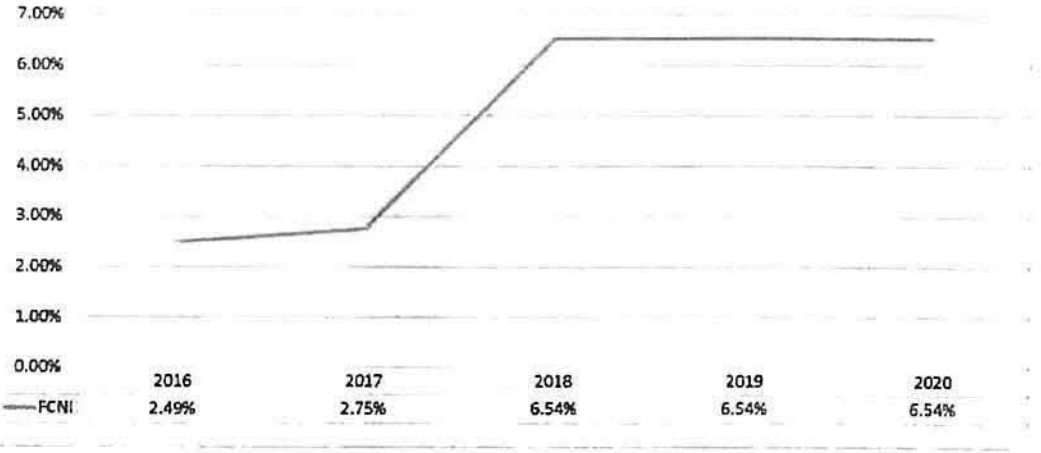
Chart Ex-3 below indicates the effects of the FCNI ratio per year, assuming the required funds and expenditures **ARE** made to address the identified actions each year.

Chart EX-3 Fully Funded FCNI Ratio per Year



The Chart below indicates the cumulative effects of the FCNI ratio over the study period assuming the required funds and expenditures are **NOT** provided to address the identified works and deferred maintenance each year.

Chart EX-4 Unfunded FCNI Ratio per Year

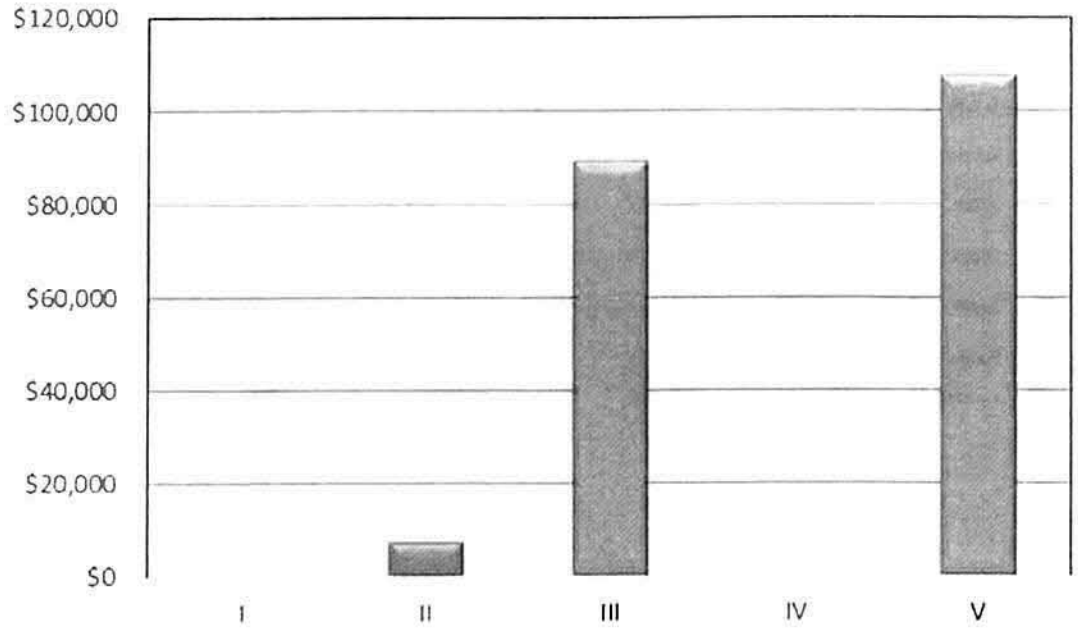


Needs Sorted By Prioritization of Work

Faithful+Gould has prioritized the identified work in order to assist with analyzing the deficiencies found during the assessment. The baseline prioritization model is not just based on replacement year or criticality but uses five key data attributes to build an overall importance metric for every recommendation: System type, the cause or nature of the issue, timing and building mission incorporated into the model with relative weighting to provide an overall priority score. Priority categories are shown below:

Priority I Life safety and code compliance	•Systems requiring immediate action that compromises staff or public safety or requires to be upgraded to comply with current codes and accessibility
Priority II Currently Critical:	•Required to bring a system or building component back into operation or to improve reliability. Necessary to maintain continuity of operations:
Priority III Necessary / Not Critical:	•Lifecycle replacements neccessary but not critical or mid-term future replacements to maintain the integrity of the facility or component
Priority IV Recommended	•Expenditures typically based on service life or are recommended to enhance a system or component.
Priority V Appearance	•Expenditures related to improving public perception or improving aesthetics of a facility. These would mostly relate to renewal of interior finishes.

The chart below illustrates the breakdown of expenditure according the priority coding providing an opportunity to strategically plan and effectively direct funding to the highest priority.

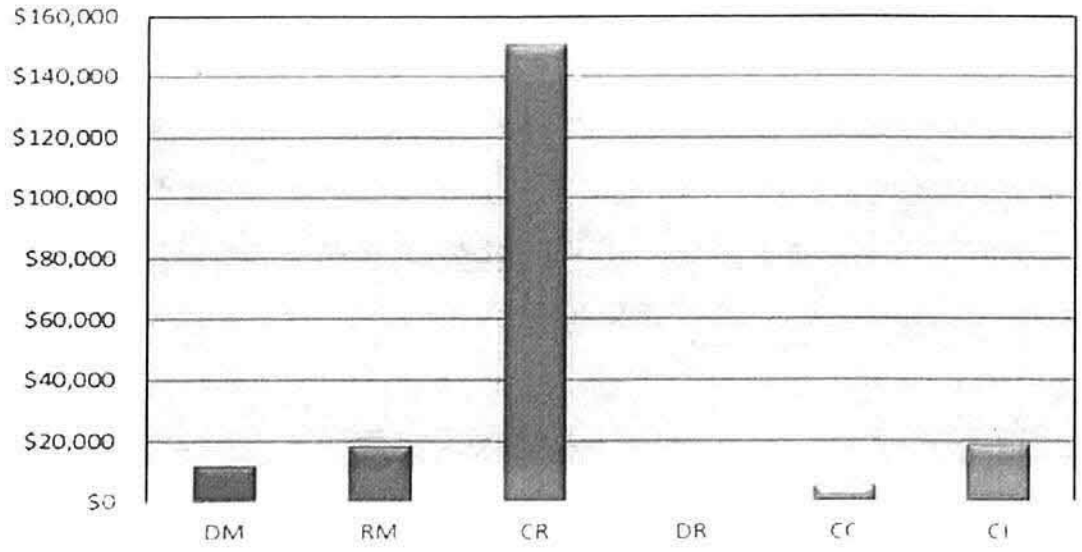


NEEDS SORTED BY PLAN TYPE

Faithful+Gould has prioritized the identified work according to the Plan Type or deficiency categories in order to assist with analyzing the deficiencies found during the assessment. The following Plan Types are shown below:

Plan Type 1 Deferred Maintenance	•Projects required for repair of a failed component in order to restore proper function.
Plan Type 2 Routine Maintenance	•Maintenance that is planned and performed on a routine basis to maintain and preserve the condition. Does not inclue preventative maintenance.
Plan Type 3 Capital Renewal	•Planned replacement of building systems that have or will reach the end of their useful life.
Plan Type 4 Deferred Capital Renewal	•Projects required for replacement of a failed building system in order to restore proper function.
Plan Type 5 Code Compliance	•Projects required modifying or replacing existing building systems in order to comply with current codes.
Plan Type 6 Capital Improvement	•Projects required/requested to enhance government services. Also includes projects resulting from changes in building use or system functionality to support a new agency.

The chart below illustrates the breakdown of expenditure according to the Plan Type or deficiency categories providing an opportunity to strategically plan and effectively direct funding.



RISK

In order to allow Fulton County to balance containment of capital investment with probability and consequence of failure, we have assigned each project with a risk number. These numbers are in addition to the Priority 1, 2, 3, and 4, descriptive ratings previously detailed. Risk numbers have been calculated based upon a numerical assignment of risk resulting from four categories: 1) Impact of Failure, 2) Condition, 3) Probability of Failure, and 4) Frequency of Failure. Numbers assigned to each category are added together to create a total risk number. This risk number is assigned a risk category based upon its numerical range. For instance, deterioration of a computer room air conditioning unit could score 2 under Impact of Failure, 3 under Condition, 3 under Probability of Failure, and 3 under Frequency of Failure, resulting in a score of 11 (2 + 3 + 3 + 3) which equates to a high risk. Table EX-4 below details the risk criteria.

Table EX-4 Risk Criteria Table

Impact of Failure	Condition	Probability of Failure	Frequency of Failure
1 - Catastrophic: The Facility System/ Component cannot be used; personnel death	1 – Very Poor OR Critical active non grandfathered code violation	1 – In state of failure OR Regulatory enforcement action	1 - Frequent: Occurs at least once per week OR Item failure will be of terminal consequence to the facility
2 - Major: A large portion of the facility is rendered unusable; interruption of facility's official mission activities; personnel injury; deterioration of historic fabric, critical operations severely affected	2 – Poor OR Severe active non grandfathered code violation	2 – Chance of immediate failure	2 - Common: occurs at least once per month
3 - Significant: Reduced use of a facility; scaled back operations; interruption of business (staff) activities; property damage as result of Facility/System/Component failure	3 – Fair OR System / component not present	3 – Increased chance of failure	3 - Seldom: occurs at least once every 31-90 days
4 - Minor: Active intervention required to maintain operations; repairs needed to maintain operations, reduced use of mission elements/actions	4 – Good	4 – Slight chance of failure	4 - Rare: occurs less than once every three months, but more than once a year
5 - Insignificant: Nuisance; operations not impacted; alternative service available without active intervention OR Failure does not require near-term active intervention	5 – Very Good	5 – No chance of failure	5 - Very rare: happens once per year or less than once per year

The Risk Score and the Risk Categories are detailed in Table EX-5 below.

Table EX-5 Risk Category

Risk Score	Risk Category
4 – 8	Critical Risk
9 – 13	High Risk
14 – 16	Medium Risk
17 – 20	Low Risk

To allow Fulton County to balance containment of capital investment with probability and consequence of failure, we have assigned each project with a risk number. The table below provides a summary of Critical and High risk expenditures identified over the 5-year study period. A complete risk assignment for each recommended project is included within Capital Expenditure Forecast provided in Appendix A of this report. No Critical items were noted for the Property; however, the following high risk items were identified:

Table EX-6 Critical & High Risk Expenditures

Risk Category	Year	Component	Cost
	2016	Investigate, Locate, and Reseal Roof Leaks	$4,250
	2016	Replace and Reseal Deteriorated Window Seals	$3,450
		TOTAL	**$7,700**

PREVENTATIVE MAINTENANCE

Table EX-7 provides a summary of the financial requirements to complete industry standard preventative maintenance activities on the building systems identified in Appendix C. In-house costs represent the cost to complete the recommended preventative maintenance activities utilizing in-house staff at current labor rates provided by the County, while contract costs includes general markups associated with contracting out the same activities to a service contractor.

Table EX-7 Annual Preventative Maintenance

System	In-House Costs	Contract Costs
Roofing	$277.41	$416.12
Mechanical	$1,846.41	$2,769.62
Electrical	$1,609.79	$2,414.69
Plumbing	$160.39	$240.59
Fire & Life Safety	$430.80	$646.20
Conveyance	$0	$0
TOTAL	**$4,324.80**	**$6,487.22**

2.0 SITE SYSTEMS

DESCRIPTION

The Property contains a land area of approximately 2-1/3 acre (102,098 square feet) bounded by railroad tracks to the east, Grady Health Center and Cleveland Avenue to the south, East Point Street to the west, and Ware Avenue to the north. Parking is provided in one principal asphalt paved lot contained at the east and north sides of the building. The parking lot contains 40 parking spaces, including three handicapped parking spaces.

There is an asphalt parking lot enclosed by concrete curb and gutter. The parking lot is drained by surface runoff, a drop inlet and a curb inlet. Cast-in-place concrete sidewalks are provided along the north and east (main entrance to library) sides of the building. Landscape areas are at the front and sides of the building and in islands in the parking lot. Site lighting is provided by pole mounted light fixtures in the parking lot.

There is a site stormwater detention pond at the south side of the building surrounded by a chain-link fence. There is also an HVAC equipment yard on the south side of the building surrounded by a brick enclosure with a chain-link double gate.

CONDITION

Cracks in the asphalt paving exist and parking space stripes have faded. We recommend that the cracks are filled, the pavement seal coated and the pavement markings re-applied in the mid-term.

The caulking expansion joints in the concrete sidewalk near the front entrance of the building are failing. We recommend that those expansion joints be cleaned out and resealed in the near-term. This work can be combined with the sealant work required for failed exterior caulk joints at the windows. We also noted several cracked concrete curbs and damaged sidewalk panels. These areas should be replaced in the mid-term.

The landscape beds appeared to be mostly overgrown with weeds. Cleaning out weeds and installing new plants and/or mulch would improve the aesthetic appearance of the site. Plant debris has built up in the retention pond (including sections of the surrounding fencing) and the enclosed area around the HVAC equipment. We recommend removing debris from the detention pond, fencing and the enclosure around the HVAC equipment. We anticipate that these items will be completed as part of general maintenance or addressed as a larger exterior landscaping program developed by the County.

Stormwater management features appeared to be in good condition and based upon observed conditions should not require significant repair or replacement within the study period. We recommend that the gate to the detention pond be secured to prevent unauthorized access and reduce the potential safety hazard to the public.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Fill Cracks, Sealcoat, Re-stripe Parking Lot and Remark ADA Spaces	III	Routine Maintenance	2018	$6,326
Replace Concrete Curbs and Sidewalks Cracks	III	Routine Maintenance	2018	$4,463

3.0 STRUCTURAL SYSTEMS

DESCRIPTION

The building structure consists of a steel framed post and beam superstructure with a concrete masonry unit (CMU) back-up and an external facing brick skin. We were not provided with details of the sub-structure. However, foundations are likely to consist of cast-in-place concrete footings.

Foundations

We anticipate that the building is supported on isolated footings for columns and spread footings for the walls.

Floor Slab

The ground floor slab is assumed to consist of a 4" deep steel reinforced slab on a waterproof membrane, select fill sub-base and compacted subgrade.

Interior Walls and Ceilings

Interior walls primarily consist of non-loading bearing steel stud partitions with gypsum wallboard sheathing.

Exterior Walls

Exterior wall systems typically consist of 4" thick facing brick anchored to CMU blockwork and metal stud walls with a 1" air gap, rigid and batt insulation. The inter face of the exterior walls consists of painted gypsum board.

Roof Structures

The roof structure consists of steel lattice beams supporting a profiled metal roof deck.

CONDITION

The structure was generally found to be sound with no evidence of differential settlement or displaced structural members.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

4.0 ROOFING SYSTEMS

DESCRIPTION

The roof comprises gable and hip roofs supported by light metal roof trusses overlaid with a profiled steel deck, rigid insulation, and a standing seam metal roof system. Pre-finished gutters and downspouts are provided around the perimeter roof eaves to capture the stormwater from the roof. The downspouts are tied into the underground stormwater management system.

CONDITION

When observed from the exterior of the building, the roofing system appeared to be in fair condition; however, we did note several locations of stained ceiling tiles from within the interior of the building. We recommend that the roof be investigated and leaks be located and resealed in the near-term. Once the repairs are completed, the ceiling tiles and damaged finishes should be repaired.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Investigate, Locate and Reseal Roof Leaks	III	Deferred Maintenance	2016	$4,250

5.0 EXTERIOR ELEMENTS

DESCRIPTION

The building is placed in a rectangular configuration with exterior elements consisting of brick masonry, double glazed aluminum framed windows, and painted metal. Windows in the building consist of aluminum-framed units with double glazed sections with rubber gasket sealants between glazed elements and the aluminum frames, and elastomeric sealants between window frames and brickwork elements. Windows range in size from 3' x 4' to 9' x 14'.

The main entrance to the Library is accessed at the eastern elevation. The entrance consists of one set each of aluminum framed glazed doors, separated by a vestibule area. The entrance door has storefront glazed units on each side. There is a covered exterior vestibule at the front entrance with brick columns and painted metal rails. The fire exit doors consist of hollow metal doors set within metal frames. The exit door on the west side of building is covered by a metal framed canopy with a wood ceiling.

CONDITION

The exterior masonry appeared to be in generally good condition. However, there are masonry joints, on the south and west sides of the building that should be repointed. There are also failed sealants between some of the windows and the adjacent brick masonry. We recommend that these areas of failed joints be stripped, cleaned and resealed. We have included the associated costs for this work in the renewal of the mortar joints within the Capital Expenditure Forecast.

The painted finish on the hollow metal door and frame, on the rails at the exterior vestibule, and on the metal framing at the exterior canopy, and the lintel on the overhang on the north side of the building was faded and showed signs of corrosion. We recommend these surfaces be prepped, cleaned and repainted as part of routine maintenance to improve the aesthetic appearance of the building. Given the minimal cost to complete this work, we anticipate it will be completed as part of general maintenance.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace and Reseal Deteriorated Window Seals	II	Deferred Maintenance	2016	$3,450
Renew Exterior and Mortar Joints and Flashing of Roof Building	III	Routine Maintenance	2016	$7,475

6.0 MECHANICAL SYSTEMS

HEATING AND COOLING SYSTEMS

DESCRIPTION

Conditioned air for the building is provided by one packaged air conditioning unit manufactured by Trane (Model SXHLF30EO-48CSC), and installed in 2013. The cooling capacity for the unit is 30-tons. Heating for the building is provided by electric resistance heating elements within the air distribution network.

CONDITION

The package unit appeared to be in good condition having been installed in 2013. We did note some organic growth growing on the exterior housing of the unit. We recommend that the unit be cleaned in the near-term as part of the next schedule maintenance activities. These types of units often have a service life of at least 20 years if properly maintained. The unit should remain serviceable throughout the study period with the implementation of a comprehensive preventative maintenance program.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

AIR DISTRIBUTION SYSTEMS

DESCRIPTION

Conditioned air from the package unit is distributed throughout the building via sheet metal with flexible duct connections to terminal units installed within the ceiling plenum. It is presumed that the terminal units are provided with electric heating elements and volume dampers to adjust the amount and temperature of the supply air discharged to the space.

CONDITION

The air distribution systems appeared to be in fair to good working condition. As part of the control upgrades, we recommend a series of re-commissioning activities to ensure the terminal units are functioning properly. An allowance for as needed repairs has been included.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

VENTILATION AND EXHAUST SYSTEMS

DESCRIPTION

Outside air for ventilation purposes is supplied to the building through outside air intakes on the package unit. General building exhaust includes ceiling mounted exhaust fans within the restrooms. The exhaust fans are controlled by local light switches and ducted through the roof.

CONDITION

The ventilation and exhaust systems for the building appeared to be in fair to good working condition. We were unable to determine if the outside air dampers on the package unit were functioning properly and therefore recommend that the outside air dampers be tested as part of the next scheduled maintenance to ensure they are operational.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

HVAC CONTROLS

DESCRIPTION

The HVAC system is controlled by a building automation system manufactured by Johnson Controls. The control system utilizes Johnson Controls Metasys system in order to program and control the HVAC systems throughout the building. Low voltage actuators are utilized to operate the zone dampers in response to the zone thermostats and system setpoints.

CONDITION

The control system is in poor to fair condition primarily due to system obsolescence. The components for the system appeared to have been installed at the time of construction. We recommend budgeting for near-term upgrades of the control system, including the VAV controllers. At a minimum, this should include replacement of zone damper and controllers, new building control panel with a touchscreen human interface and providing remote access capabilities. Once the system is upgraded, a series of commissioning activities should be undertaken to ensure the new components and sequence of operation are functioning properly.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Upgrade HVAC Controls	III	Capital Renewal	2016	$53,334

7.0 ELECTRICAL SYSTEMS

ELECTRICAL SERVICE AND DISTRIBUTION EQUIPMENT

DESCRIPTION

Electrical Service Equipment

The building is provided with one main electrical feed from a pole mounted utility transformer located at the southeast corner of the building. Secondary service from the transformer is routed underground to an electrical service panel, MDP, located in the electrical room. The main electrical panel is provided with a surge suppressor. Service characteristics for the electrical service are 120/208-volts, 3-phase and 4-wire. The main distribution panel is rated at 600-amps.

Wire and Conduit

Typical power distribution for the feeders and branch circuits is accomplished using wire in conduit. Conduit types varied based on the area and usage, but is primarily rigid metal conduit.

Motor Control

Motor control is provided locally to the driven equipment. Motors are controlled by circuit breakers at the distribution panels and disconnect switches located at the equipment.

CONDITION

The major electrical equipment items appear to be in good condition. There is no indication of damage from short circuit or overload condition. Electrical distribution equipment of the type installed are generally considered to have a service life of 30 years or more. Switchboards, panelboards and wiring are often serviceable beyond this time if properly maintained, and not subjected to repeated overload or short circuit conditions. We do not anticipate a requirement to upgrade or replace the electrical systems during the study period as replacement and repair components are still readily available if the systems required repair.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

LIGHTING SYSTEMS

DESCRIPTION

General area lighting consists of nominal 2' x 4' and 2' x 2' lensed, lay-in fluorescent fixtures with some recessed down lights in common areas and restrooms. Illuminated exit signs are installed at exit doors. A General Electric lighting control panel is provided for the building lighting. Exterior lights are flushed mounted on the brick structure perimeter.

CONDITION

The interior light fixtures appeared to be in good condition. We recommend that the lighting fixtures be upgraded in the main and administrative areas in the mid-term in order to improve lighting quality and energy efficiency. The retrofit of these fixtures should include replacement of the lenses cover in order to improve the quality of lighting provided to the space. By improving the lighting quality, often times the number of fixtures can be reduced, which in turn improves energy efficiency. In addition, we have allowed for the replacement of the lighting control panel due to the potential for component obsolescence.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Upgrade Lighting (Main and Administrative Area)	V	Capital Improvement	2018	$18,750

COMMUNICATIONS AND SECURITY SYSTEMS

DESCRIPTION

Telephone and communications service enters the building in the main Electrical Room. Incoming service cables belong to the telephone company. An electronic security system is installed and tied in with the fire alarm control panel. Motion detectors are provided at various locations.

CONDITION

The communications systems appear to be in good condition and primarily maintained by the serving utility company. Consideration of the IT and associated equipment is excluded from this report. The security system was reportedly to be operational; however, we did note that the security key pad was duct taped around the perimeter of the unit in order to keep it from falling off the wall. As part of the recommended fire alarm control panel replacements, we recommend that the security key pad be replaced and properly secured to the wall.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

8.0 PLUMBING SYSTEMS

DOMESTIC WATER SYSTEMS

DESCRIPTION

Domestic cold water service consists of a water main that enters the building. Domestic hot water is generated by a 30-gallon electric storage tank type water heater and is located in the mechanical room. Water distribution relies on service pressure from the local utility. Domestic water piping is typically copper.

Plumbing Fixtures

Plumbing fixtures in the restrooms consist of floor mounted water closets with sensor controlled flush valves, wall mounted urinals with sensor controlled flush vales and vitreous china sinks with sensor controlled faucets. The employee break room is equipped with a stainless steel service sink. There is one public drinking water fountain located between the men's and women's public restrooms.

CONDITION

The domestic water service, backflow preventer and domestic water heater appear to be in good condition. There is no evidence of leaks or other areas of deterioration noted or reported to us for the building. The tankless water heater appeared to have been installed in the last 5 years.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

SANITARY WASTE AND STORM DRAINAGE SYSTEMS

DESCRIPTION

Sanitary Waste Systems

Sanitary waste is collected from multiple laterals and routed to the municipal sanitary system via lateral gravity drains lines. The sanitary lateral pipes are not visible.

Stormwater Systems

Stormwater drainage systems consist of perimeter gutters and downspouts. The downspouts in turn connect to the site stormwater management system.

CONDITION

The sanitary waste and storm drainage piping is believed to be in good condition and adequate for the building. Reports of routine blockages or leaks were not reported to us, nor was historical evidence of such issues noted. Based on the age of this system, we anticipate that it should last throughout the study period. Plumbing sanitary steel piping usually has an average service life of 40 plus years.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

9.0 FIRE & LIFE SAFETY

STRUCTURAL FIRE PROTECTION

DESCRIPTION

The building was constructed in 1998 and based upon classification of code requirements and occupancy type, the building is not required to have additional structural fire protection.

CONDITION

No significant firewall penetrations were observed during this inspection. However, we recommend periodic inspections be completed to ensure that through wall penetrations in areas such as mechanical and electrical rooms remain properly sealed.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

MEANS OF EGRESS

DESCRIPTION

Primary means of egress for the building is provided by one entrance and exit on the front elevation of the building as well as a secondary means of egress on the south side of the building. Lighting for the egress paths appears to be provided by emergency lights and exit signs on an emergency circuit.

CONDITION

Means of egress appear to be sufficient and unobstructed from all points in the building relative to exit discharge and travel distance. Exit signage appears to be installed at the exterior doors and installed above doors at interior work areas and public restrooms.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

FIRE DETECTION AND ALARM SYSTEMS

DESCRIPTION

The building is protected by a Silent Knight Model 5207 burglary/fire communicator zone fire alarm system. The fire alarm control panels (FACP) are located in the main Electrical Room. The fire alarm system monitors manual pull stations, smoke and heat detectors within various zones throughout the building. Smoke detectors are located in common areas and pull stations are provided at exits. Alarm notification is provided by either horn/strobe combination devices or a single strobe or horn devices located throughout the building.

CONDITION

The fire alarm system appeared to be in fair condition and installed in general accordance with the codes enforced at the time of installation. The 5207 fire alarm control panel has since been discontinued by Silent Knight. Repair and replacement components are now primarily only available on the secondary market. We recommend budgeting for the replacement of the fire alarm control panel, as needed initiating/notification devices, and replacement of the security alarm key pad in the near-term.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace Fire Alarm Control Panel	III	Capital Renewal	2017	$8,250

10.0 INTERIORS

DESCRIPTION

The interior of the building is divided into the Main Library Media Center, Conference Room, Manager's Office, and Administrative Area. The building is occupied by the Fulton County Library, Staff and Library Patrons.

Finishes within the meeting room and office areas consist of broadloom carpeting, painted drywall and 2' x 2' suspended ceiling tile contained within a prefinished grid. Finishes within the common area of the library consist of broadloom carpeting, painted drywall soffits and 2' x 2' suspended ceiling tile contained within a prefinished grid. Finishes in the break area consist of 12" x 12" resilient floor tiles (VCT). The break area has casework consisting of laminated countertops and cabinets.

Single stall male and female restrooms are located in the corridor near the conference room. Finishes consist of 4' x 4' ceramic wall and 2' x 2' ceramic floor tile, suspended acoustical ceiling, and plastic laminate counters.

A children's restroom is located adjacent to the Child reading area. The staff restroom is located in the administration area.

CONDITION

The interior finishes range from poor to good condition. Poor to fair conditions that should be addressed are as follows:

- There is damaged sheet rock at the south reading bay windows
- Carpet is ripped, starting to buckle, and/or worn in numerous locations throughout the building
- Ceiling tiles above the west reading bay windows and in the staff break room are stained and should be replaced
- Floor tiles in the restrooms are in fair condition but should be replaced
- VCT in the entry vestibule is worn and should be replaced

We recommend budgeting for near and mid-term renewal of interior finishes.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Renovate Restrooms	V	Capital Renewal	2018	$37,950
Replace Carpet	V	Capital Renewal	2018	$31,680
Replace Floor Tile	V	Capital Renewal	2018	$1,208
Replace Suspended Acoustical Ceiling As A Result of Roof Leaks	V	Capital Renewal	2018	$18,113
Repair or Replace Damaged Sheet Rock in Main Library and Bay Windows	II	Deferred Maintenance	2016	$4,025

11.0 ACCESSIBILITY

ACCESSIBILITY ISSUES

THE GUIDELINES

As a publically accessible facility, the Property should seek compliance with the 2010 ADA Standards for Accessible Design (2010 Standards), made effective March 2012. These standards are revised standards for the ADA Accessibility Guidelines (ADAAG), issued in July 1991. This report section compares the requirements of the ADA with as-built conditions, and where applicable, recommends upgrades required to achieve compliance. Specifically, two areas of the ADA have significant effect on the physical aspects of the Property.

Title I deals with employment discrimination, and requires that employers not discriminate against a disabled person in hiring or employment. This can impact the configuration and features of buildings and those employers are expected to make "reasonable accommodation", including making facilities readily accessible to disabled employees.

Title III requires that public accommodation provide goods and services to disabled patrons on an equal basis with the non-disabled patrons. This title is the part of the ADA with perhaps the greatest impact on buildings, which provide public accommodations.

The ADA has provided a benchmark for measuring accessibility, primarily orientated towards new construction. It also provides guidance for modification of existing facilities to eliminate barriers to access. This benchmark is the 2010 ADA Standards for Accessible Design (2010 Standards). The stated purpose of the guidelines is to ensure that newly constructed facilities and altered portions of existing facilities covered by the ADA are readily accessible to disabled persons.

Regulatory implementation of the ADA includes the following priorities for barrier removal in existing facilities:

- **Accessible Entrances.** Providing access from public sidewalks, parking or public transportation that enables disabled individuals to enter the facility.
- **Access to Goods and Services.** Providing access to areas where goods and services are made available to the public.
- **Usability of Restrooms.** Providing access to restroom facilities.
- **Removal of Remaining Barriers.** Providing access to the goods, services, facilities, privileges, advantages, or accommodations.

APPLICABILITY

The ADA in its purest form relates only to facilities occupied or significantly altered after March 13, 1991. As this building was constructed in 1998, it is therefore required to comply with the applicable aspects of 1991 ADA guidelines. Any subsequent refurbishments must comply with the ADA guidance in affect at that time.

SITE ACCESS AND BUILDING ENTRANCES

REQUIREMENTS

The first consideration relates to measures that will enable individuals with disabilities to physically approach and enter a place of public accommodation. The priority of "getting through the door" recognizes that providing actual physical access to a facility from public sidewalks, public transportation or parking, is generally preferable to any alternative arrangement in terms of both business efficiency and the dignity of individuals with disabilities. Additionally, if passenger drop-off areas are provided, they must be accessible and an accessible route must connect each accessible drop-off area with the accessible entrance(s). Curb ramps must be provided if the drop-off area is next to a curb and raised sidewalk.

Section 405 (Ramps) of the ADAAG requires that any part of an accessible route with a slope greater than 1:20 shall be considered a ramp. Confirmation should be sought that all exterior ramps on accessible routes meet these requirements.

The parking areas should contain a suitable amount of car and van accessible spaces in line with Section 502 (Parking Spaces) of the ADA. These should be located near the accessible building entrance, along the accessible path and should be provided with suitable signage and pavement markings.

The entrance approach, door widths and hardware must be compliant with ADAAG, and it is advised that automated door openers are provided if the opening force to entrance doors is considered excessive.

ON-SITE CONDITIONS

Disabled persons wishing to access the Property are able to gain entry utilizing the public sidewalks that lead to the parking lot driveway to the previously detailed entrances. The route of travel from the public street frontage to the entrance is generally unrestricted and accessible in compliance with the GAC and ADA standards. There are two accessible parking spaces available in the parking lot. Access for visitors is restricted to the main entrance. Employees are able to access the building at a service entrance at the east side of the building. Access at the entrance is through a double swinging door. Access at the service entrance is through an outward swinging door. Each door has a compliant clear opening width of 32".

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

ACCESSIBLE ROUTES

REQUIREMENTS

All publically accessible areas should be provided with suitable horizontal and vertical circulation. Elevators should comply with Section 407 (Elevators), including suitable controls, signage (including braille), audio floor indicators, and the applicable spatial requirements. All publically accessible floors should be provided with an elevator along the accessible path.

Section 405 (Ramps) of the ADAAG requires that any part of an accessible route with a slope greater than 1:20 shall be considered a ramp.

Section 308 (Space Allowance and Reach Ranges) of the ADAAG requires that a minimum clear width for single wheelchair passage shall be 32-inches, the minimum width for two wheelchairs to pass is 60-inches, the space required for a wheelchair to make a 180-degree turn is a clear space of 60-inches, and the minimum clear floor or ground space required to accommodate a single, stationary wheelchair occupant is 30-inches by 48-inches.

Section 307 (Protruding Objects) of the ADAAG requires that objects projecting from walls (e.g. drinking fountains) with their leading edges between 27-inches and 80-inches above the finished floor shall protrude no more than 4-inches into walks, halls, corridors, passageways, or aisles. Objects mounted with their leading edges at or below 27-inches above the finished floor may protrude any amount. Free-standing objects mounted on posts or pylons may overhang 12-inches maximum from 27-inches to 80-inches above the ground or finished floor. Protruding objects shall not reduce the clear width of an accessible route or maneuvering space.

Section 302 (Floor or Ground Surfaces) of the ADAAG requires that ground and floor surfaces along accessible routes and in accessible rooms and spaces, including floors, walks, ramps, stairs, and curb ramps, be stable, firm and slip-resistant. Flooring within the Property generally complied with this requirement.

This section also requires that changes in level between ¼-inches to ½-inches be beveled with a slope no greater than 1:2, and that changes in level greater than ½-inches be accomplished by means of a ramp. The section also states that carpet or carpet tile used on a ground or floor surface be securely attached; have a firm cushion, pad or backing or no cushion or pad; and have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Where gratings are located on walking surfaces, then they shall have spaces no greater than ½-inches wide in one direction.

ON-SITE CONDITIONS

Once through the entrance doors, the Property generally complies with these requirements. Door widths were compliant with the applicable sections of the GAC and 2010 Standards. Access to the main lobby, horizontal and vertical circulation through the remaining public areas of the building is unrestricted, and no protruding objects were noted. In addition, all floor surfaces along accessible routes are firm and slip resistant. The stated requirements for elevators, ramps and changes in level between floor surfaces do not apply.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

DOORS AND SIGNAGE

REQUIREMENTS

The ADAAG states that signs that identify permanent rooms and spaces such as those identifying restrooms and exits or providing room numbers must have Braille and raised letters or numbers to allow them be read visually or tactilely. The ADAAG also states that signs must also meet specific requirements for mounting location, color contrast and non-glare surface. Signs that provide direction to or information about functional spaces must only comply with requirements for character proportion, character height and finish, and with contrast between the characters and background.

Letters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10. The letters and numbers on signs shall be raised 1/32-inches minimum and shall be sans serif. The characters or symbols on signs shall be at least 5/8-inches high, but no higher than 2-inches. Symbols or pictographs on signs shall be raised 1/32-inches minimum. The ADAAG also requires that doors to hazardous areas be equipped with tactile warnings.

Section 404 (Doors, Doorways and Gates) states that doorways and gates, including security entrance gates shall have a minimum clear opening of 32-inches and that the respective maneuvering clearances are maintained.

This section of the ADAAG also states that the threshold at doorways shall not exceed ½-inches in height, and that door hardware (handles, pulls, latches, locks, etc.) on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching or twisting of the wrist to operate.

ON-SITE CONDITIONS

The limited signage used to identify offices and other permanent rooms and spaces within the building generally meet these requirements. Signs at each public restroom do not meet the physical requirements and positioning requirement of the GAC and ADA standards and should be replaced as a routine maintenance item. The doorways at each building entrance and at the book sensor met this requirement with a typical clear opening width of 33 to 34-inches.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

ACCESSIBLE AMENITIES AND FUNCTION SPACES

REQUIREMENTS

The ADA requires that all primary function areas are readily accessible for all. Confirmation should be sought that all such facilities and equipment is readily accessible in line with the respective section of the ADAAG.

ADAAG requires that where provided, at least one of each type of depository, vending machine and change machine shall comply with Section 309. Such requirements including that operable parts are located no more than 48" above finishes floor level and that operable parts shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist.

Drinking fountains should meet the requirements set out in Section 211 – Drinking Fountains, including the requirement for a minimum of two drinking fountains. Section 602.4 (Spout Height) of the ADA requires that the spout height of drinking fountains not exceed 36-inches. Additionally they should have a clear floor space in line with Section 602.2 and a minimum of 27" knee clearance.

ON-SITE CONDITIONS

Generally, the Property complies with these requirements, as primary function areas are readily accessible. However, we did note that the circulation desk was standard height across its entire length. We recommend budgeting for the modification of the circulation desk to accommodate disabled individuals.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Install ADA Compliant Circulation Counter	III	Code Compliance	2016	$5,250

USABILITY OF RESTROOMS

REQUIREMENTS

The third priority emphasizes those measures that will provide individuals with disabilities with access to restroom facilities. A clear approach should be provided to one of each fixture type within an accessible restroom and a minimum of a 60" diameter turning space should be provided.

The ADAAG requires that the minimum width of the standard accessible stall shall be 60" and the minimum depth of floor mounted standard accessible stall shall be 59" (or 56" if wall mounted). The height of water closets shall be 17" to 19", measured to the top of the toilet seat. A 36" minimum length grab bar is required behind the water closet, extending 24" from the centerline of the toilet on the open side. A 42" minimum length grab bar is required on the sidewall, which should extend at least 54" from the rear wall. All grab bars should be mounted between 33" and 36" above the finished floor.

The ADAAG requires that urinals shall be stall-type or wall-hung with an elongated rim at a maximum of 17-inches above the finish floor. The ADAAG also requires that a clear floor space of 30-inches x 48-inches shall be provided in front of urinals to allow for a forward approach. Flush controls shall be hand operated or automatic, and shall be mounted no more than 44-inches above the finish floor.

The ADAAG requires that lavatories shall be mounted with the rim or counter surface no higher than 34-inches above the finish floor and a minimum of 27" knee clearance should be provided beneath a lavatory. Faucets are required to be operable with a closed fist. Lever-operated, push-type and electronically controlled mechanisms are examples of acceptable designs. Hot water and drain pipes under lavatories shall be insulated or otherwise configured to protect against contact.

Mirrors located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface 40 inches maximum above the finish floor or ground. Mirrors not located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface no more than 35 inches maximum above the finish floor or ground.

ON-SITE CONDITIONS

Restrooms were generally compliant with the requirements of the GAC and ADA.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

APPENDICES

APPENDIX A: Capital Expenditures

APPENDIX B: Photographic Record

APPENDIX C: Other Documentation

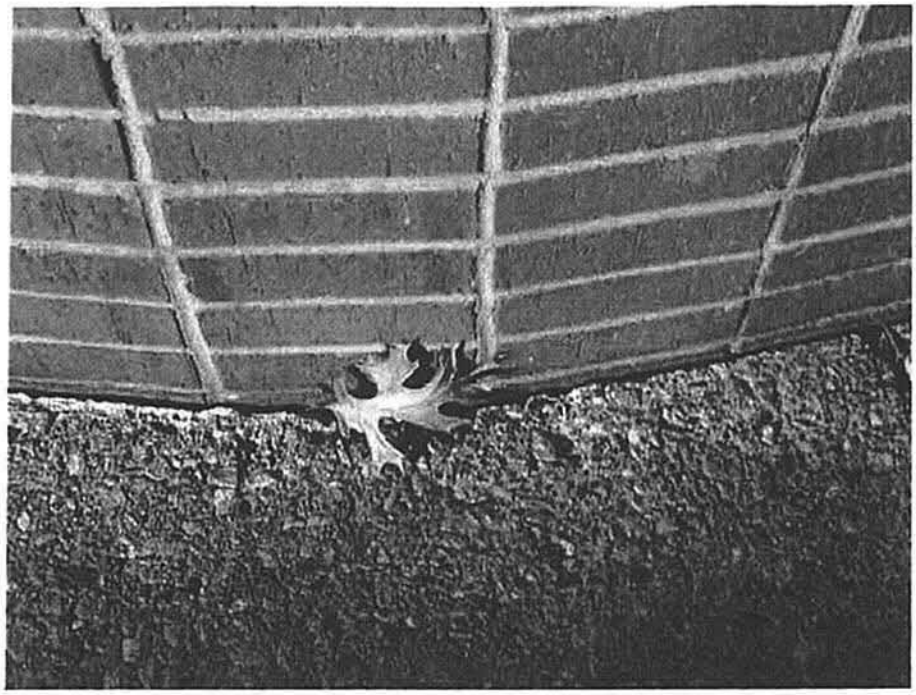
APPENDIX A:
CAPITAL EXPENDITURES

Five Year Capital Expenditure Forecast
East Point Branch Library
2757 Main Street
East Point, Georgia 30344

FAITHFUL+GOULD

Component No.	Component	Priority Category	Deficiency Category	Impact of Failure	Condition	Probability of Failure	Frequency of Failure	Risk Score	Risk Category	Estimated Useful Life or Replacement Cycle (Yrs)	Remaining Useful Life (Yrs)	Cost Multiplier	Quantity	Unit of Measurement	Unit Cost	2016	2017	2018	2019	2020	Required
															Year	1	2	3	4	5	
Site Systems																					
Required																					
1	Fill Cracks, Sealcoat, Re-stripe Parking Lot, and Remark ADA Spaces	III	RM	5	4	5	5	19	Low	10	3	1.05	2,410	SY	$2.50			$6,326			$6,326
2	Repair Concrete Curbs and Sidewalk Cracks	III	RM	5	4	5	5	19	Low	5	3	1.05	125	LF	$34.00			$4,463			$4,463
Structural Systems																					
Required																					
No Expenditures Required At This Time																					
Roofing Systems																					
Required																					
1	Investigate, Locate and Reseal Roof Leaks	III	OM	3	3	3	3	12	High	5	1	1.00	50	Hour	$85.00	$4,250					$4,250
Exterior Elements																					
Required																					
1	Replace and Reseal Deteriorated Window Seals	II	OM	4	3	3	3	13	High	20	1	1.15	12	EA	$250.00	$3,450					$3,450
2	Renew Exterior and Mortar Joints and Flashing of Building Roof	II	RM	4	4	4	4	16	Medium	15	1	1.15	1	Allowance	$6,500.00	$7,475					$7,475
Mechanical																					
Required																					
1	Upgrade Control System	III	CR	3	3	4	5	15	Medium	15	1	1.25	11,378	EA	$3.75	$53,334					$53,334
Electrical																					
Required																					
1	Upgrade Lighting (Main and Administration Area)	V	CI	4	4	4	5	17	Low	20	3	1.00	25	EA	$750.00			$18,750			$18,750
Plumbing																					
Required																					
No Expenditures Required At This Time																					
Fire & Life Safety																					
Required																					
1	Replace Fire Alarm Control Panel	III	CR	4	3	4	5	16	Medium	15	2	1.50	1	EA	$5,500.00		$8,250				$8,250
Conveyance Systems																					
Required																					
No Expenditures Required At This Time																					
Interiors																					
Required																					
1	Renovate Restrooms	V	CR	4	4	4	5	17	Low	20	3	1.15	6	FXT	$5,500.00			$37,950			$37,950
2	Replace Carpet	V	CR	4	4	4	5	17	Low	10	3	1.20	880	SY	$30.00			$31,680			$31,680
3	Replace Floor Tile	V	CR	4	4	4	5	17	Low	20	3	1.05	230	FT	$5.00			$1,208			$1,208
4	Replace Suspended Acoustical Ceiling As A Result of Roof Leaks	V	CR	4	4	4	5	17	Low	20	3	1.05	3,000	SF	$5.75			$18,113			$18,113
5	Repair or Replace Damaged Sheet Rock in Main Library and Bay Windows	II	DM	4	4	4	4	16	Medium	15	1	1.15	1	Allowance	$3,500.00	$4,025					$4,025
Accessibility																					
Required																					
1	Install ADA Compliant Circulation Counter	III	CC	5	5	5	5	20	Low	20	1	1.05	1	Allowance	$5,000.00	$5,250					$5,250
														Required Cost (2016 Dollars)		$77,784	$8,250	$118,489	$0	$0	$204,523

APPENDIX B:
PHOTOGRAPHIC RECORD



Photograph No. 1

Bay structure
separation

Photograph No. 2

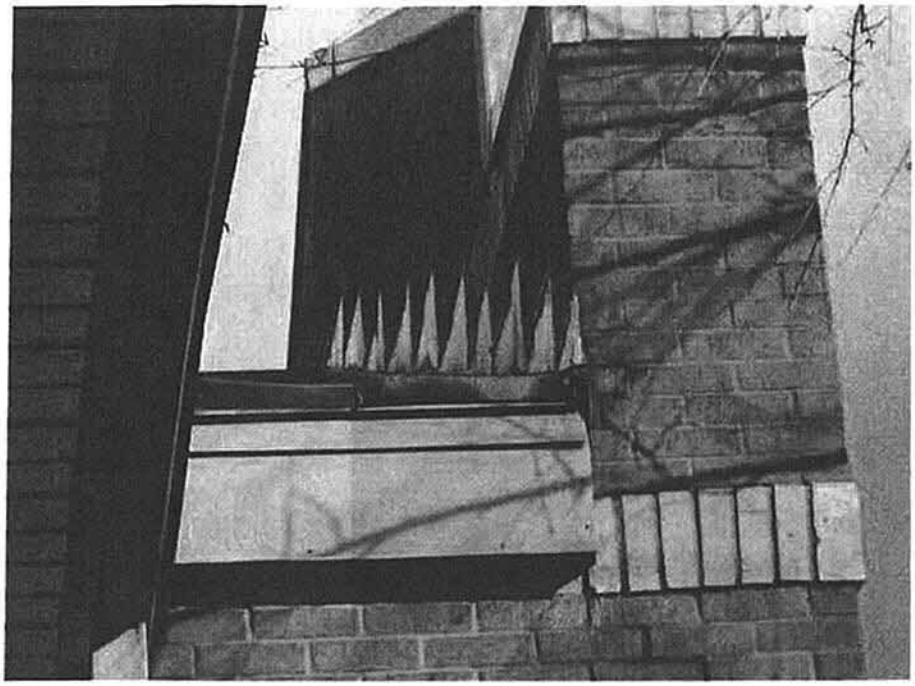
Front Entrance

Photograph No. 3

Fencing not secure

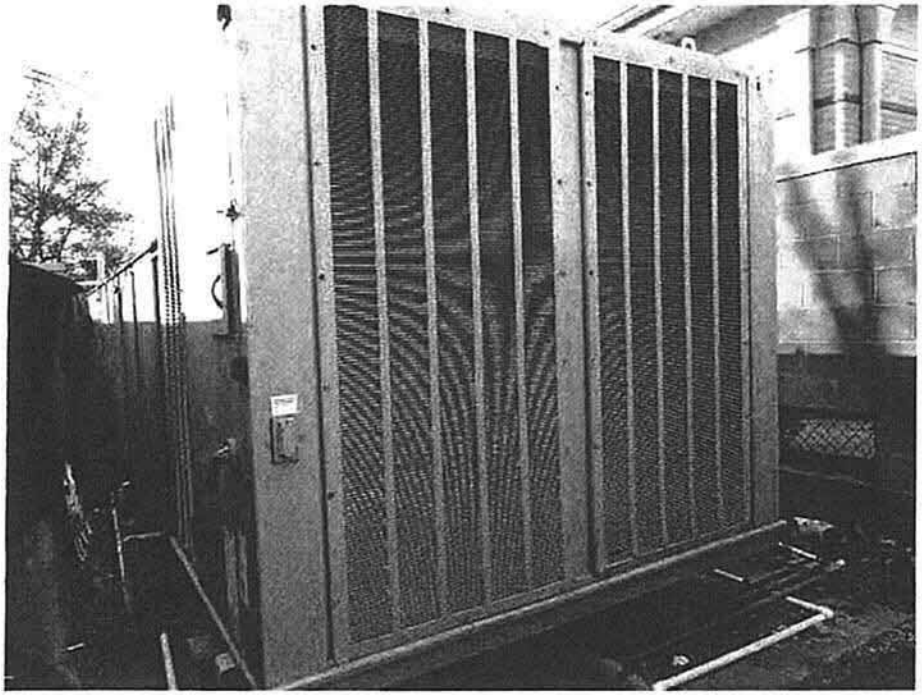
Photograph No. 4

Fencing of holding pond



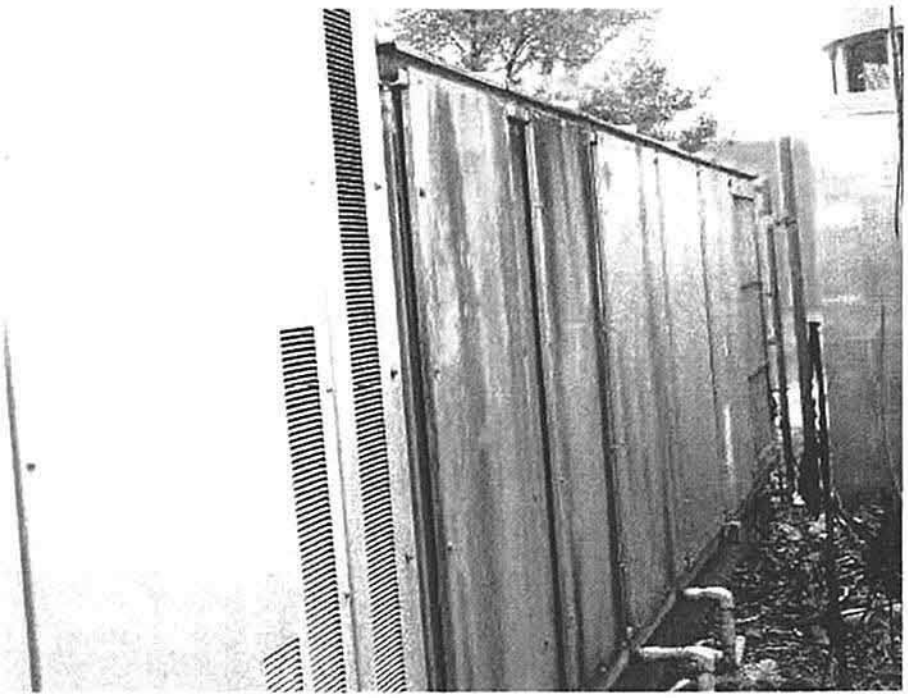
Photograph No. 5

Flashing repair



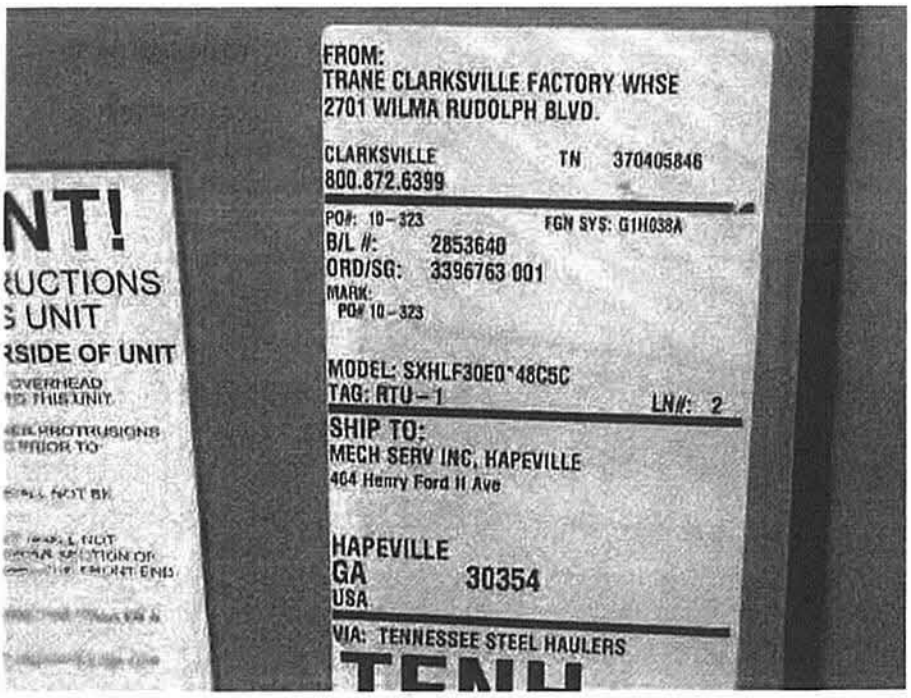
Photograph No. 6

HVAC Trane unit



Photograph No. 7

Trane HVAC rear view



Photograph No. 8

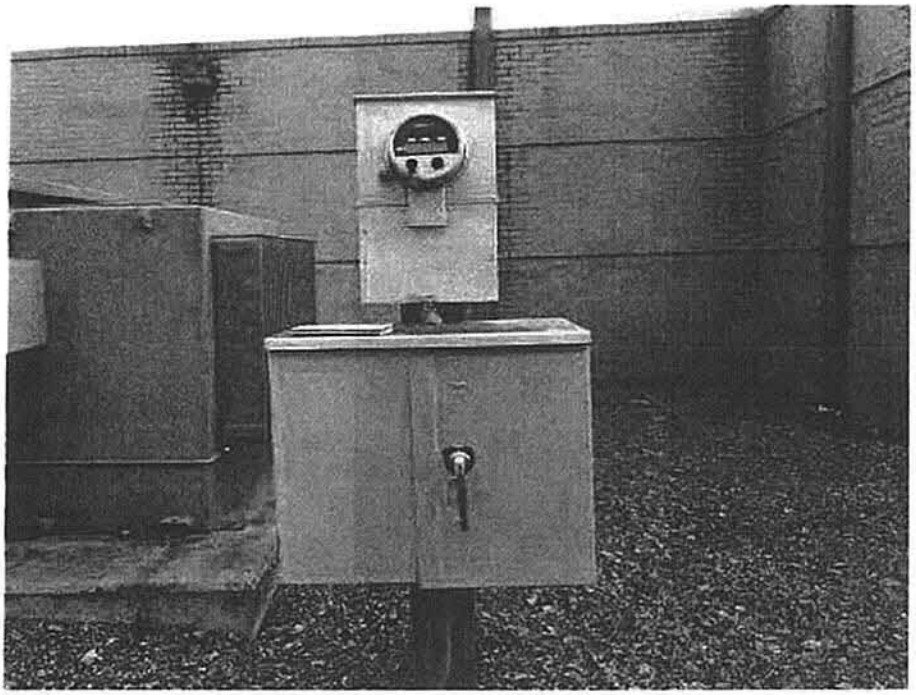
HVAC label

Photograph No. 9

Library entrance

Photograph No. 10

Patch caulking

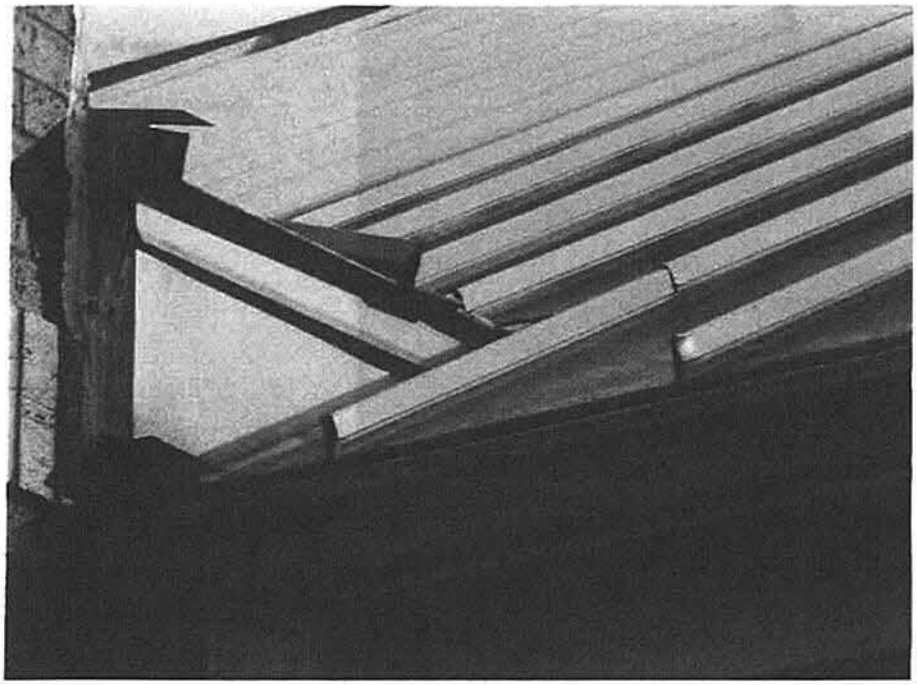


Photograph No. 11

Power system

Photograph No. 12

Retaining pond drainage



Photograph No. 13

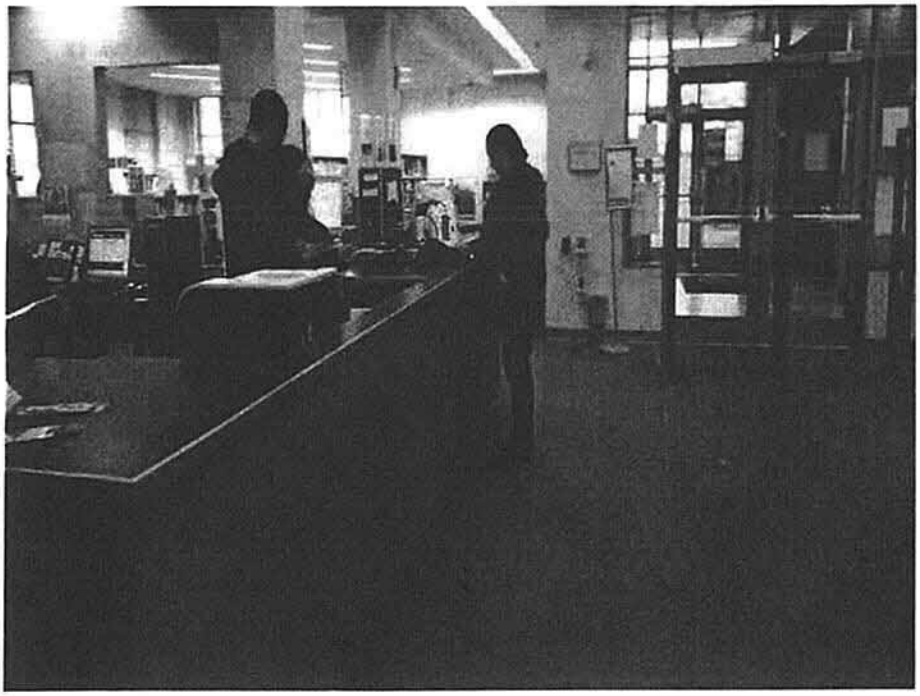
Roof patch caulking

Photograph No. 14

Roof patches

Photograph No. 15

Roof

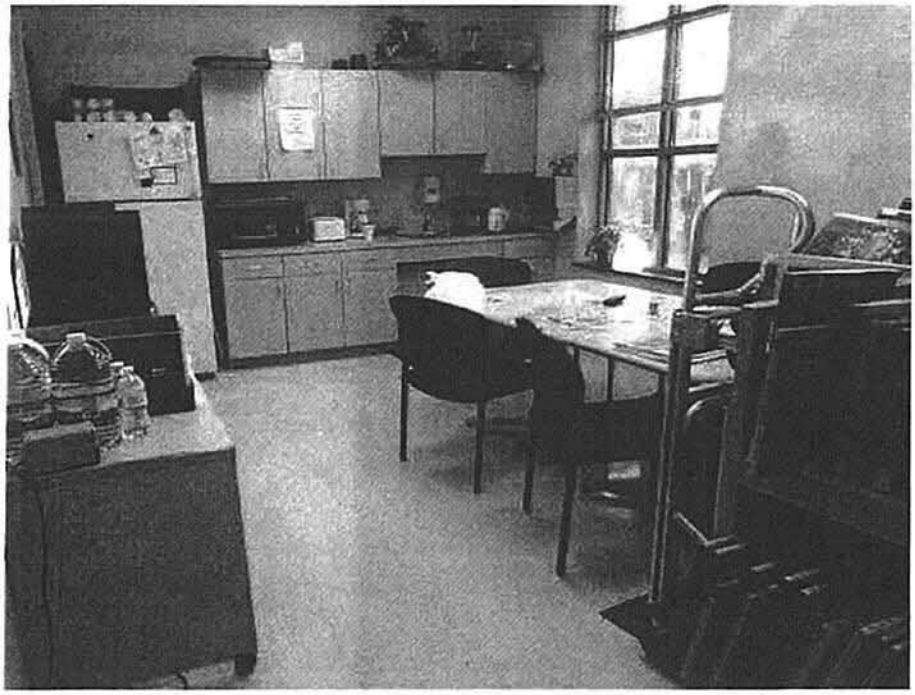


Photograph No. 16

Circulation desk

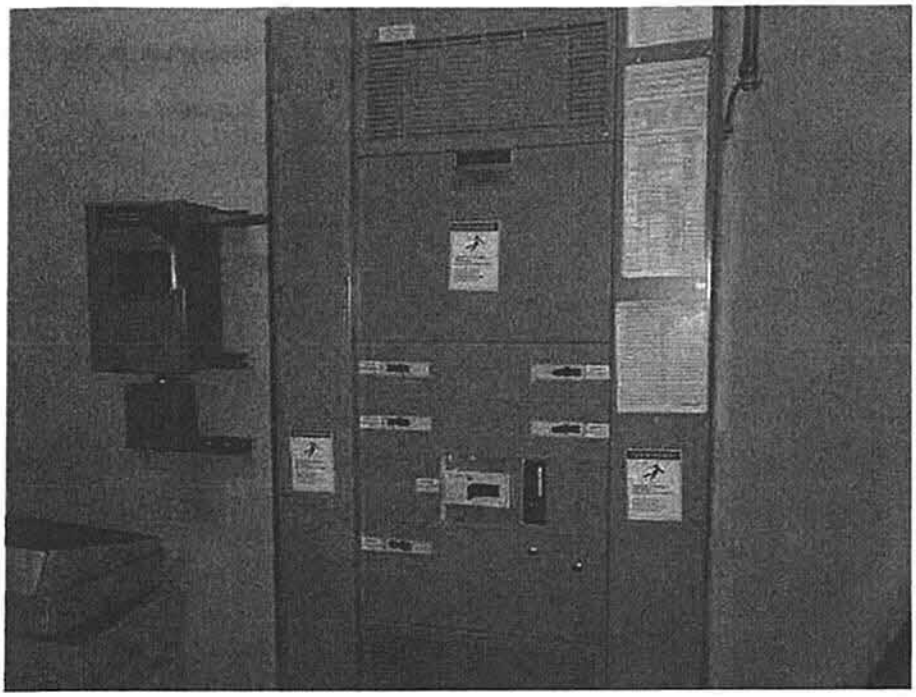
Photograph No. 17

Sensor entrance



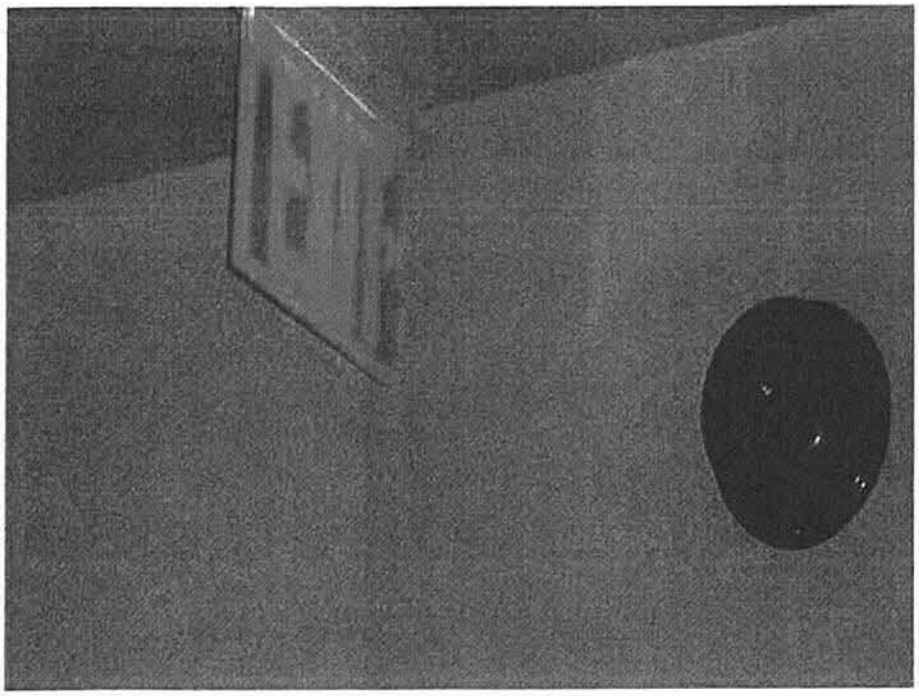
Photograph No. 18

Breakroom



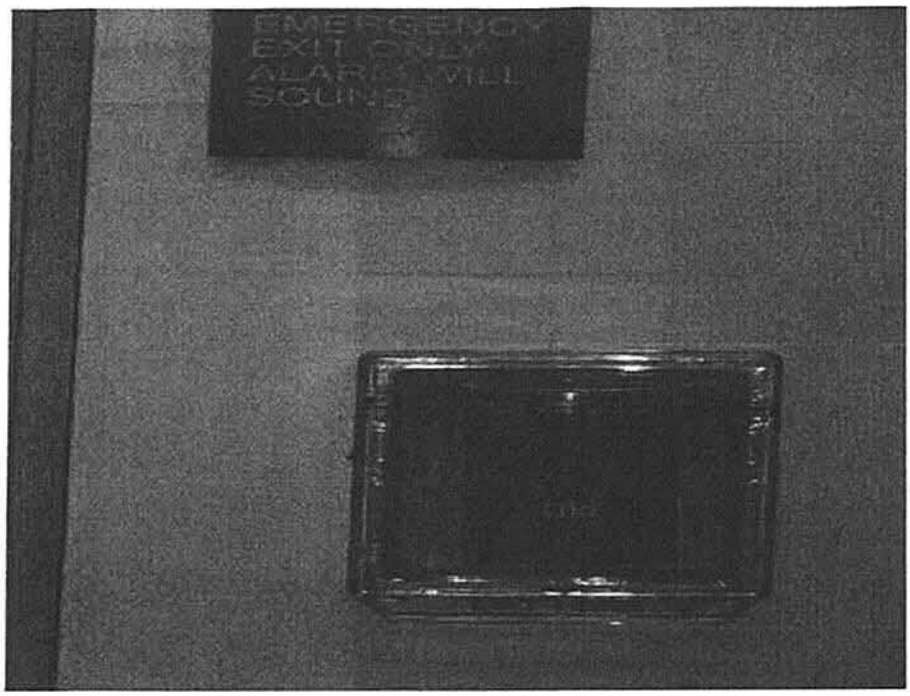
Photograph No. 19

Electrical power



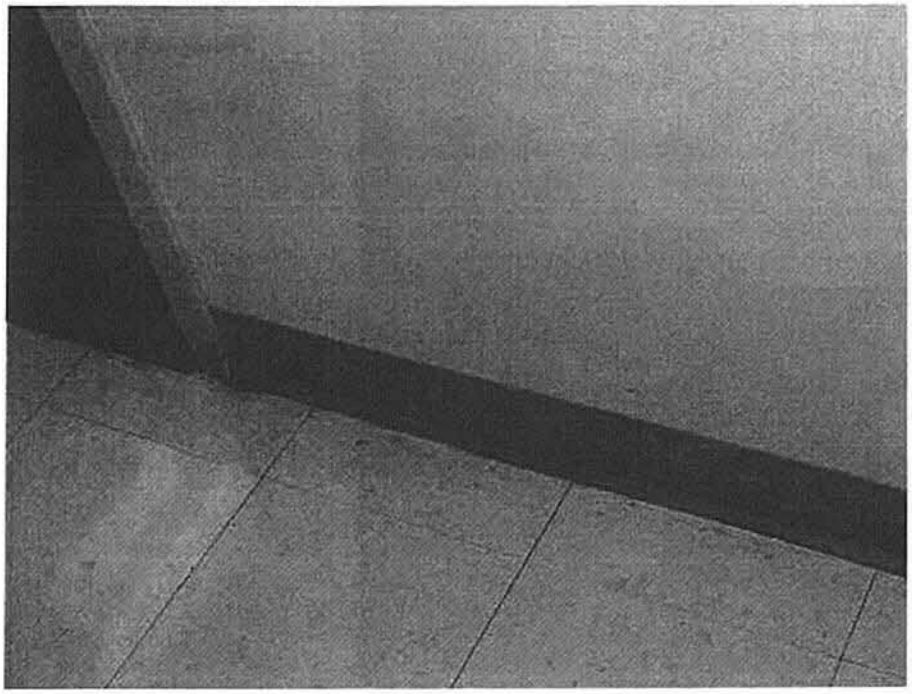
Photograph No. 20

Exit sign



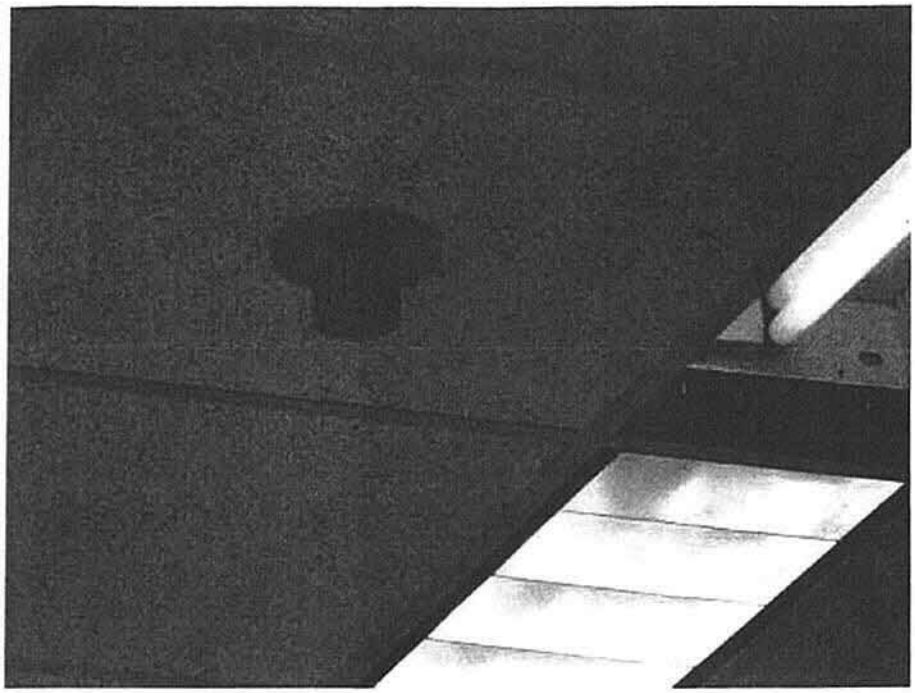
Photograph No. 21

Fire alarm



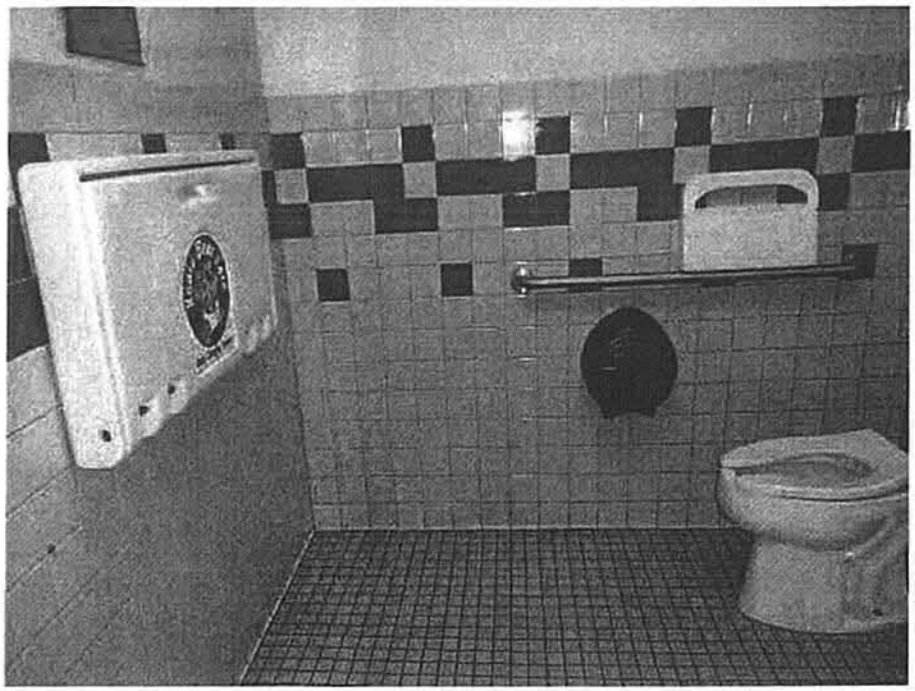
Photograph No. 22

Floor tile breakroom



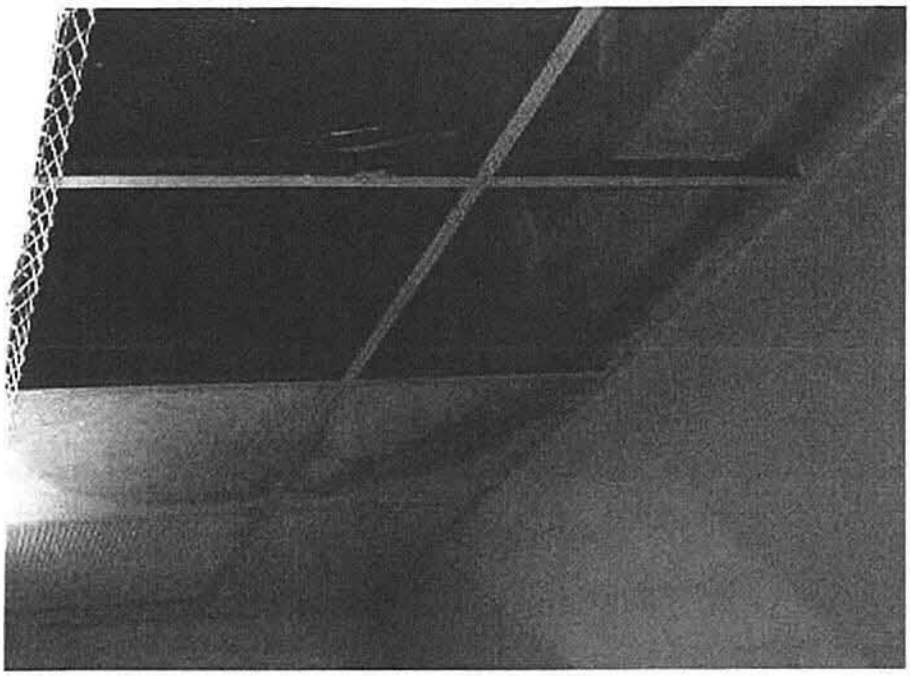
Photograph No. 23

Light cover missing and smoke detector



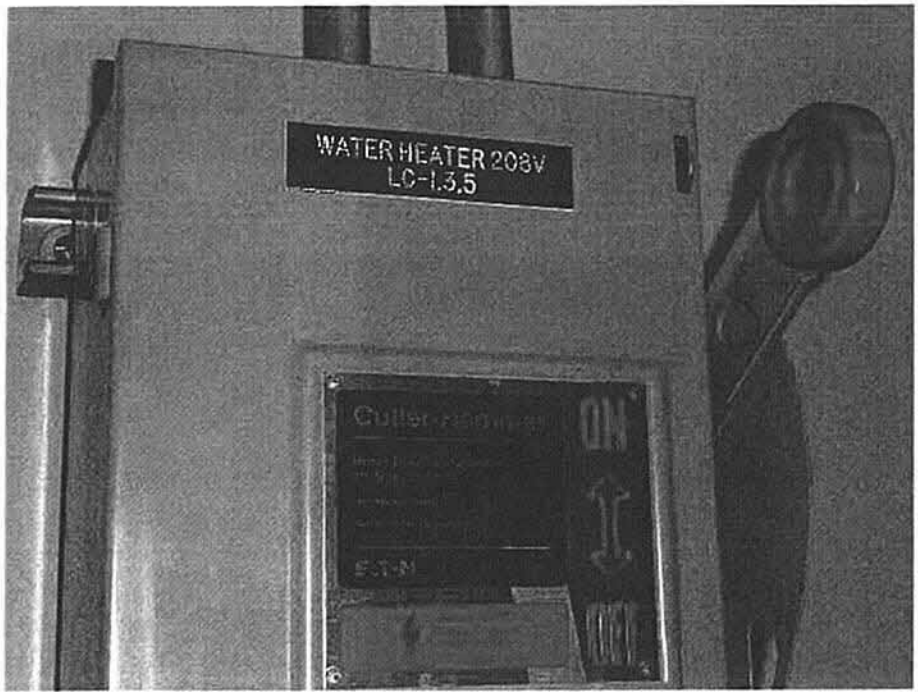
Photograph No. 24

Men's restroom



Photograph No. 25

Missing ceiling



Photograph No. 26

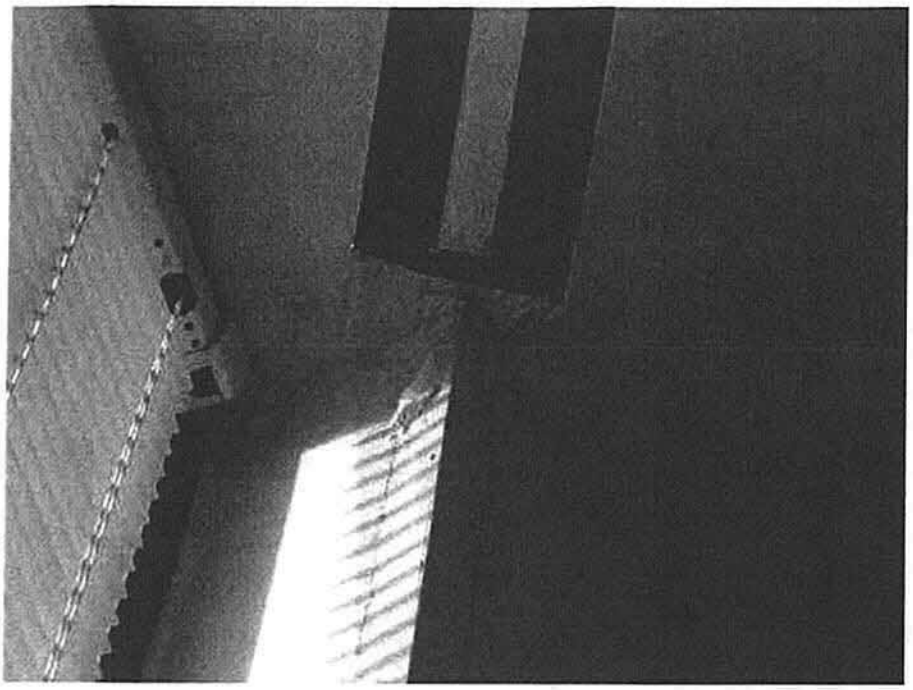
Power source

Photograph No. 27

Power System

Photograph No. 28

Wall and floor damage

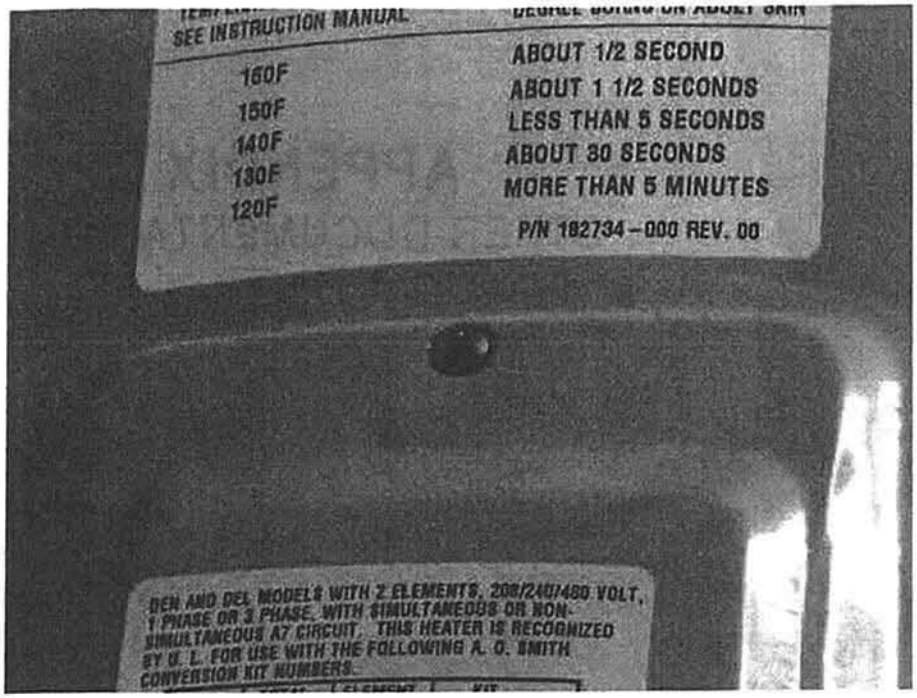


Photograph No. 29

Water ceiling damage

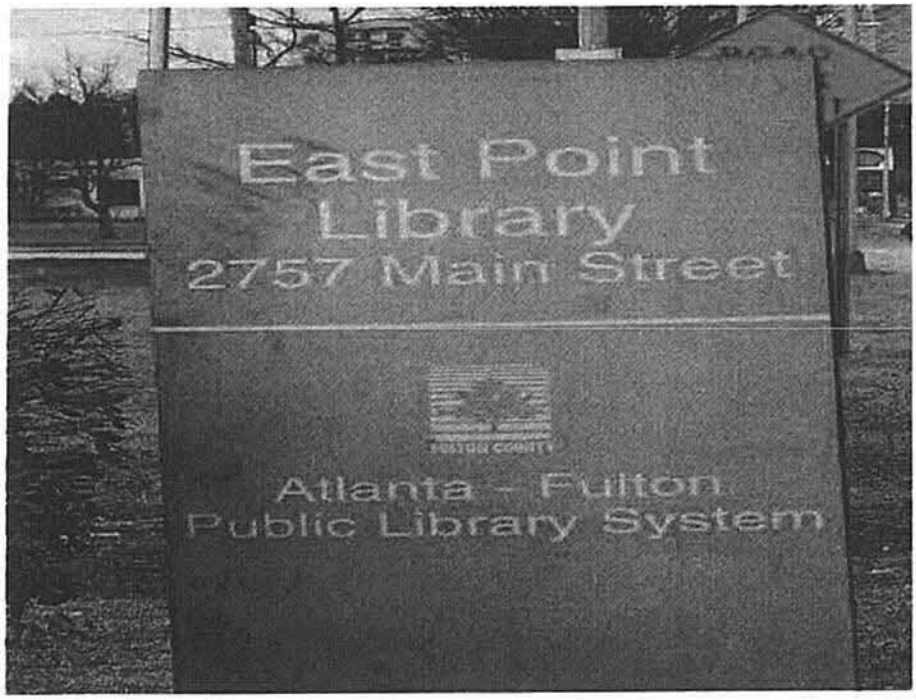
Photograph No. 30

Water heater label



Photograph No. 31

Water tank



Photograph No. 32

Sign

APPENDIX C:
OTHER DOCUMENTATION

Preventative Maintenance Budget

Building Name	Uniformat Level 2	Title	Quantity	Total Labor Hours per Year	Cost In-House	Cost Contract
Roofing Systems						
East Point Library	Roofing Systems	Preventative maintenance of roof coverings.	3.0	2.86	$277.41	$416.12
Subtotal:			3.00	2.86	$ 277.41	$ 416.12
Mechanical						
East Point Library	Mechanical	HVAC control system, Zone Controllers	3.0	8.65	$850.86	$1,276.29
East Point Library	Mechanical	Package unit, 25 tons through 50 tons	1.0	9.01	$995.55	$1,493.33
Subtotal:			4.00	17.66	$ 1,846.41	$ 2,769.62
Electrical						
East Point Library	Electrical	Main electrical switchgear/distribution panel preventative maintenance	1.0	1.64	$190.48	$285.72
East Point Library	Electrical	Lighting system, emergency w/ battery backup	14.0	16.84	$1,066.31	$1,599.47
East Point Library	Electrical	Switchboard, Electrical	4.0	4.6	$353.00	$529.50
Subtotal:			19.00	23.09	$ 1,609.79	$ 2,414.69
Plumbing						
East Point Library	Plumbing	Backflow prevention device, up to 4"	2.0	1.1	$160.39	$240.59
Subtotal:			2.00	1.10	$ 160.39	$ 240.59
Fire & Life Safety						
East Point Library	Fire & Life Safety	Fire Alarm System Testing and Maintenance, 50	1.0	5.56	$430.80	$646.20

Preventative Maintenance Budget

Building Name	Uniformat Level 2	Title	Quantity	Total Labor Hours per Year	Cost In-House	Cost Contract
		devices or less				
Subtotal:			1.00	5.56	$ 430.80	$ 646.20
Total:			29.00	50.27	$ 4,324.80	$ 6,487.22

Count: 8

FAIRBURN HOBGOOD-PALMER BRANCH LIBRARY

60 Valley View Drive
Fairburn, Georgia 30213

March 21, 2016

Report of Facility Condition Assessment

DRAFT

..ITHFUL + GOULD
CONSTRUCTIVE EXPERTISE

FULTON COUNTY

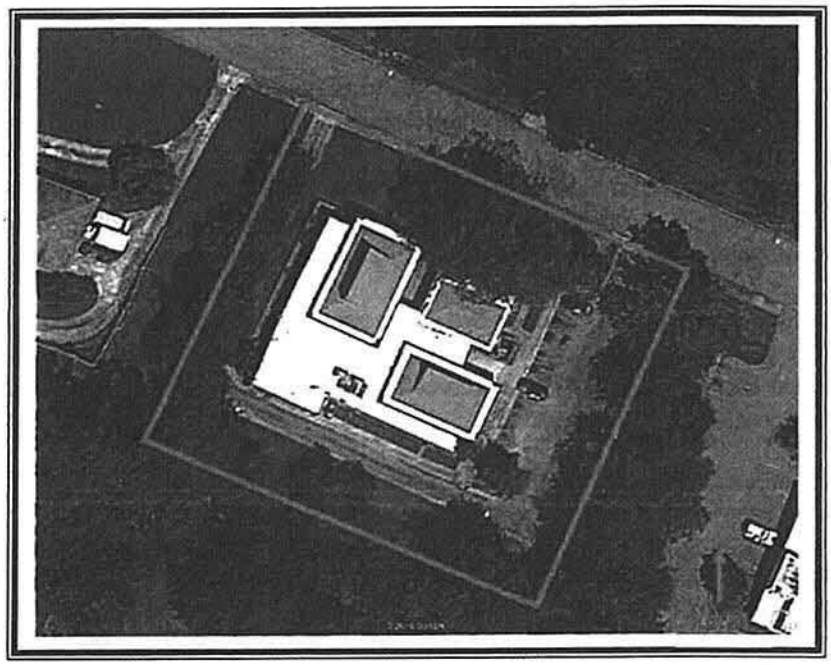
TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

INTRODUCTION

The Fairburn Hobgood-Palmer Branch Library ("the Property) is located at 60 Valley View Drive in Fairburn, Georgia. Site features at the Property contains a land area of approximately 1.00 acre (roughly 43,560 square feet) bounded by Valley View Drive to the north, business properties to the east, Washington Street to the south, and Malone Street to the west. This single story structure of 9,625 GSF was constructed in 1969 and contains a main entry lobby, a public meeting room, public and staff restrooms, open stacks and reading spaces, and staff offices, work areas and breakroom facilities. Plan 1-1 provides an overview of the Property considered by this report

Plan 1-1 – Aerial View of Property



PROJECT DETAILS

On January 21, 2016, Mr. Alexander Morgan, PMP from BuildSmart Enterprises, LLC (a Consultant working under contract from Faithful+Gould, Inc., and hereafter referred to as Faithful+Gould) visited the Property to complete a comprehensive facilities condition assessment of the building and site systems. The objectives of the assessment were to:

1. Identify the condition of the Property and the timing and cost of expenditures required over the next five years. Capital expenditures considered by this report typically have an aggregate value of $1,000 or more and generally exclude minor repair and maintenance items.
2. Determine failure probability of the various systems and components.
3. Determine criticality of system and component failure in relation to the functions served or area supported.

4. Validate existing maintainable equipment inventories and develop preliminary budgets for preventative maintenance activities of the identified equipment.

SCOPE OF SERVICES

Faithful+Gould was requested to complete a Facility Condition Assessment of the site and site improvements of the facility and related site features contained at the Fairburn Hobgood-Palmer Branch Library. The key issues to be addressed by the Facility Condition Assessment include the following:

- Identify the condition of the Property and the prioritization, timing, and cost of expenditures (>$1,000) required over the next 5-years.
- Determine criticality of system and component failure.
- Document the maintainable equipment within each facility and develop preliminary preventative maintenance budgets for equipment maintained by the General Services/Public Works Department.

Strategy Employed to Meet Key Issues

The strategy employed to meet the key issues detailed above (i.e. our scope of services) consisted of performing a visual assessment of the interior, exterior and site components of the subject Property.

The primary purpose of the Facility Condition Assessment was to identify visually apparent deficiencies in the buildings. The evaluation included site visits to observe the buildings and site systems, interviewing building management and maintenance personnel, and reviewing available maintenance systems, design and construction documents and plans, and public records.

This Facility Condition Assessment has been conducted in general accordance with industry standards and the American Society for Testing and Materials (ASTM) Standard E 2018-15 Standard Guide for Property Condition Assessment: Baseline Property Condition Assessment Process and the Contract Documents for 15RFP082615K-DJ Facilities Condition Assessment for the Fulton County General Services/Public Works Department.

We performed a visual non-destructive assessment of the interior, exterior and site components of the Property, including the following major components and systems:

- **Substructure.** We observed the structures for visible signs of distress and reported our findings. We also reviewed available structural drawings for information regarding the design load criteria of the existing structures and the building codes to which the structures were designed. We did not complete a seismic evaluation (PML) of the Property.

- **Shell.** We visually observed the exterior wall system, window and door systems for visible evidence of deficiencies, continuity of seals, and other types of distress and have our findings. We reviewed available flashing and connection details for drainage design and observed the condition and placement of expansion joints. Our visual observations were based on those conditions that can be observed from ground level, roof level and with binoculars. We visually evaluated the condition of accessible roof systems, accessories, and details. In addition, where applicable we discussed existing roof warranties.

- **Interiors**. We visually observed the interior areas of the Property and reported their general condition. Interior finish replacement costs are included if they are significant or if they are part of a repair. Otherwise, interior finish costs are considered part of the interior finish replacement program and are not included in the cost tables.

- **Services.** We observed the age and condition of the Mechanical, HVAC, Electrical, Plumbing (MEP) Systems and related building systems and have commented on their condition and visible deficiencies.

- **Sitework.** We visually observed the exterior areas of the Property and reported their general condition.

- **Accessibility.** We reviewed the Property for conformance with applicable accessibility requirements and reported our findings.

The scope of services under which the Facility Condition Assessment was completed was visual in nature and not intended to be destructive to the Property to gain access to hidden conditions. We did not perform any destructive testing, uncover, or expose any system members. We have documented the type and extent of visually apparent defects in the systems in order to perform the condition assessment.

The scope of services under which the Facility Condition Assessment was completed includes only those items specifically indicated. The evaluation does not include any environmental services such as (without limitation) sampling, testing, or evaluation of asbestos, lead-based paint, lead-in-water, indoor air quality, PCB's, radon, mold, or any other potentially hazardous materials, air-borne toxins or issues not outlined in the previous scope of services. In addition, the assessment does not include identification of underground soils, identification, or quantification of underground contaminants.

Code References

We have considered that the Property holds a grandfathered status in terms of only having to comply with codes in effect at the time of construction or retroactive codes. Codes considered within this report include the following:

- IBC Codes
- Americans with Disabilities Act
- ASHRAE
- National Electrical Code
- EPACT 2005
- NFPA 10 1

Cost Estimates

We have developed cost estimates for completion of the repair and replacement projects recommended over the study period. Cost estimates have been developed on a labor and material basis primarily from data provided by Faithful+Gould project costing group. This data has been amended to reflect the geographic location of the Property. Where the County has supplied us with cost estimate information relating to completed or planned projects we have verified and included this information.

BUILDING DETAILS

Refer to table EX-1 for summary details of the facility.

Table EX-1 Facility Details

Item	Description
Project Name	Fairburn Hobgood-Palmer Branch Library
Property Type	Library
Full Address	60 Valley View Drive Fairburn, Georgia 30213
Onsite Date	January 21, 2016
Year Built	1969
Occupancy Status	Occupied
Number of Stories	Single Story
Gross Building Area (SF)	9,625
Current Replacement Value	$2,646,875
ARV/GSF ($/Sq Ft)	$275

SUMMARY OF FINDINGS

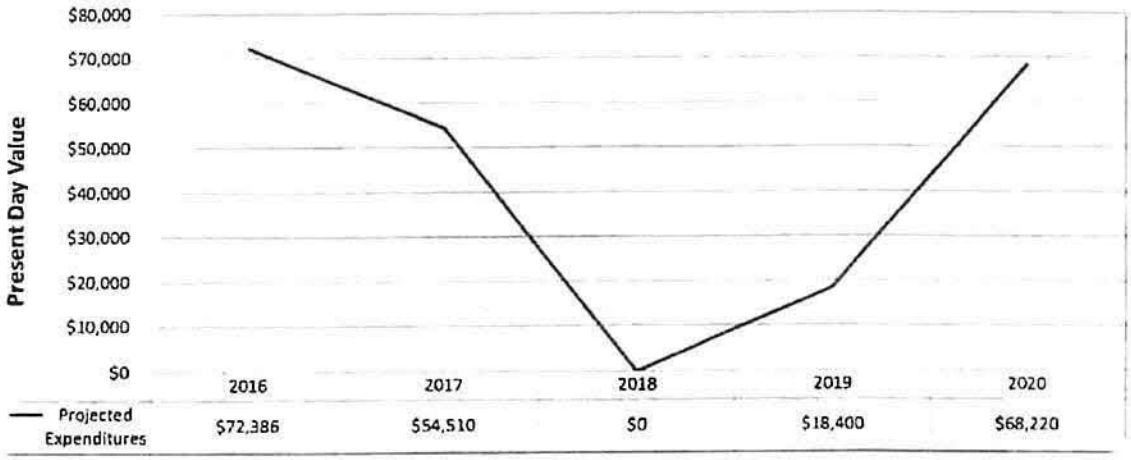
The Property is generally in fair condition, well-constructed, and has had a reasonable level of maintenance carried out over the years. However, given the age of the buildings, we anticipate the following major expenditures over the 5-year study period:

- Exterior – Surface clean and paint exterior elements
- Mechanical – Replace rooftop Carrier unit
- Mechanical – Replace split system unit
- Electrical – Upgrade lighting (Main and Administration Areas)
- Interior – Replace carpet
- Interior – Replace suspended acoustical ceiling
- Interior – Renovate restrooms (public and employee)

BUILDING EXPENDITURE SUMMARY

The building expenditure summary section provides an executive overview of the findings from the assessment. Chart EX-1 provides a summary of the anticipated expenditures over the **5-year study**. Further details of these expenditures are included within each respective report section and within the expenditure forecast, in Appendix A of this report.

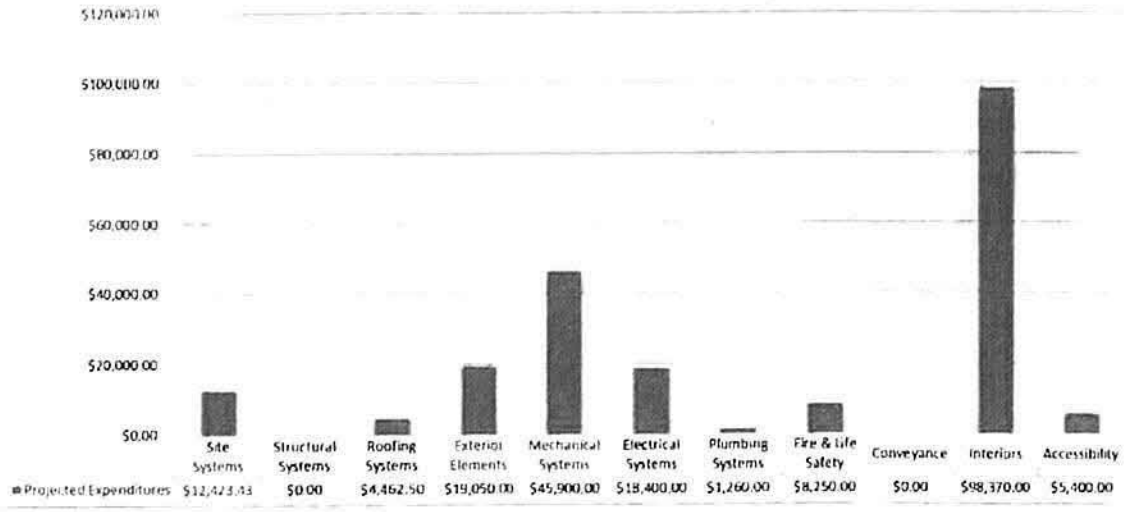
Chart EX-1 Building Expenditure Summary by Year



DISTRIBUTION OF EXPENDITURES BY BUILDING SYSTEM

Chart EX-2 illustrates a summary of the expenditures by building system over the **5-year study**. A more detailed analysis is provided within Appendix A, which provides a breakdown of individual work items as recommended within the main body of the report.

Chart EX-2 Expenditures by Building System over 5-Years



FACILITY CONDITION NEEDS INDEX

In this report, we have calculated the Facility Condition Needs Index (FCNI), which is used in Facilities Management to provide a benchmark to compare the relative condition of a group of facilities. The FCNI is primarily used to support asset management initiatives of federal, state, and local government facilities organizations.

The FCNI is the ratio of accumulated Total Cost (TC) (Deferred Renewal, Deferred Maintenance, Capital Renewal, and Capital Improvement) to the Current Replacement Value (CRV) for a constructed asset calculated by dividing the TC by the CRV. The range is from zero for a newly constructed asset, to one for a constructed asset with a TC value equal to its CRV. Acceptable ranges vary by "Asset Type', but as a general guideline the FCNI scoring system is as follows:

$$FCNI = \frac{\text{Deferred Maintenance/Renewal + Capital Renewal + Capital Improvement (TC)}}{\text{Current Replacement Value of the Facility(s) (CRV)}}$$

If the FCNI rating is 60% or greater then replacement of the asset/building should be considered instead of renewal.

Condition	Definition	Percentage Value
GOOD	In a new or well-maintained condition, with no visual evidence of wear, soiling or other deficiencies	0% to 5%
FAIR	Subject to wear, and soiling but is still in a serviceable and functioning condition	5% to 10%
POOR	Subjected to hard or long-term wear. Nearing the end of its useful or serviceable life.	Greater than 10%
V-POOR	Subjected to hard or long-term wear. Has reached the end of its useful or serviceable life. Renewal now necessary	Greater than 60%

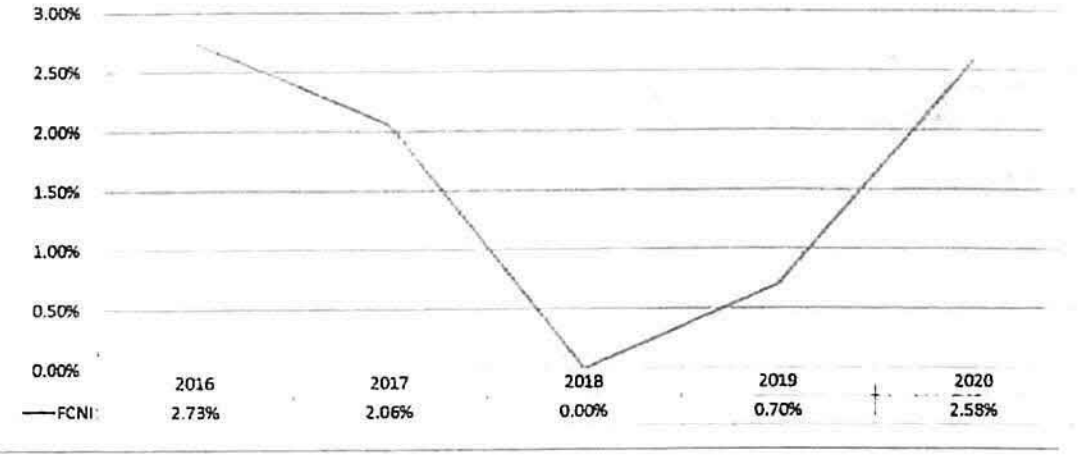
The table below indicates the current FCNI ratio of the Fairburn Hobgood – Palmer Branch Library.

Table EX-3 Facility Condition Needs Index

Key Findings	Metric
Current Year Facility Condition Needs Index	**3%**
Immediate Capital Needs (included in FCNI)	**$72,386**
Year 2 to Year 5 Capital Needs	**$141,130**

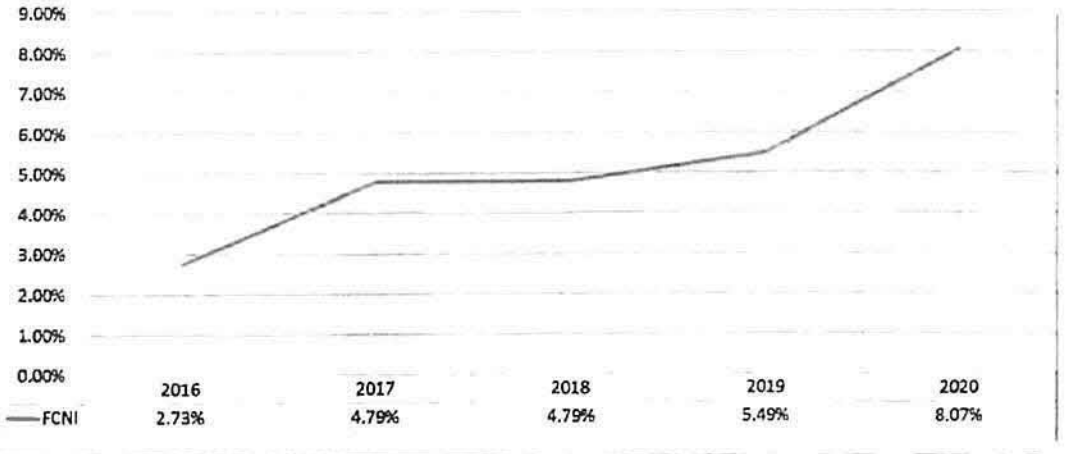
Chart Ex-3 below indicates the effects of the FCNI ratio per year, assuming the required funds and expenditures **ARE** made to address the identified actions each year.

Chart EX-3 Fully Funded FCNI Ratio per Year



The Chart below indicates the cumulative effects of the FCNI ratio over the study period assuming the required funds and expenditures are **NOT** provided to address the identified works and deferred maintenance each year.

Chart EX-4 Unfunded FCNI Ratio per Year

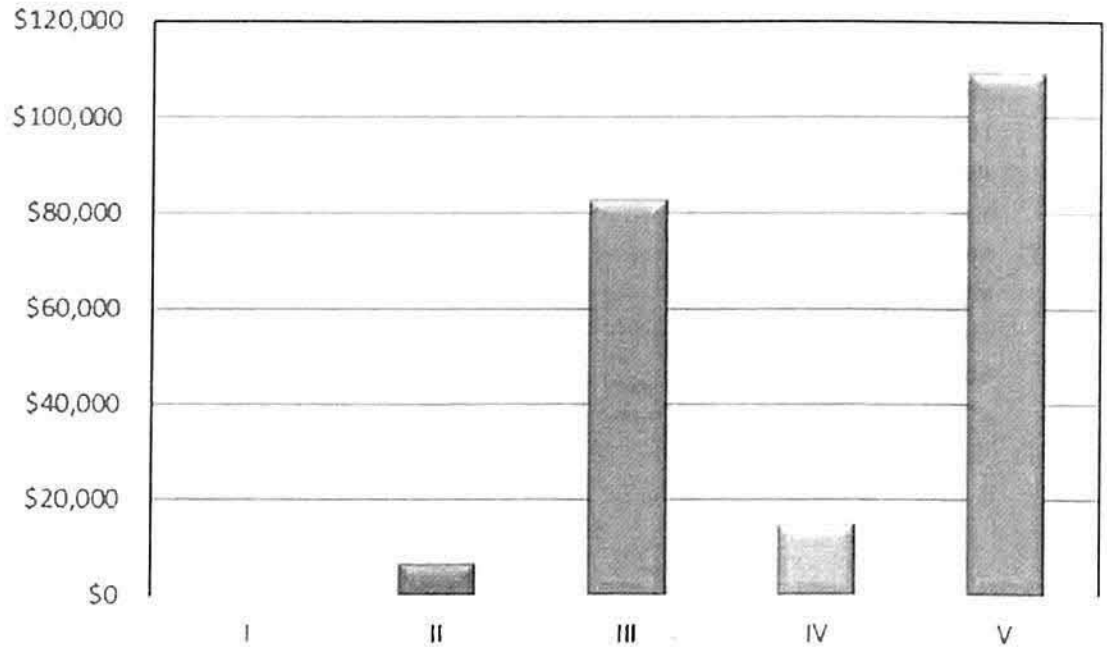


NEEDS SORTED BY PRIORITIZATION OF WORK

Faithful+Gould has prioritized the identified work in order to assist with analyzing the deficiencies found during the assessment. The baseline prioritization model is not just based on replacement year or criticality but uses five key data attributes to build an overall importance metric for every recommendation: System type, the cause or nature of the issue, timing and building mission incorporated into the model with relative weighting to provide an overall priority score. Priority categories are shown below:

Priority I Life safety and code compliance	•Systems requiring immediate action that compromises staff or public safety or requires to be upgraded to comply with current codes and accessibility
Priority II Currently Critical:	•Required to bring a system or building component back into operation or to improve reliability. Necessary to maintain continuity of operations:
Priority III Necessary / Not Critical:	•Lifecycle replacements neccessary but not critical or mid-term future replacements to maintain the integrity of the facility or component
Priority IV Recommended	•Expenditures typically based on service life or are recommended to enhance a system or component.
Priority V Appearance	•Expenditures related to improving public perception or improving aesthetics of a facility. These would mostly relate to renewal of interior finishes.

The chart below illustrates the breakdown of expenditure according the priority coding providing an opportunity to strategically plan and effectively direct funding to the highest priority.

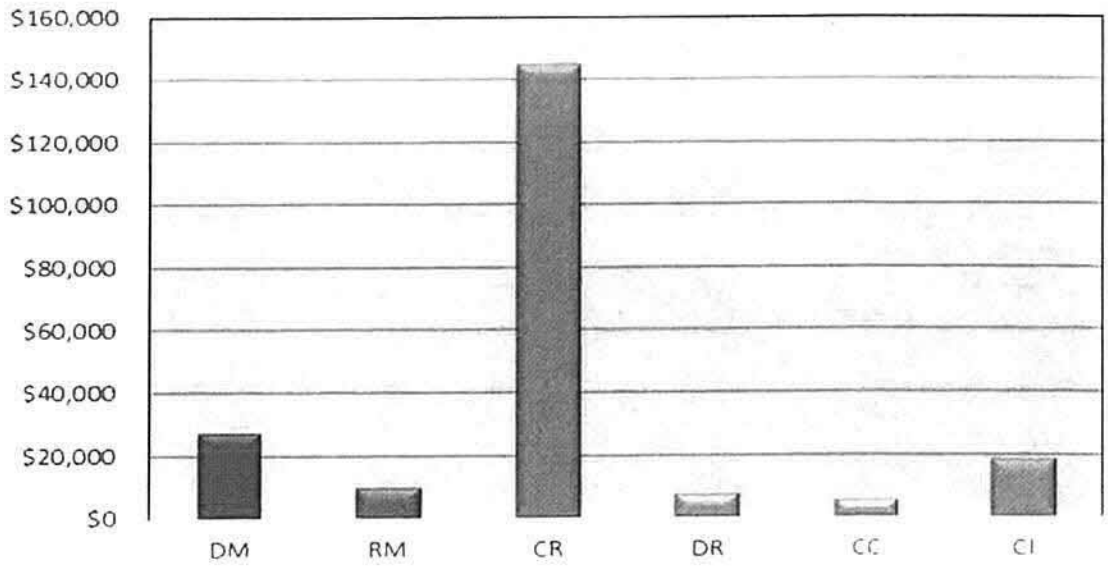


NEEDS SORTED BY PLAN TYPE

Faithful+Gould has prioritized the identified work according to the Plan Type or deficiency categories in order to assist with analyzing the deficiencies found during the assessment. The following Plan Types are shown below:

Plan Type 1 Deferred Maintenance	•Projects required for repair of a failed component in order to restore proper function.
Plan Type 2 Routine Maintenance	•Maintenance that is planned and performed on a routine basis to maintain and preserve the condition. Does not inclue preventative maintenance.
Plan Type 3 Capital Renewal	•Planned replacement of building systems that have or will reach the end of their useful life.
Plan Type 4 Deferred Capital Renewal	•Projects required for replacement of a failed building system in order to restore proper function.
Plan Type 5 Code Compliance	•Projects required modifying or replacing existing building systems in order to comply with current codes.
Plan Type 6 Capital Improvement	•Projects required/requested to enhance government services. Also includes projects resulting from changes in building use or system functionality to support a new agency.

The chart below illustrates the breakdown of expenditure according to the Plan Type or deficiency categories providing an opportunity to strategically plan and effectively direct funding.



RISK

In order to allow Fulton County to balance containment of capital investment with probability and consequence of failure, we have assigned each project with a risk number. These numbers are in addition to the Priority 1, 2, 3, and 4, descriptive ratings previously detailed. Risk numbers have been calculated based upon a numerical assignment of risk resulting from four categories: 1) Impact of Failure, 2) Condition, 3) Probability of Failure, and 4) Frequency of Failure. Numbers assigned to each category are added together to create a total risk number. This risk number is assigned a risk category based upon its numerical range. For instance, deterioration of a computer room air conditioning unit could score 2 under Impact of Failure, 3 under Condition, 3 under Probability of Failure, and 3 under Frequency of Failure, resulting in a score of 11 (2 + 3 + 3 + 3) which equates to a high risk. Table EX-4 below details the risk criteria.

Table EX-4 Risk Criteria Table

Impact of Failure	Condition	Probability of Failure	Frequency of Failure
1 - Catastrophic: The Facility/System/ Component cannot be used; personnel death;	1 – Very Poor OR Critical active non grandfathered code violation	1 – In state of failure OR Regulatory enforcement action	1 - Frequent: Occurs at least once per week OR Item failure will be of terminal consequence to the facility
2 - Major: A large portion of the facility is rendered unusable; interruption of facility's official mission activities; personnel injury; deterioration of historic fabric, critical operations severely affected	2 – Poor OR Severe active non grandfathered code violation	2 – Chance of immediate failure	2 - Common: occurs at least once per month
3 - Significant: Reduced use of a facility; scaled back operations; interruption of business (staff) activities; property damage as result of Facility/System/Component failure	3 – Fair OR System / component not present	3 – Increased chance of failure	3 - Seldom: occurs at least once every 31-90 days
4 - Minor: Active intervention required to maintain operations; repairs needed to maintain operations, reduced use of mission elements/actions	4 – Good	4 – Slight chance of failure	4 - Rare: occurs less than once every three months, but more than once a year
5 - Insignificant: Nuisance operations not impacted; alternative service available without active intervention OR Failure does not require near-term active intervention	5 – Very Good	5 – No chance of failure	5 - Very rare: happens once per year or less than once per year

The Risk Score and the Risk Categories are detailed in Table EX-5 below.

Table EX-5 Risk Category

Risk Score	Risk Category
4 – 8	Critical Risk
9 – 13	High Risk
14 – 16	Medium Risk
17 – 20	Low Risk

To allow Fulton County to balance containment of capital investment with probability and consequence of failure, we have assigned each project with a risk number. The table below provides a summary of Critical and High risk expenditures identified over the 5-year study period. A complete risk assignment for each recommended project is included within Capital Expenditure Forecast provided in Appendix A of this report. No Critical items were noted for the Property; however, the following High risk items were identified:

Table EX-6 Critical & High Risk Expenditures

Risk Category	Year	Component	Cost
High	2016	Investigate, locate and patch roof leaks	$4,463
High	2016	Replace Rooftop Carrier Unit	$31,050
		TOTAL	**$35,513**

PREVENTATIVE MAINTENANCE

Table EX-7 provides a summary of the financial requirements to complete industry standard preventative maintenance activities on the building systems identified in Appendix C. In-house costs represent the cost to complete the recommended preventative maintenance activities utilizing in-house staff at current labor rates provided by the County, while contract costs includes general markups associated with contracting out the same activities to a service contractor.

Table EX-7 Annual Preventative Maintenance

System	In-House Costs	Contract Costs
Roofing	$221.93	$332.90
Mechanical	$1,084.89	$1,627.34
Electrical	$1,431.95	$2,147.93
Plumbing	$0	$0
Fire & Life Safety	$375.80	$563.70
Conveyance	$0	$0
TOTAL	**$3,114.57**	**$4,671.87**

2.0 SITE SYSTEMS

DESCRIPTION

The Property contains a land area of approximately 1.00 acre (43,560 square feet) bounded by Valley View Drive to the north, business properties to the east, Washington Street to the south, and Malone Street to the west. A concrete sidewalk is provided in front of the main entrance to the library. Handrails are provided at the concrete steps near the building's entrance.

The Property contains one principal parking lot for visitors and employees. The parking lot is contained at the east side corner of the building. There are approximately 20 parking spaces, including two accessible spaces available for use by customers and employees. A concrete sidewalk is located in front of the main entrance to the library. Handrails are provided at the concrete steps near the building's entrance. The parking lot and the building site are boarded by cast-in-place concrete curb sections.

Concrete sidewalks are provided along the east, south and north (main entrance) perimeter of the building.

A rectangular concrete structure situated hillside south of the library between a residential area is designed to control water flowing off of slope.

CONDITION

The asphalt paving in the parking areas appear to be in fair to good condition. However, we noted localized areas of alligator cracking and noted failed surface markings and general aging of the wearing surface. Based upon these conditions, we recommend budgeting for near-term replacement of alligator cracking, fillings of cracks, seal coating and re-striping.

Site concrete and associated handrails appeared to be in good condition. However, we noted two locations where the concrete curb is broken. We have inflated our opinion of cost for pavement work to include for replacement of concrete curbs. Caulked expansion joints in the concrete sidewalks are failing. We recommend that the expansion joints be cleaned-out and resealed in the near-term. This work can be combined with the sealant work required for failed exterior caulk joints at the windows.

The drainage structure is in good condition. We recommend backfilling the structure to minimize erosion in the near-term.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Partial Asphalt Pavement Resurfacing/Repair at Parking Lot	III	Deferred Maintenance	2016	$4,600
Sealcoat and Stripe Parking Lot and Remark ADA Spaces	III	Deferred Maintenance	2016	$4,148
Backfill Drainage Structure to Minimize Erosion	III	Deferred Maintenance	2016	$3,675

3.0 STRUCTURAL SYSTEMS

DESCRIPTION

No construction drawings were available and few structural elements were visible at the time of the site visit. However, the Property is assumed to consist of a single story, structural steel framed post and beam construction with a concrete masonry unit (CMU) back-up with an external facing brick skin. The roof structure consists of steel lattice beams supporting a profiled metal roof deck. We were not provided with details of the sub-structure. However, foundations are likely to consist of a combination of cast-in-place concrete isolated and continuous footings.

Foundations

No design or construction drawings showing the foundation details were available for review, so the exact foundation composition cannot be commented on as the design of this element varies from site to site.

Floor Slab

The ground floor slab is assumed to consist of a 4" deep steel reinforced slab on a waterproof membrane, select fill sub-base and compacted subgrade.

Interior Walls and Ceilings

Interior walls primarily consist of non-loading bearing steel stud partitions with gypsum wallboard sheathing, plus small areas of textured fabric wall panels. Public restrooms have some ceramic tile wall finishes. Suspended acoustical ceilings are typically provided throughout and within the mechanical room in the ceiling is open to the above structural system.

Exterior Walls

Exterior wall systems typically consist of 4" thick facing brick anchored to CMU blockwork and metal stud walls with a 1" air gap, rigid and batt insulation. The inter face of the exterior walls consists of painted gypsum board.

Roof Structures

The roof structure consists of light steel beams supporting a profiled metal roof deck.

CONDITION

The structure was generally found to be sound with no evidence of differential settlement or displaced structural members.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

4.0 ROOFING SYSTEMS

DESCRIPTION

The building contains a low-slope roof covered with a thermoplastic polyolefin (TPO) single-ply roofing membrane. The building also contains sloped triangular shaped dormers and skylights. The sloped face of the dormers are covered with fiberglass reinforced asphalt shingles with the vertical faces clad with metal panels. The main building is trimmed with either metal fascia panels or horizontal metal trim at the eave. The roof appears to be drained to the building perimeter to scupper drains and painted metal downspouts.

CONDITION

The roof system is in fair condition. The probabilities that there are breaches in the roofing system are apparently causing damages to ceiling tiles and soffits inside the building. We recommend that the roof leaks be patched in the near-term based upon an investigation that identifies the areas to be repaired.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Investigate, locate and patch roof leaks	II	Deferred Maintenance	2016	$4,463

5.0 EXTERIOR ELEMENTS

DESCRIPTION

The building is placed in a rectangular configuration with exterior elements consisting of brick masonry, double glazed aluminum frame windows and painted metal. The exterior wall system of the library is consistent and primarily consists of exposed brickwork with cementitious mortar filled joints laid in a stretcher bond with indented accent detailing. Building control joints consist of a compressible backer road, and are sealed with elastomeric sealant.

Windows in the building consist of aluminum-framed units with double glazed sections with rubber gasket sealants between glazed elements and the aluminum frames and elastomeric sealants between window frames and brickwork elements. Windows range in size from 3' x 4' to 9' x 14'. The main entrance to the library is accessed from the north elevation of the building, and a more frequent entrance is accessed from the eastern elevation of the building. Both entrances consist of one set each of aluminum framed glazed doors, separated by a vestibule area. These entrance doors have storefront glazed units on each side.

CONDITION

The exterior masonry appears to be in fair condition. There are numerous locations where mortar and sealant has deteriorated, especially near the downspouts. There are also locations of previous poor tuckpointing and patching. We recommend that deteriorated mortar joints and control joints be repaired.

The paint on the exterior hollow metal doors and frames, the steel lintel angle at the front entrance, and the handrails at the front steps is faded are starting to rust. We recommend that these surfaces be cleaned, prepped and painted in the near-term. This work would improve the aesthetic appearance of the building exterior. This work can be combined with other aesthetic improvements.

Elastomeric 'wet sealants' at the perimeter of window frames and skylights were found to be in fair condition with limited areas of deterioration noted. Considering the age and condition of these elements, we recommend that the sealants are replaced alongside the building control joints in the near-term of the study period. Additionally, we recommend that the failed glazing units be replaced in the near-term.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Surface Cleaning and Painting Exterior Elements	III	Routine Maintenance	2016	$8,625
Renew Exterior Sealant and Mortar Joints	III	Deferred Maintenance	2016	$8,125
Replace Failed Glazing Units	II	Deferred Maintenance	2016	$2,300

6.0 MECHANICAL SYSTEMS

HEATING AND COOLING SYSTEMS

DESCRIPTION

Heating and cooling for the Property is provided by one rooftop package unit with direct expansion and natural gas fired furnace. The unit was manufactured by Carrier in 1995 with a capacity of 15-tons. The rooftop unit serves the office areas and portions of the main library. There is also a split system heat pump unit which serves the multipurpose room, entry area and additional areas of the building. The split system was manufactured by York in 2006 with a rated capacity of 7.5-tons.

CONDITION

The rooftop system malfunctions about 60% of the time and has become increasingly maintenance intensive and costly to repair. Based on the age and historical failures, we recommend budgeting for the replacement of the rooftop unit in the near-term. The split system appeared to be in fair condition, we did note that the filter appeared to have not been replaced recently and refrigerant lines were missing insulation. As the unit has been in service for 10-years and with a typical service life of 15-years for these types of units, we recommend budgeting for the replacement of the split system late-term. It may be possible to defer the replacement if a structured preventative maintenance program is implemented.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace Rooftop Carrier Unit	III	Capital Renewal	2016	$31,050
Replace Split System Unit	IV	Capital Renewal	2020	$14,850

AIR DISTRIBUTION SYSTEMS

DESCRIPTION

Conditioned air from the rooftop package unit and split system air-handling unit is distributed via sheet metal and flexible duct connections to the respective areas served. Air is discharged into the respective areas via ceiling mounted diffusers.

CONDITION

The air distribution systems appeared to be in fair to good working condition.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

VENTILATION AND EXHAUST SYSTEMS

DESCRIPTION

Ventilation Air

Outside air for ventilation purposes is supplied to the building either through fresh air intakes located on the rooftop unit, split system unit or through natural air infiltration.

Exhaust Systems

General building exhaust systems included exhaust fans for the restrooms. The exhaust fans are installed in the ceiling and ducted through the roof.

CONDITION

The ventilation and exhaust systems for the building appeared to be in fair to good working condition. We did note that the exhaust fan in the men's restroom exhaust fan was not operational. Given the minimal expense of repairing the exhaust fan, we recommend that it be repaired as an operational expense.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

HVAC CONTROLS

DESCRIPTION

The controls for the rooftop units consists of wall mounted thermostats.

CONDITION

The HVAC controls system is adequate for the building occupant's needs based on the types of systems installed. We anticipate that the thermostats will be replaced in conjunction with the respective units. We also recommend that where none programmable thermostats are provided, they be replaced with a programmable thermostat in order to set an operational schedule based on the occupancy status of the building. This will help decrease energy usage and help ensure optimal thermal comfort.

PROJECTED EXPENDITURES

No capital expenditures are expected at this time.

7.0 ELECTRICAL SYSTEMS

ELECTRICAL SERVICE AND DISTRIBUTION EQUIPMENT

DESCRIPTION

Electrical Service Equipment

The building is provided with one main electrical feed from a pole mounted utility transformer located at the southwest of the building. Secondary service from the transformer is routed overhead to an electrical service panel. Service characteristics for the electrical service are 120/208-volts, 3-phase and 4-wire. The main distribution panel is rated at 400-amps.

Power Distribution

The HVAC equipment, lighting and general purpose loads throughout the building are supplied from the 120/208-volt system panels.

Wire and Conduit

Typical power distribution for the feeders and branch circuits is accomplished using wire in conduit. Conduit types varied based on the area and usage.

Motor Control

Motor control is provided locally to the driven equipment. Motors are controlled by circuit breakers at the distribution panels and disconnect switches located at the equipment

CONDITION

The major electrical equipment items appear to be in fair condition. There is no indication of damage from short circuit or overload condition. We did note that some stored materials in front of the panels that should be removed to help ensure clear unrestricted access to the panels. Electrical distribution equipment of the type installed is generally considered to have a service life of 30 years or more. Switchboards, panelboards and wiring are often serviceable beyond this time if properly maintained, and not subjected to repeated overload or short circuit conditions. Even though the panels are original to the time of construction, replacement components are still available and the equipment still provides reliable service. We do not anticipate a requirement to upgrade or replace the electrical systems during the study period, but electrical upgrades should be planned for within the next 8 to 12 years.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

LIGHTING SYSTEMS

DESCRIPTION

General area lighting consists of nominal 2' x 4' and 2' x 2' lensed, lay-in fluorescent fixtures and some recessed down lights in common areas and restrooms. Illuminated exit signs are installed at exit doors. Exterior lights are flushed mounted on the brick structure perimeter. No other site lighting exists.

CONDITION

The interior light fixtures appear to be in dated but fair condition. We recommend that the lighting fixtures be upgraded in the main and administrative areas in far-term in order to improve lighting quality and energy efficiency. The retrofit of these fixtures should include replacement of the lens covers in order to improve the quality of lighting provided to the space. By improving the lighting quality, often times the number of fixtures can be reduced, which in turn improves energy efficiency.

ROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period and scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Upgrade Lighting (Main and Administration Area)	V	Capital Improvement	2019	$18,400

COMMUNICATIONS AND SECURITY SYSTEMS

DESCRIPTION

Telephone and communications service enters the building on the southwest elevation. The main equipment and incoming cables are rack mounted and easily accessible within the administrative office area. An electronic security system is incorporated as part of the fire alarm system.

CONDITION

The communications systems appear to be in good condition and primarily maintained by the serving utility company. Consideration of the IT and associated equipment is excluded from this report.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

8.0 PLUMBING SYSTEMS

DOMESTIC WATER SYSTEMS

DESCRIPTION

Domestic cold water service consists of an approximate 2" water main that enters the building in the mechanical room on the southeast elevation. Domestic hot water is generated by a 30-gallon electric storage tank type water heater and is located in the mechanical room. Water distribution relies on service pressure from the local utility. Domestic water piping is typically copper.

Plumbing Fixtures

Plumbing fixtures in the restrooms consist or floor mounted water closets with sensor controlled flush valves, wall mounted urinals with sensor controlled flush vales and vitreous china sinks with sensor controlled faucets. The employee breakroom is equipped with a stainless steel service sink. There is one public drinking water fountain located between the men's and women's public restrooms.

CONDITION

The domestic water service, backflow preventer and domestic water heater appear to be in fair condition. There is no evidence of leaks or other areas of deterioration noted or reported to us for the building. The domestic water heater appeared to have been installed within the last 10 years. Given the age of the water heater, we anticipate that it will require replacement in the near-term.

The plumbing fixtures appeared to be in fair condition and are scheduled to be replaced in conjunction with the recommended restrooms refurbishments.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5 year study period and scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace Water Heater	III	Routine Maintenance	2017	$1,260

SANITARY WASTE AND STORM DRAINAGE SYSTEMS

DESCRIPTION

Sanitary Waste Systems

Sanitary waste is collected from multiple laterals and routed to the municipal sanitary system via lateral gravity drains lines. The sanitary lateral pipes are not visible.

Stormwater Systems

Strom drainage from the roof is via collection boxes and downspouts, which tie into the underground stormwater management system.

CONDITION

The sanitary waste and storm drainage piping is believed to be in good condition and adequate for the building. Reports of routine blockages or leaks were not reported to us nor was historical evidence of such issues noted. Based on the age of this system, we anticipate that it should last throughout the study period. Plumbing sanitary steel piping usually has an average service life of 40 plus years. There did appear to be some interior water damage along the walls behind the downspouts; however, we anticipate that the damage was historical in nature as the gutters appeared to have been replaced in conjunction with the roof replacement.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

9.0 FIRE & LIFE SAFETY

STRUCTURAL FIRE PROTECTION

DESCRIPTION

The building was constructed in 1969 and based upon classification of code requirements and occupancy type, the building is not required to have additional structural fire protection.

CONDITION

Based on the Occupancy and Construction type classifications, the building structure is not required to have additional means of fire protection.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

MEANS OF EGRESS

DESCRIPTION

Primary means of egress for the building is provided by one front entrance and exit on the front elevation of the building as well as at the south side of the building. Lighting for the egress paths appears to be provided by emergency lights and exit signs on an emergency circuit.

CONDITION

Means of egress appear to be sufficient and unobstructed from all points in the building relative to exit discharge and travel distance. Exit signage appears to be installed at the exterior doors and installed above doors at interior work areas and public restrooms.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

FIRE DETECTION AND ALARM SYSTEMS

DESCRIPTION

The building is protected by a Silent Knight Model 4720 (and Model 4120 extender panel) burglary/fire communicator zone fire alarm system. The fire alarm control panel (FACP) is located in the main mechanical room. The fire alarm system monitors manual pull stations, smoke and heat detectors within various zones throughout the building. Pull stations are provided at exits. Alarm notification is provided by horn devices located throughout the building.

CONDITION

The fire alarm system appeared to be in fair condition and installed in general accordance with the codes enforced at the time of installation. Current code requirements need to be verified to determine if a combination audio/visual (horn/strobe) alarm device is required to notify fire alarm activation to a person with a visual or hearing impairment. We recommend that the dated fire alarm panel be replaced in the near-term and additional devices installed as necessary.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace Fire Alarm Control Panel	III	Capital Renewal	2017	$8,250

10.0 INTERIORS

DESCRIPTION

Ceiling finishes within the main library, meeting room and office area consists of gypsum ceilings and soffits combined with 2' x 2' suspended ceiling tiles contained within a prefinished grid. Finishes in the break area consist of 12" x 12" resilient floor tiles. Break areas have casework consisting of laminated countertops and cabinets.

Single stall male and female restrooms are located in the corridor near the conference room. Finishes consist of 4" x 4" ceramic wall and floor tile, painted gypsum ceiling systems and plastic laminate counters.

CONDITION

Ceiling tiles were painted during a rehabilitation program in circa 2012. Recently, a few tiles were stained due to roof leaks. We recommend due to age, that the tiles be replaced in the far-term.

The interior finishes are in fair condition due to a rehabilitation program performed in or about 2012. New carpeting was installed, and the interior walls and ceiling tiles were painted. A few ceiling tiles are stained from water leaks in the roof. We recommend that the dated restroom facilities be renovated in the near-term.

The multi-purpose room appeared to be in fair condition with many damaged concealed spline ceiling tiles and stained carpeting. These types of ceiling systems are maintenance intensive and hard to repair. In addition, replacement tiles are hard to match. We recommend budgeting for the renovation of the multi-purpose room in the near-term.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Replace Carpet	V	Capital Renewal	2020	$33,660
Replace Floor Tile	V	Capital Renewal	2020	$1,080
Replace Suspended Acoustical Ceiling	V	Capital Renewal	2020	$18,630
Renovate Restrooms (Public and Employee)	V	Capital Renewal	2017	$37,500
Renovate Multi-Purpose Room	III	Deferred Renewal	2017	$7,500

11.0 ACCESSIBILITY

ACCESSIBILITY ISSUES

THE GUIDELINES

As a publically accessible facility, the Property should seek compliance with the 2010 ADA Standards for Accessible Design (2010 Standards), made effective March 2012. These standards are revised standards for the ADA Accessibility Guidelines (ADAAG), issued in July 1991. This report section compares the requirements of the ADA with as-built conditions, and where applicable, recommends upgrades required to achieve compliance. Specifically, one area the ADA has a significant effect on the physical aspects of the Property.

Title I deals with employment discrimination, and requires that employers not discriminate against a disabled person in hiring or employment. This can impact the configuration and features of buildings and those employers are expected to make "reasonable accommodation", including making facilities readily accessible to disabled employees.

Title III requires that public accommodation provide goods and services to disabled patrons on an equal basis with the non-disabled patrons. This title is the part of the ADA with perhaps the greatest impact on buildings, which provide public accommodations.

The ADA has provided a benchmark for measuring accessibility, primarily orientated towards new construction. It also provides guidance for modification of existing facilities to eliminate barriers to access. This benchmark is the 2010 ADA Standards for Accessible Design (2010 Standards). The stated purpose of the guidelines is to ensure that newly constructed facilities and altered portions of existing facilities covered by the ADA are readily accessible to disabled persons.

Regulatory implementation of the ADA includes the following priorities for barrier removal in existing facilities:

- **Accessible Entrances.** Providing access from public sidewalks, parking or public transportation that enables disabled individuals to enter the facility.
- **Access to Goods and Services.** Providing access to areas where goods and services are made available to the public.
- **Usability of Restrooms.** Providing access to restroom facilities.
- **Removal of Remaining Barriers.** Providing access to the goods, services, facilities, privileges, advantages, or accommodations.

APPLICABILITY

The ADA in its purest form relates only to facilities occupied or significantly altered after March 13, 1991. As this building was constructed in 1999, it is therefore required to comply with the applicable aspects of 1991ADA guidelines. Any subsequent refurbishments must comply with the ADA guidance in affect at that time.

SITE ACCESS AND BUILDING ENTRANCES

REQUIREMENTS

The first consideration relates to measures that will enable individuals with disabilities to physically approach and enter a place of public accommodation. The priority of "getting through the door" recognizes that providing actual physical access to a facility from public sidewalks, public transportation or parking, is generally preferable to any alternative arrangement in terms of both business efficiency and the dignity of individuals with disabilities. Additionally, if passenger drop-off areas are provided, they must be accessible and an accessible route must connect each accessible drop-off area with the accessible entrance(s). Curb ramps must be provided if the drop-off area is next to a curb and raised sidewalk.

Section 405 (Ramps) of the ADAAG requires that any part of an accessible route with a slope greater than 1:20 shall be considered a ramp. Confirmation should be sought that all exterior ramps on accessible routes meet these requirements.

The parking areas should contain a suitable amount of car and van accessible spaces in line with Section 502 (Parking Spaces) of the ADA. These should be located near the accessible building entrance, along the accessible path and should be provided with suitable signage and pavement markings.

The entrance approach, door widths and hardware must be compliant with ADAAG, and it is advised that automated door openers are provided if the opening force to entrance doors is considered excessive.

ON-SITE CONDITIONS

Access for visitors and employees are restricted to the main entrances and east entrance. Access at both entrances is through double doors.

Each door has a compliant clear opening width of 32". Once through the entrance doors, access to the main lobby and remaining portions of the building is unrestricted. Door widths were compliant with the applicable sections of the GAC and 2010 Standards.

Ramps of the GAC and the ADA standards requires that any part of an accessible route with a slope greater than 1:20 shall be considered a ramp. There is one ramp serving the building. The Property contains approximately 20 parking spaces including two accessible spaces.

Disabled persons wishing to access the Property are able to gain entry utilizing the public sidewalks that lead to a ramp (with handrails) to the previously detailed entrances. The route of travel from the public street frontage to the entrances is generally unrestricted and accessible in compliance with the GAC and ADA standards. ADA and GAC requires that two accessible parking spaces should be provided for parking of this size.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

ACCESSIBLE ROUTES

REQUIREMENTS

All publically accessible areas should be provided with suitable horizontal and vertical circulation. Elevators should comply with Section 407 (Elevators), including suitable controls, signage (including braille), audio floor indicators, and the applicable spatial requirements. All publically accessible floors should be provided with an elevator along the accessible path.

Section 405 (Ramps) of the ADAAG requires that any part of an accessible route with a slope greater than 1:20 shall be considered a ramp.

Section 308 (Space Allowance and Reach Ranges) of the ADAAG requires that a minimum clear width for single wheelchair passage shall be 32-inches, the minimum width for two wheelchairs to pass is 60-inches, the space required for a wheelchair to make a 180-degree turn is a clear space of 60-inches, and the minimum clear floor or ground space required to accommodate a single, stationary wheelchair occupant is 30-inches by 48-inches.

Section 307 (Protruding Objects) of the ADAAG requires that objects projecting from walls (e.g. drinking fountains) with their leading edges between 27-inches and 80-inches above the finished floor shall protrude no more than 4-inches into walks, halls, corridors, passageways, or aisles. Objects mounted with their leading edges at or below 27-inches above the finished floor may protrude any amount. Freestanding objects mounted on posts or pylons may overhang 12-inches maximum from 27-inches to 80-inches above the ground or finished floor. Protruding objects shall not reduce the clear width of an accessible route or maneuvering space.

Section 302 (Floor or Ground Surfaces) of the ADAAG requires that ground and floor surfaces along accessible routes and in accessible rooms and spaces, including floors, walks, ramps, stairs, and curb ramps, be stable, firm and slip-resistant. Flooring within the Property generally complied with this requirement.

This section also requires that changes in level between ¼-inches to ½-inches be beveled with a slope no greater than 1:2, and that changes in level greater than ½-inches be accomplished by means of a ramp. The section also states that carpet or carpet tile used on a ground or floor surface be securely attached; have a firm cushion, pad or backing or no cushion or pad; and have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Where gratings are located on walking surfaces, then they shall have spaces no greater than ½-inches wide in one direction.

ON-SITE CONDITIONS

Generally, the Property complies with these requirements as no protruding objects were noted. However, we did note that the circulation desk was standard height across its entire length. We recommend budgeting for the modification of the circulation desk to accommodate disabled individuals.

PROJECTED EXPENDITURES

Identified recommended works that are required during the 5-year study period are scheduled below.

Recommendation	Priority	Plan Type	Year	Expenditures
Install ADA Compliant Circulation Counter	III	Code Compliance	2016	$5,400

DOORS AND SIGNAGE

REQUIREMENTS

The ADAAG states that signs that identify permanent rooms and spaces such as those identifying restrooms and exits or providing room numbers must have Braille and raised letters or numbers to allow them be read visually or tactilely. The ADAAG also states that signs must also meet specific requirements for mounting location, color contrast and non-glare surface. Signs that provide direction to or information about functional spaces must only comply with requirements for character proportion, character height and finish, and with contrast between the characters and background.

Letters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10. The letters and numbers on signs shall be raised 1/32-inches minimum and shall be sans serif. The characters or symbols on signs shall be at least 5/8-inches high, but no higher than 2-inches. Symbols or pictographs on signs shall be raised 1/32-inches minimum. The ADAAG also requires that doors to hazardous areas be equipped with tactile warnings.

Section 404 (Doors, Doorways and Gates) states that doorways and gates, including security entrance gates shall have a minimum clear opening of 32-inches and that the respective maneuvering clearances are maintained.

This section of the ADAAG also states that the threshold at doorways shall not exceed ½-inches in height, and that door hardware (handles, pulls, latches, locks, etc.) on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching or twisting of the wrist to operate.

ON-SITE CONDITIONS

The doorways at each building entrance and at the book sensor met the requirements with a typical clear opening width of 33 to 34-inches. The limited signage used to identify offices and other permanent rooms and spaces within the building generally meet these requirements. Signs at each restroom also appear to meet the physical requirements and positioning requirement of the GAC and ADA standards.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

ACCESSIBLE AMENITIES AND FUNCTION SPACES

REQUIREMENTS

The ADA requires that all primary function areas are readily accessible for all. Confirmation should be sought that all such facilities and equipment is readily accessible in line with the respective section of the ADAAG.

ADAAG requires that where provided, at least one of each type of depository, vending machine and change machine shall comply with Section 309. Such requirements including that operable parts are located no more than 48" above finishes floor level and that operable parts shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist.

Drinking fountains should meet the requirements set out in Section 211 – Drinking Fountains, including the requirement for a minimum of two drinking fountains. Section 602.4 (Spout Height) of the ADA requires that the spout height of drinking fountains not exceed 36-inches. Additionally, they should have a clear floor space in line with Section 602.2 and a minimum of 27" knee clearance.

ON-SITE CONDITIONS

The Property generally met these requirements.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

USABILITY OF RESTROOMS

REQUIREMENTS

The third priority emphasizes those measures that will provide individuals with disabilities with access to restroom facilities. A clear approach should be provided to one of each fixture type within an accessible restroom and a minimum of a 60" diameter turning space should be provided.

The ADAAG requires that the minimum width of the standard accessible stall shall be 60" and the minimum depth of floor mounted standard accessible stall shall be 59" (or 56" if wall mounted). The height of water closets shall be 17" to 19", measured to the top of the toilet seat. A 36" minimum length grab bar is required behind the water closet, extending 24" from the centerline of the toilet on the open side. A 42" minimum length grab bar is required on the sidewall, which should extend at least 54" from the rear wall. All grab bars should be mounted between 33" and 36" above the finished floor.

The ADAAG requires that urinals shall be stall-type or wall-hung with an elongated rim at a maximum of 17-inches above the finish floor. The ADAAG also requires that a clear floor space of 30-inches x 48-inches shall be provided in front of urinals to allow for a forward approach. Flush controls shall be hand operated or automatic, and shall be mounted no more than 44-inches above the finish floor.

The ADAAG requires that lavatories shall be mounted with the rim or counter surface no higher than 34-inches above the finish floor and a minimum of 27" knee clearance should be provided beneath a lavatory. Faucets are required to be operable with a closed fist. Lever-operated, push-type and electronically controlled mechanisms are examples of acceptable designs. Hot water and drain pipes under lavatories shall be insulated or otherwise configured to protect against contact.

Mirrors located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface 40 inches maximum above the finish floor or ground. Mirrors not located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface no more than 35 inches maximum above the finish floor or ground.

ON-SITE CONDITIONS

Restrooms were generally compliant with the requirements of the GAC and ADA.

PROJECTED EXPENDITURES

No capital expenditures are anticipated at this time.

APPENDICES

APPENDIX A: Capital Expenditures

APPENDIX B: Photographic Record

APPENDIX C: Other Documentation

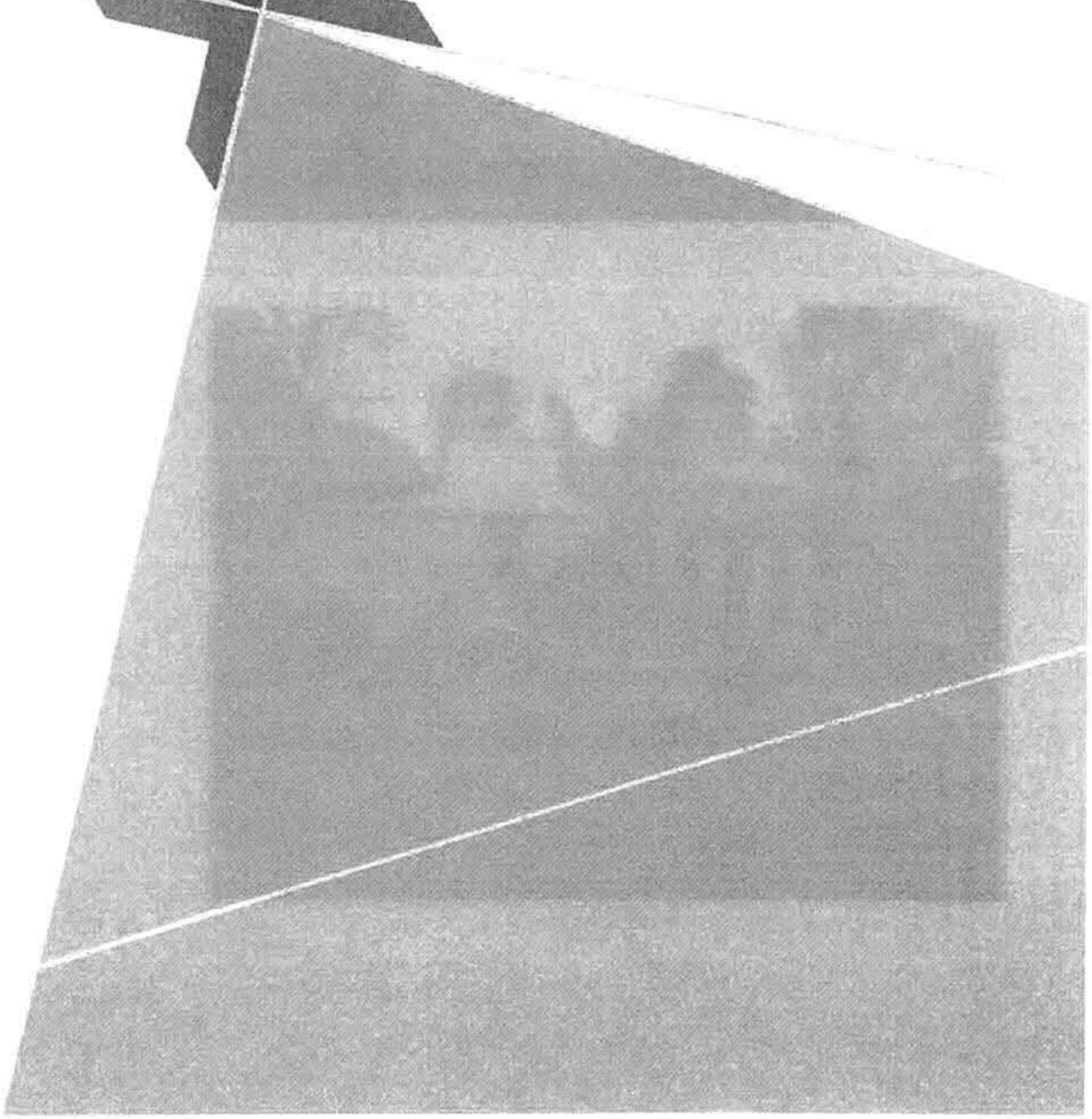
APPENDIX A:
CAPITAL EXPENDITURES

Five Year Capital Expenditure Forecast
Fairburn Hobgood - Palmer Branch Library
60 Valley View Drive
Fairburn, Georgia 30213

FAITHFUL+GOULD

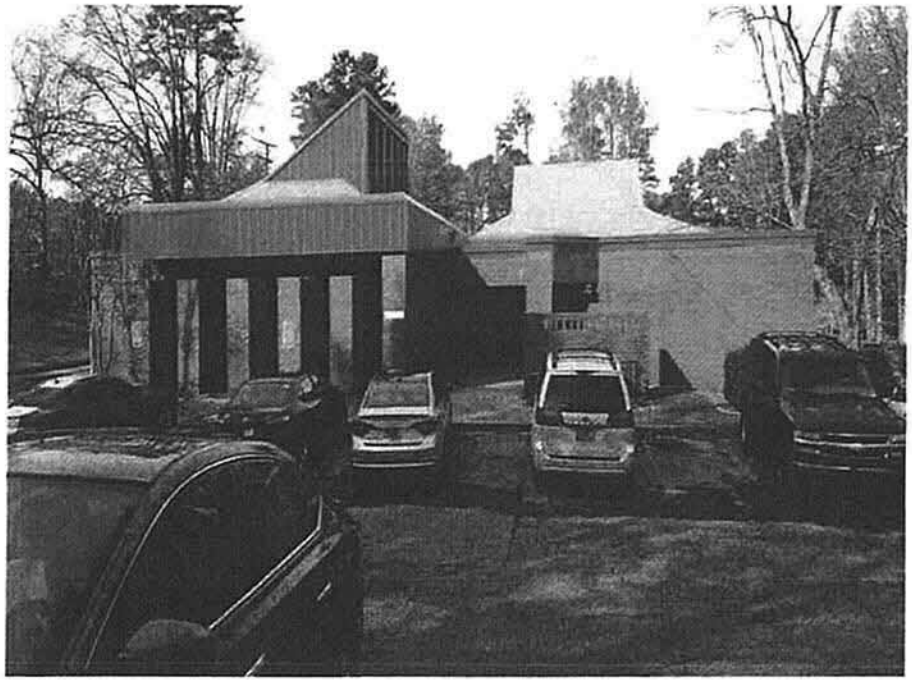
Component No.	Component	Priority Category	Deficiency Category	Impact of Failure	Condition	Probability of Failure	Frequency of Failure	Risk Score	Risk Category	Estimated Useful Life or Replacement Cycle (Yrs)	Remaining Useful Life (Yrs)	Cost Multiplier	Quantity	Unit of Measurement	Unit Cost	2016	2017	2018	2019	2020	Required
															Year	1	2	3	4	5	
Site Systems																					
Required																					
1	Partial Asphalt Pavement Resurfacing/Repair at Parking Lot	III	DM	4	3	4	4	15	Medium	5	1	1.15	200	SY	$20.00	$4,600					$4,600
2	Sealcoat and Stripe Parking Lot and Remark ADA Spaces	III	DM	4	4	4	5	17	Low	5	1	1.10	967	SY	$3.90	$4,148					$4,148
3	Backfill Drainage Structure to Minimize Erosion	III	DM	5	4	4	5	18	Low	5	1	1.05	1	Allowance	$3,500.00	$3,675					$3,675
Structural Systems																					
Required																					
No Expenditures Required At This Time																					
Roofing Systems																					
Required																					
1	Investigate, Locate and Patch Roof Leaks (Determine If Historical)	II	DM	3	3	3	3	12	High	20	1	1.05	50	Hour	$85.00	$4,463					$4,463
Exterior Elements																					
Required																					
1	Surface Cleaning and Painting Exterior Elements	III	RM	3	4	4	4	15	Medium	15	1	1.15	1	Allowance	$7,500.00	$8,625					$8,625
2	Renew Exterior Sealant and Mortar Joints	III	DM	3	3	4	4	14	Medium	15	1	1.25	1	Allowance	$6,500.00	$8,125					$8,125
3	Replace Failed Glazing Units	II	DM	5	4	4	5	18	Low	15	1	1.15	4	Allowance	$500.00	$2,300					$2,300
Mechanical																					
Required																					
1	Replace Rooftop Carrier Unit	III	CR	3	3	3	3	12	High	20	1	1.15	15	Ton	$1,800.00	$31,050					$31,050
2	Replace Split System Unit	IV	CR	4	4	4	5	17	Low	15	5	1.10	7.5	Ton	$1,800.00					$14,850	$14,850
Electrical																					
Required																					
1	Upgrade Lighting (Main and Administration Area)	V	CI	4	4	4	5	17	Low	25	4	1.15	32	EA	$500.00				$18,400		$18,400
Plumbing																					
Required																					
1	Replace Water Heater	III	RM	4	4	4	4	16	Medium	20	2	1.05	1	Each	$1,200.00		$1,260				$1,260
Life Safety																					
Required																					
1	Replace Fire Alarm Control Panel	III	CR	4	4	4	5	17	Low	15	2	1.50	1	EA	$5,500.00		$8,250				$8,250
Conveyance Systems																					
Required																					
No Expenditures Required At This Time																					
Interiors																					
Required																					
1	Replace Carpet	V	CR	4	4	4	5	17	Low	10	5	1.20	935	SY	$30.00					$33,660	$33,660
2	Replace Floor Tile	V	CR	4	4	4	5	17	Low	20	5	1.08	200	SF	$5.00					$1,080	$1,080
3	Replace Suspended Acoustical Ceiling	V	CR	4	4	4	5	17	Low	20	5	1.08	3,000	SF	$5.75					$18,630	$18,630
4	Renovate Restrooms (Public & Employee)	V	CR	4	4	4	5	17	Low	20	2	1.25	6	FXT	$5,000.00		$37,500				$37,500
5	Renovate Multipurpose Room	III	DR	4	3	4	5	16	Medium	20	2	1.25	500	SF	$12.00		$7,500				$7,500
Accessibility																					
Required																					
1	Install ADA Compliant Circulation Counter	III	CC	5	5	5	5	20	Low	30	1	1.08	1	EA	$5,000.00	$5,400					$5,400
														Required Cost (2016 Dollars)		$72,386	$54,510	$0	$18,400	$68,220	$213,516

APPENDIX B:
PHOTOGRAPHIC RECORD



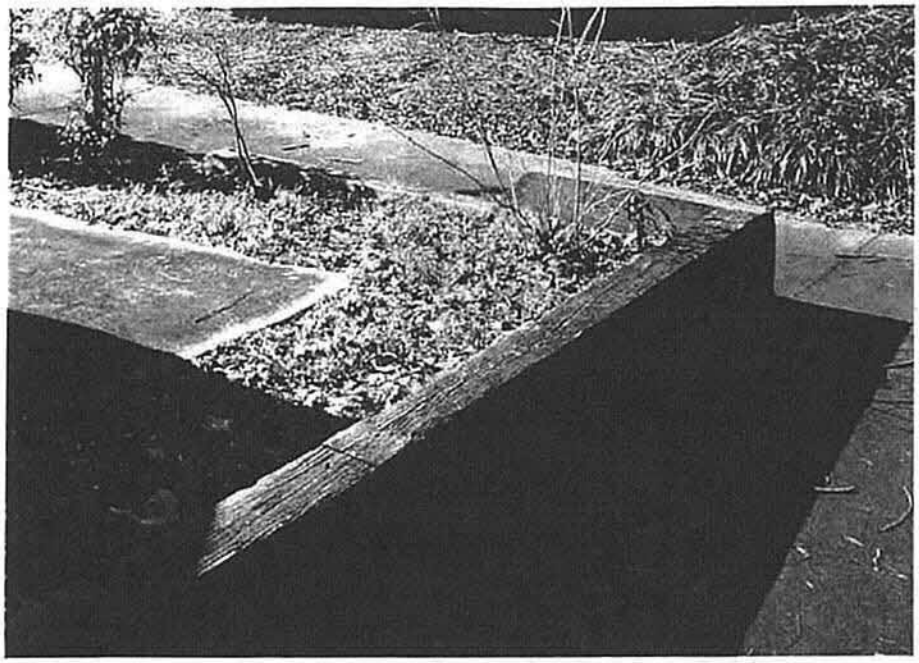
Photograph No. 1

Library (East) entrance



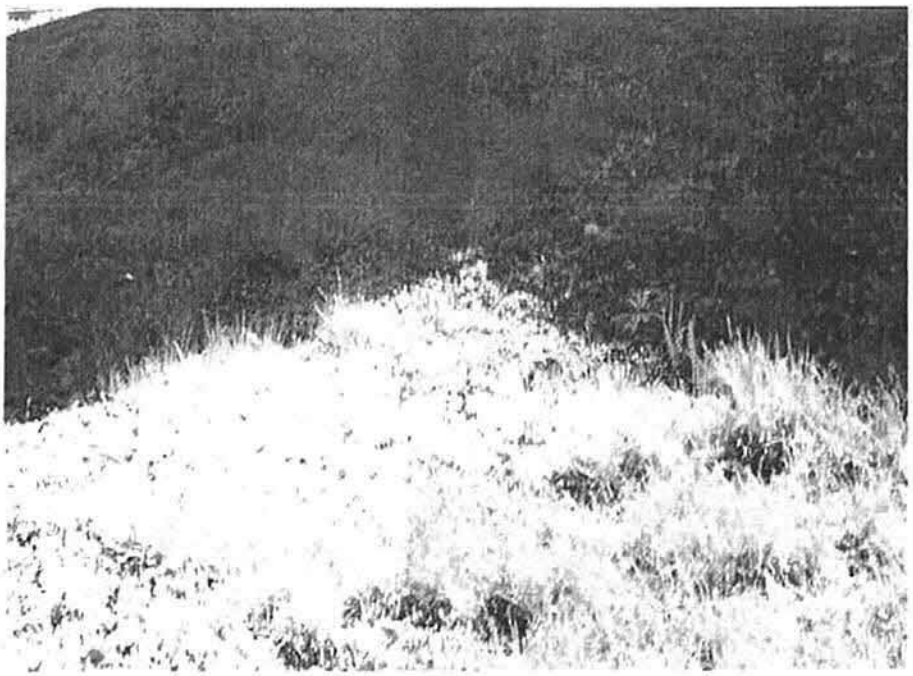
Photograph No. 2

No stripe on parking lot



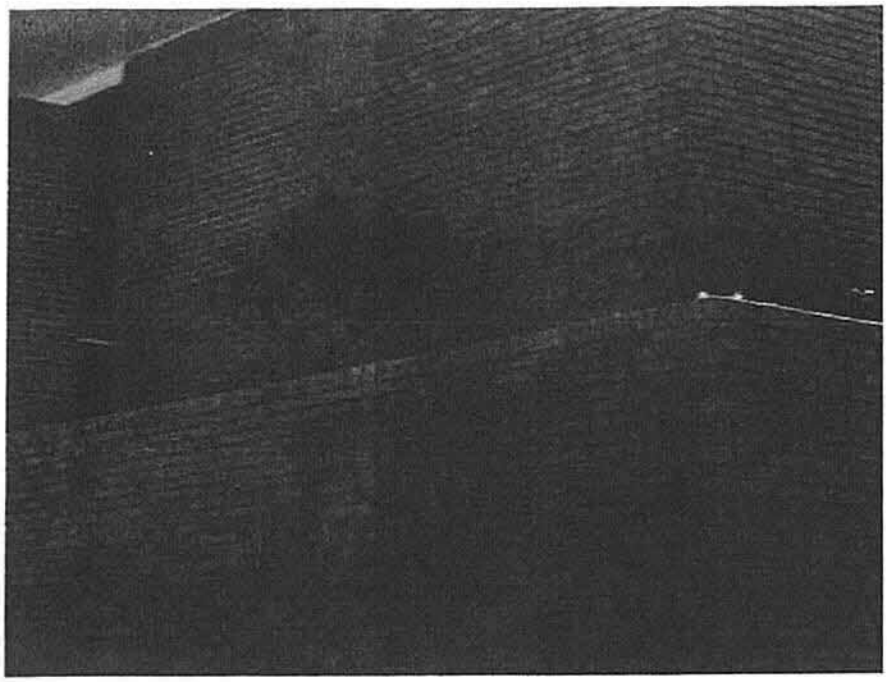
Photograph No. 3

Retaining block



Photograph No. 4

Sparse landscaping



Photograph No. 5

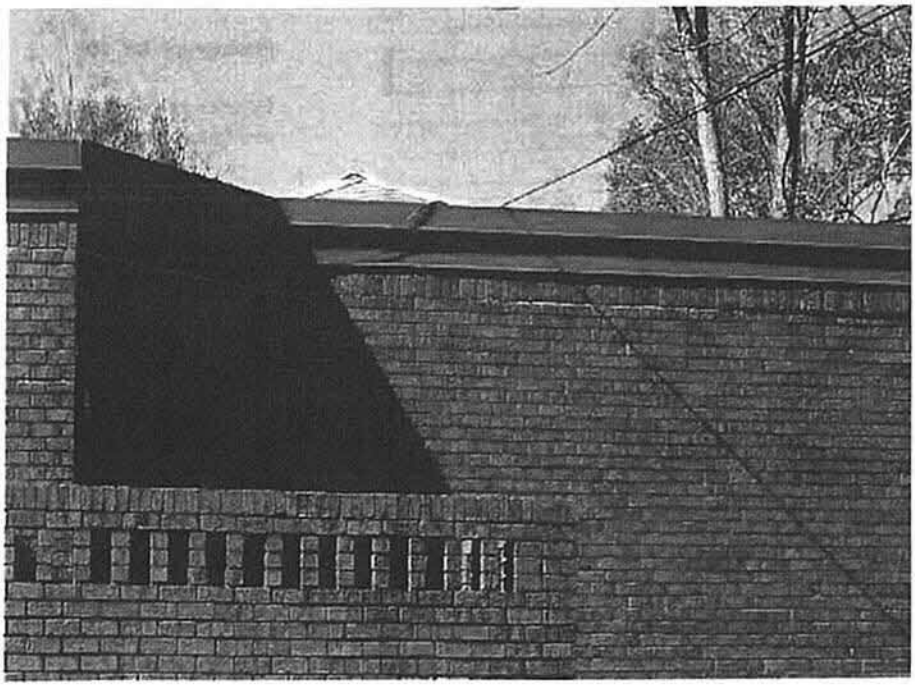
Dirt build-up on exterior masonry

Photograph No. 6

Front entrance, north side, excess debris

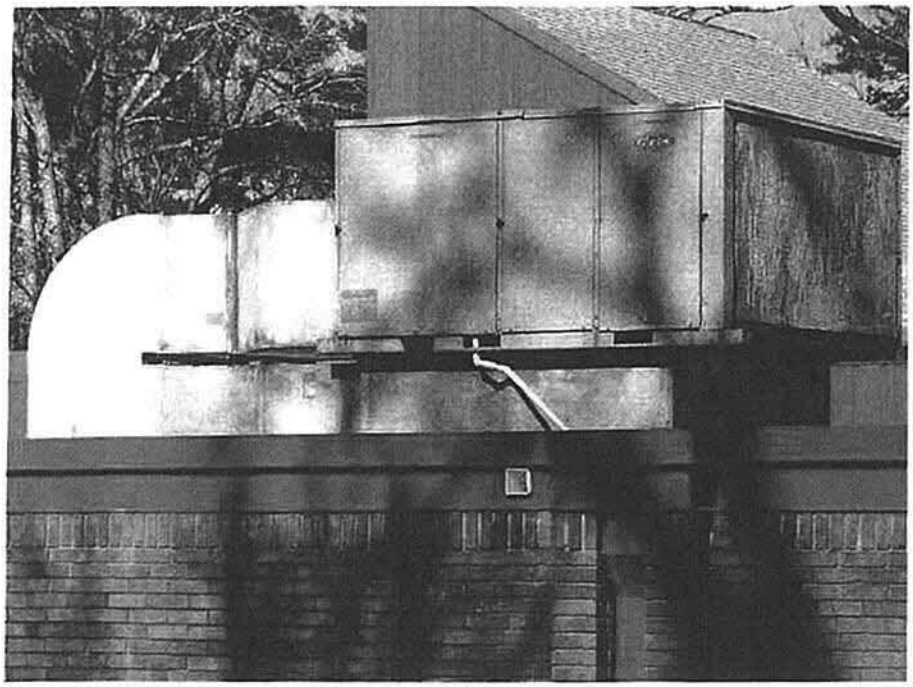
Photograph No. 7

Dirt build-up and mortar repair required on exterior retaining wall



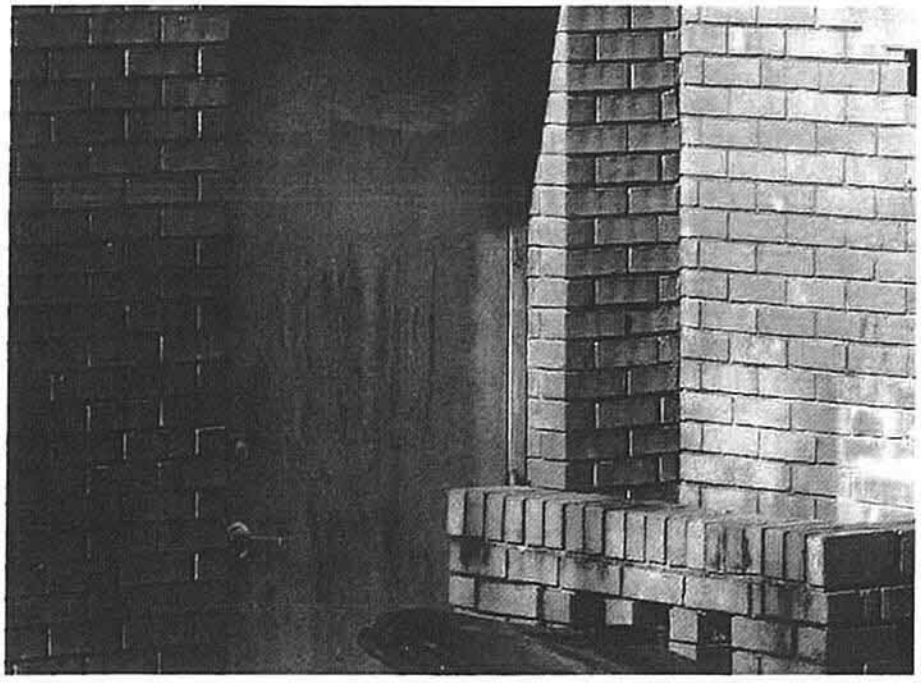
Photograph No. 8

Renew exterior sealant and mortar joints on west side of library



Photograph No. 9

Rooftop Carrier HVAC

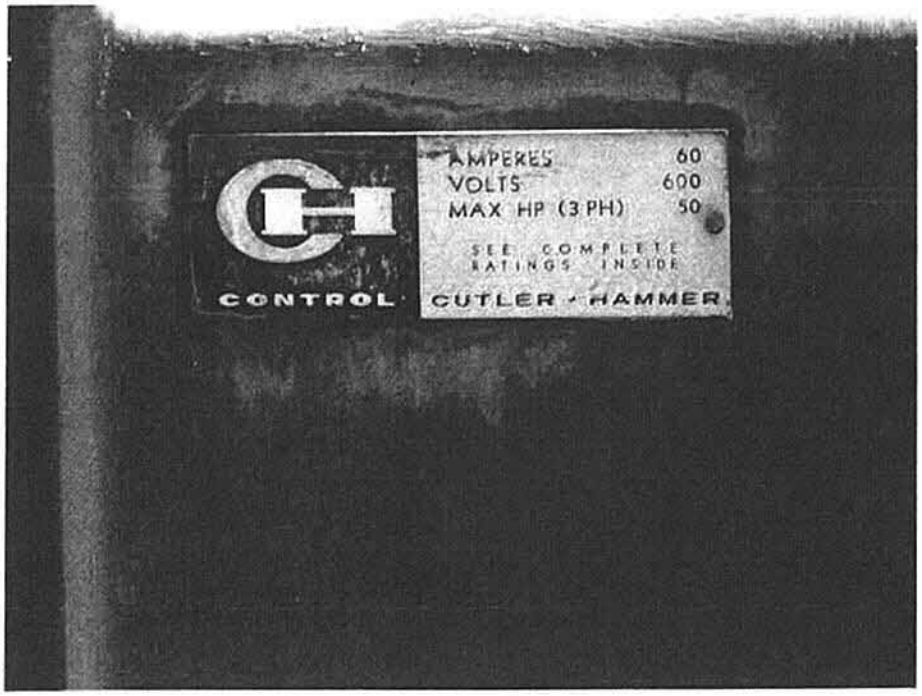


Photograph No. 10

Exterior exit door dirty and faded paint

Photograph No. 11

York HVAC area has not been maintained



Photograph No. 12

Power source for HVAC

Photograph No. 13

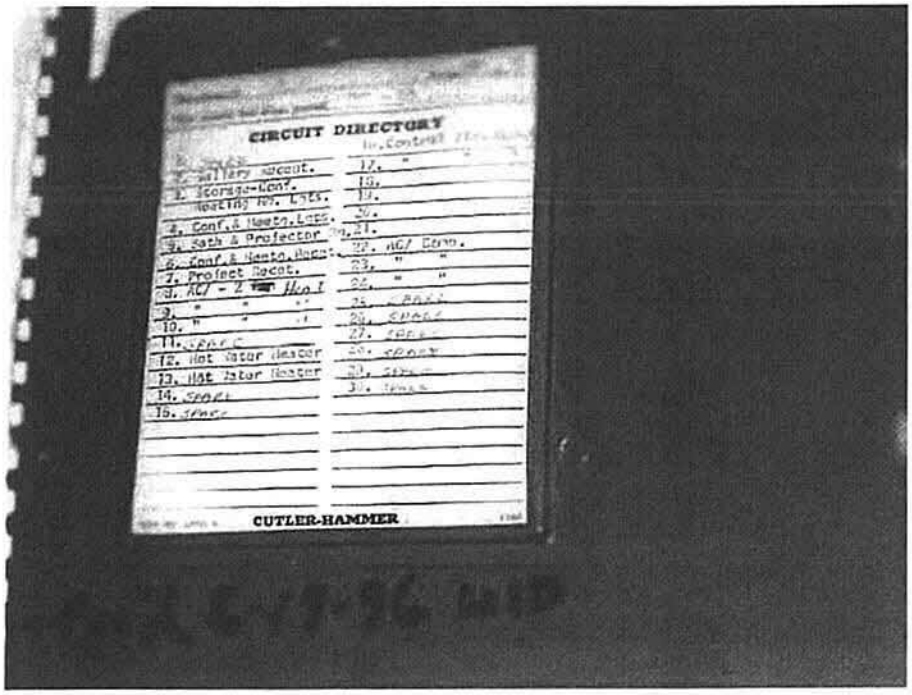
Stains of water leak in maintenance room interior

Photograph No. 14

Dedication of library plaque

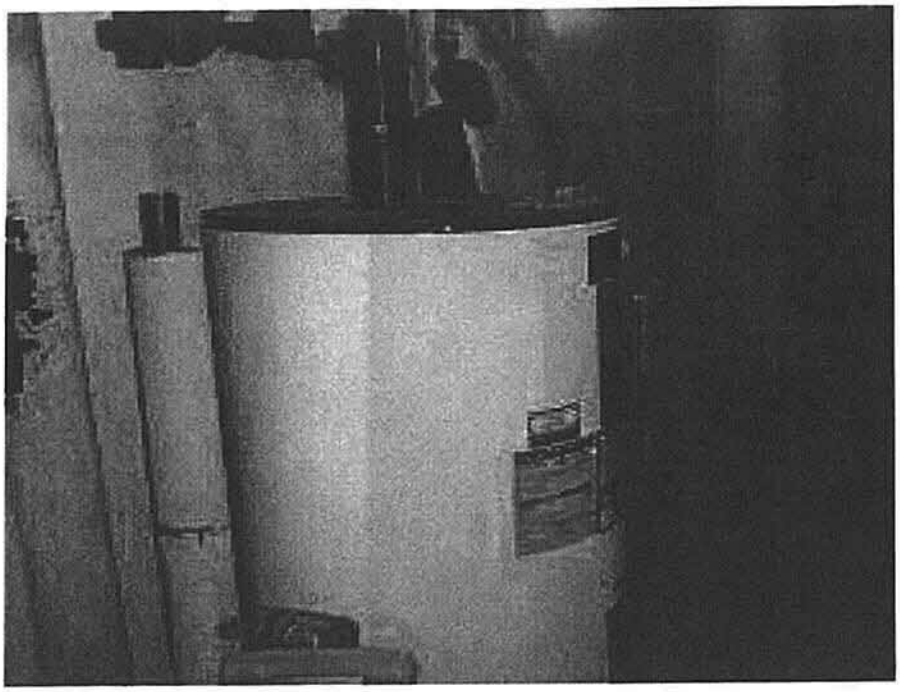
Photograph No. 15

Light fixture damaged and signs of water leaks from roof



Photograph No. 16

Electrical power circuit director

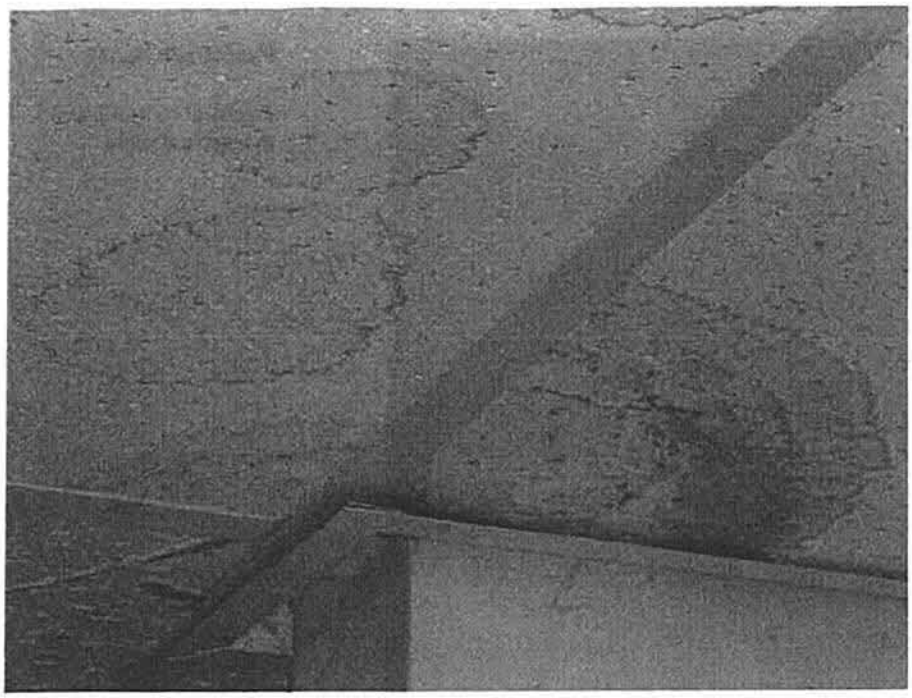


Photograph No. 17

Water heater and label located in mechanical room

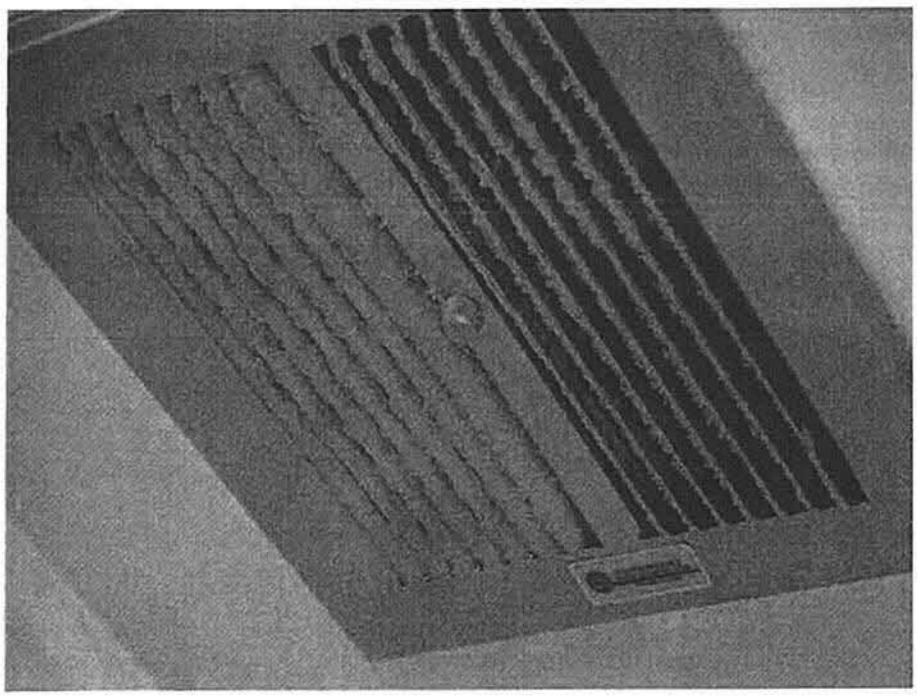
Photograph No. 18

Fire alarm



Photograph No. 19

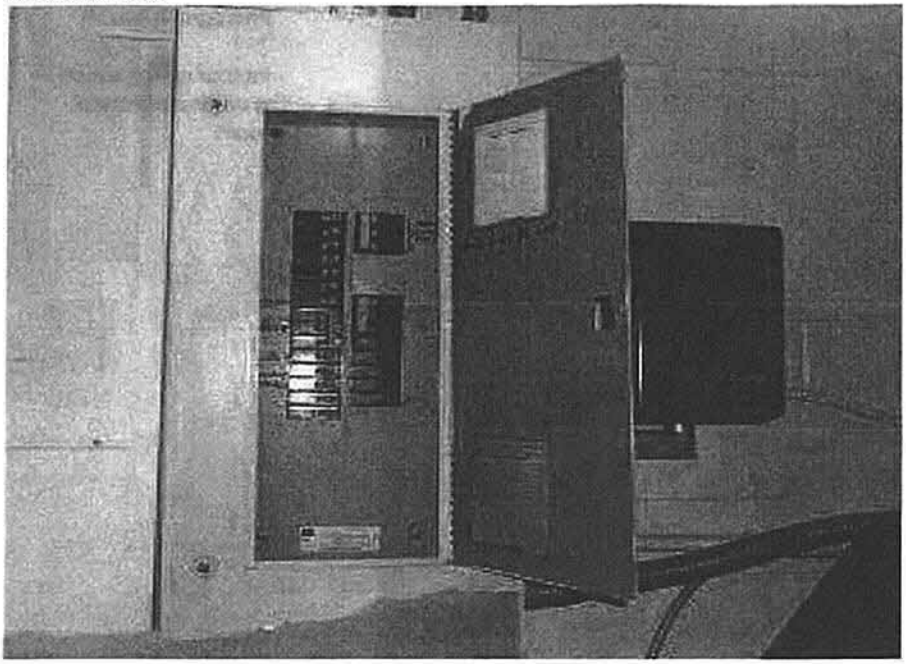
Interior ceiling water stains in mechanical room



Photograph No. 20

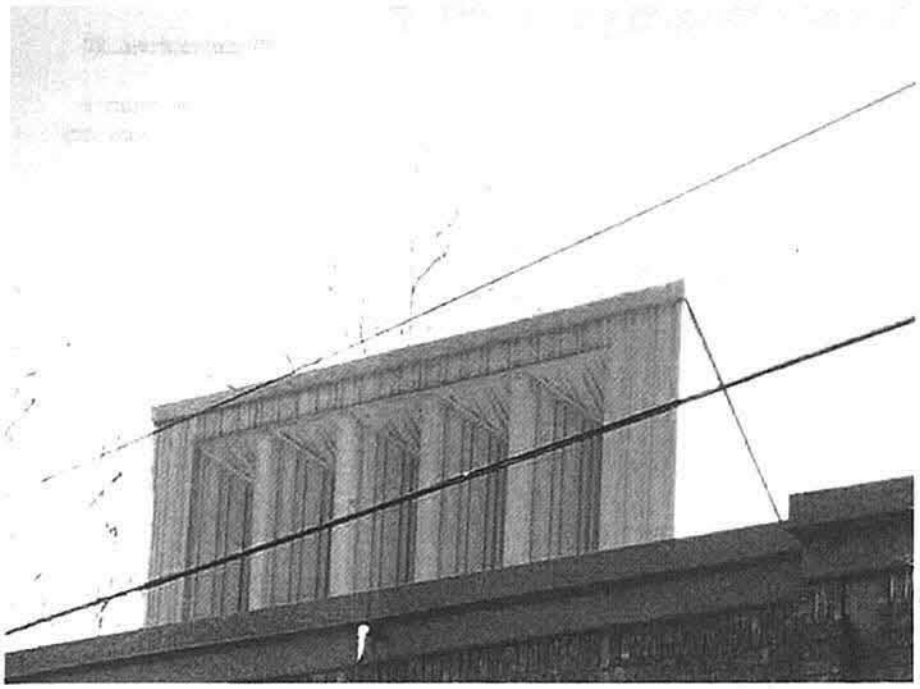
Interior air return in conference room lack maintenance

Need this Photo



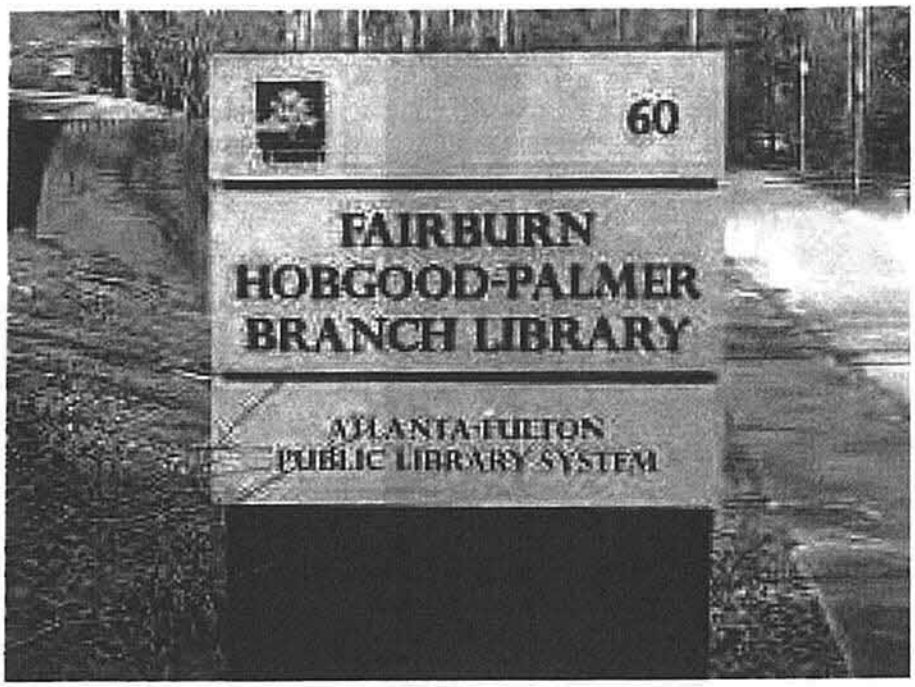
Photograph No. 21

Electrical control panel
in electrical room



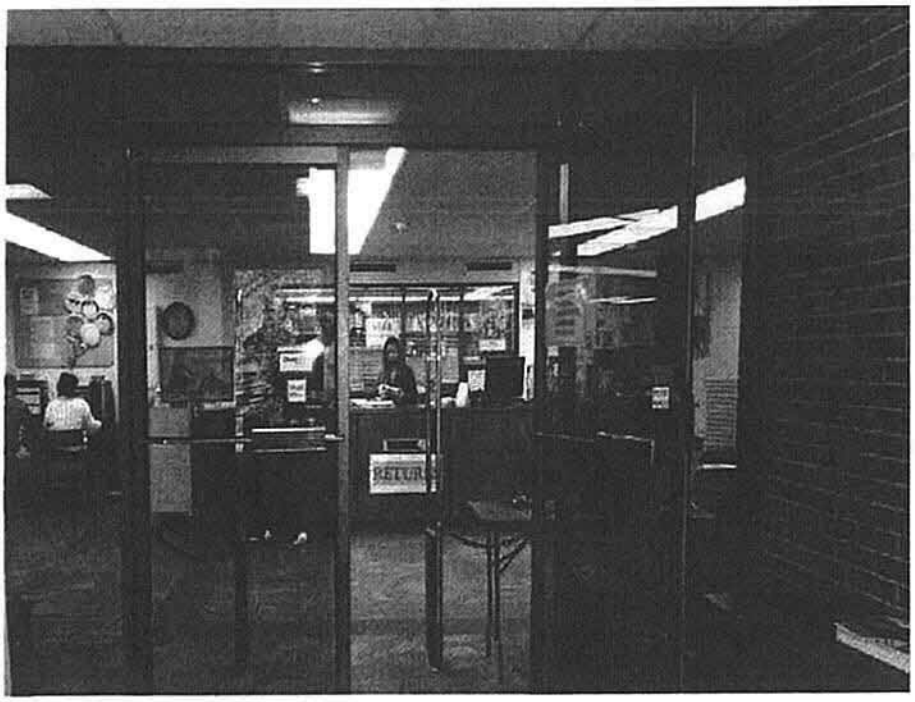
Photograph No. 22

Sky-light view



Photograph No. 23

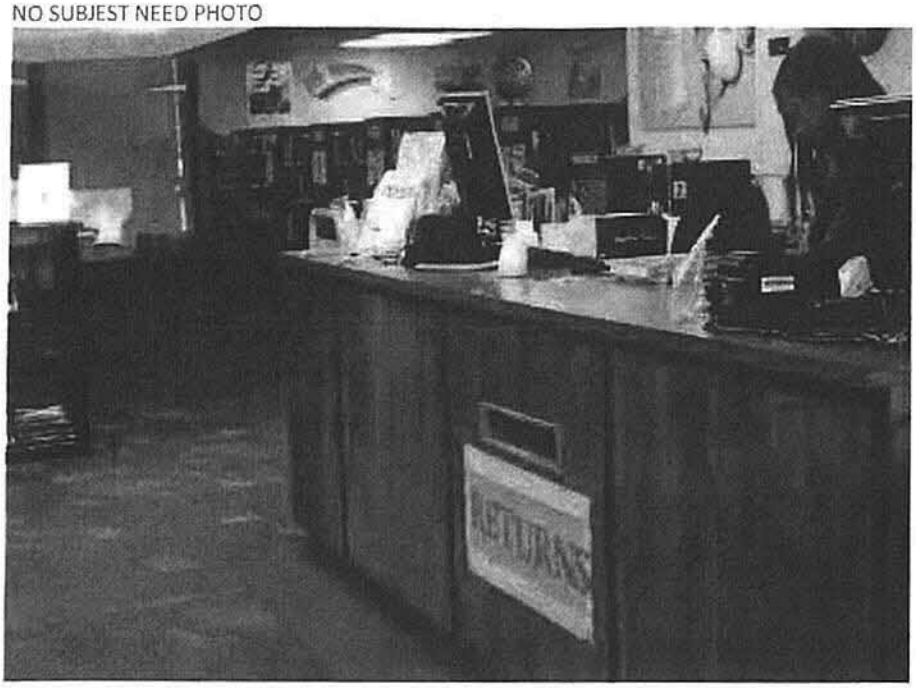
Library sign



Photograph No. 24

Entrance to library by way of ADA non-compliant access through sensor

NO SUBJEST NEED PHOTO

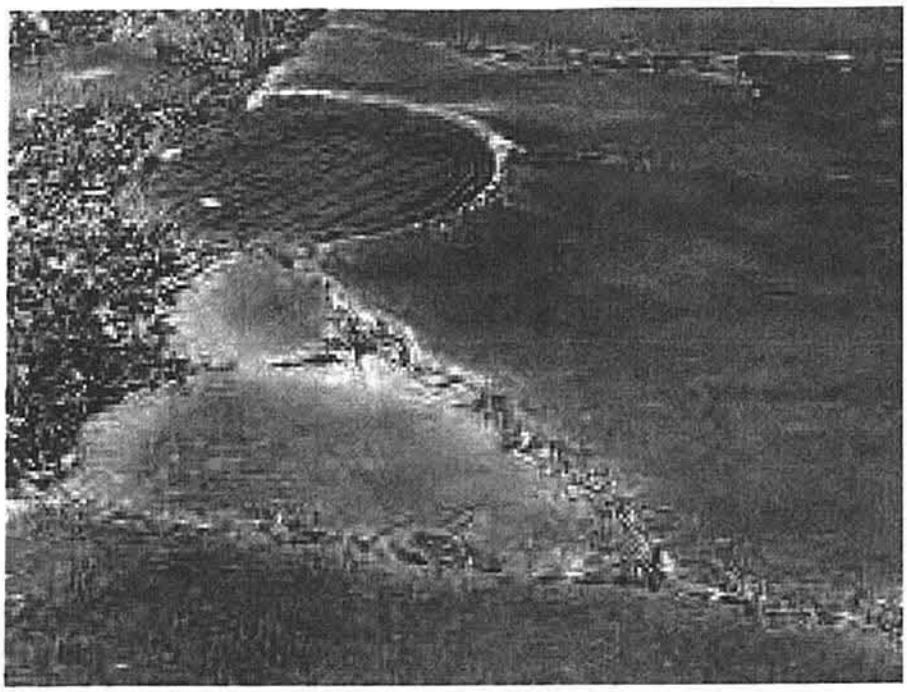


Photograph No. 25

Non-compliant to Ada
at circulation desk

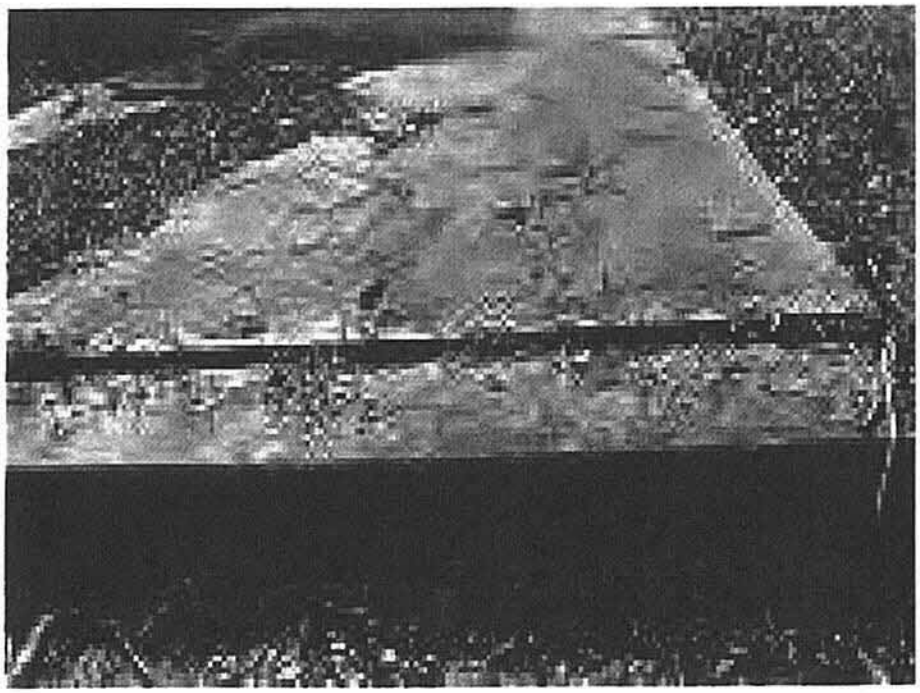
Photograph No. 26

Faded sign



Photograph No. 27

Deteriorated asphalt

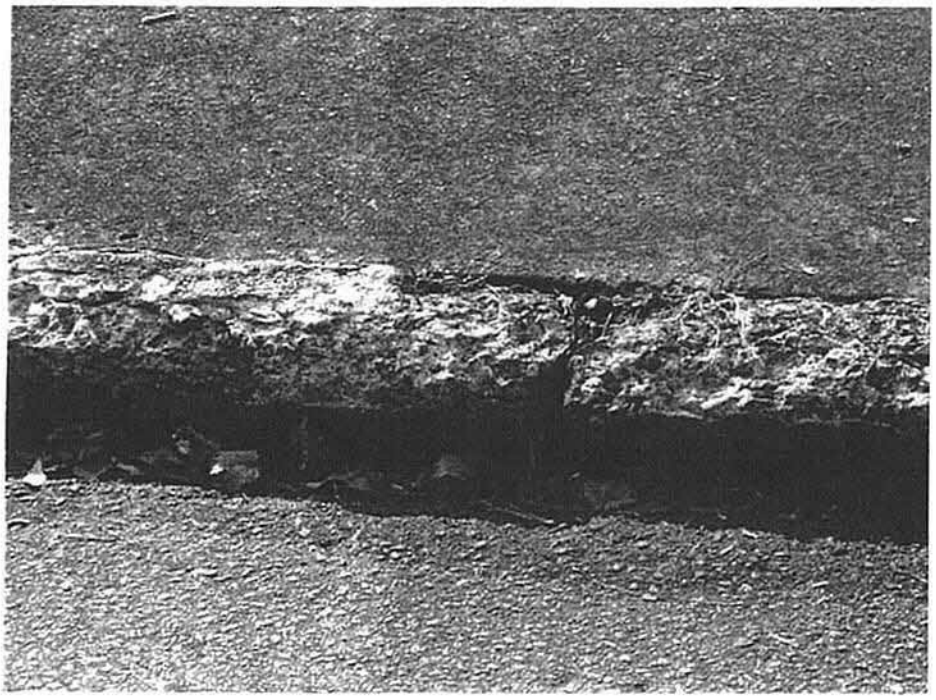


Photograph No. 28

Sidewalk uneven

Photograph No. 29

Gas meter on building's west side

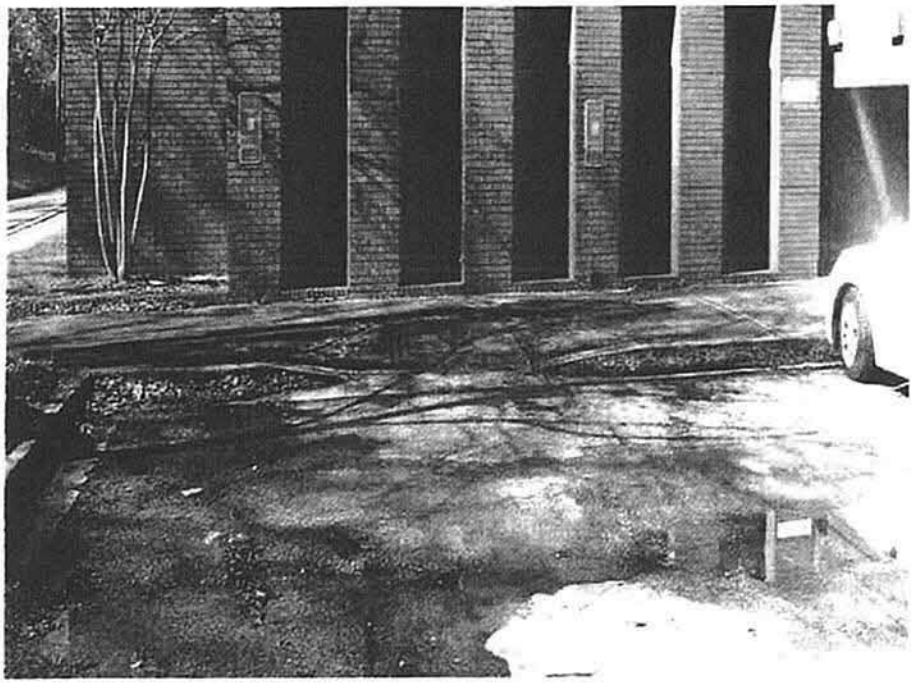


Photograph No. 30

Damaged concrete curb

Photograph No. 31

Handicapped parking sign



Photograph No. 32

Worn asphalt and faded ADA symbols

APPENDIX C:
OTHER DOCUMENTATION

Preventative Maintenance Budget

Building Name	Uniformat Level 2	Title	Quantity	Total Labor Hours per Year	Cost In-House	Cost Contract
Roofing Systems						
Fairburn Library	Roofing Systems	Preventative maintenance of roof coverings.	2.0	1.91	$221.93	$332.90
Subtotal:			2.00	1.91	$ 221.93	$ 332.90
Mechanical						
Fairburn Library	Mechanical	Package unit, up to 24 tons, with natural gas furnace	1.0	6.21	$641.55	$962.33
Fairburn Library	Mechanical	Heat pump, air cooled, over 5 tons	1.0	5.79	$443.34	$665.01
Subtotal:			2.00	12.00	$ 1,084.89	$ 1,627.34
Electrical						
Fairburn Library	Electrical	Lighting system, emergency w/ battery backup	8.0	19.04	$1,167.20	$1,750.80
Fairburn Library	Electrical	Preventative maintenance of electrical panels	3.0	3.45	$264.75	$397.13
Subtotal:			11.00	22.49	$ 1,431.95	$ 2,147.93
Fire & Life Safety						
Fairburn Library	Fire & Life Safety	Fire Alarm System Testing and Maintenance, 50 devices or less	1.0	4.56	$375.80	$563.70
Subtotal:			1.00	4.56	$ 375.80	$ 563.70
Total:			16.00	40.96	$ 3,114.57	$ 4,671.87

Count: 6

EXHIBIT 3

INSTRUMENTATION AND CONTROL FOR HVAC

Section 23 09 23

Instrumentation and Control for HVAC

Phase 2 Libraries Equipment Upgrade
0021

Prepared By:

Fulton County HVAC/BAS Department

Contents

23 09 23 Direct-Digital Control System for HVAC
PART 1: GENERAL

1.1 Products Furnished but Not Installed under This Section

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   3. Flow switches
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   1. Control valves
C. Section 23 09 13.43 - Control Dampers
   1. Automated Dampers
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   1. AHU, heating, and ventilating unit controls
E. Section 23 80 00 - Decentralized HVAC Equipment
   1. Terminal unit controls

1.2 Products Installed but Not Furnished under This Section

A. Section 23 09 13.23 - Sensors and Transmitters
   1. Duct static pressure sensors
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1.3 Products Not Furnished or Installed under but Integrated with the Work of This Section

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   1. Boiler controls
E. Section 23 60 00 - Central Cooling Equipment
   1. Chiller controls
F. Section 23 70 00 - Central HVAC Equipment
   1. Packaged AHU or evaporative cooler controls
G. Section 23 80 00 - Decentralized HVAC Equipment
   1. Unit ventilators, unit heaters, fan coils, etc.

1.4 Related Sections

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are part of this specification and shall be used in conjunction with this section as part of the contract documents.
B. The following sections constitute related work:
   1. Section 01 30 00 - Administrative Requirements

2. Section 01 60 00 - Product Requirements
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19. Section 26 50 00 - Lighting
20. Section 28 00 00 - Electronic Safety and Security (includes Fire and Smoke)

1.5 Description

A. General: The control system shall consist of a high-speed, peer-to-peer network of DDC controllers, a control system server, and a web-based operator interface.

B. System software shall be based on a server/thin client architecture, designed around the open standards of web technology. The control system server shall be accessed using a Web browser over the control system network, the owner's local area network, and (at the owner's discretion) over the Internet. The intent of the thin-client architecture is to provide operators complete access to the control system via a Web browser. No special software other than a web browser shall be required to access graphics, point displays, and trends, configure trends, configure points and controllers, or to download programming into the controllers.

C. System shall use the BACnet protocol for communication to the operator workstation or web server and for communication between control modules. I/O points, schedules, setpoints, trends and alarms specified in 23 09 93 – "Sequence of Operations for HVAC Controls" shall be BACnet objects.

1.6 Approved Control system Manufacturers

A. The following are approved control system suppliers, manufacturers, and product lines:

Supplier	Manufacturer	Product Line

ALC	Automated Logic Corporation	WebCTRL
Trane	Trane	Tracer SC
CCI	Siemens	Niagara 4
Siemens	Desigo	Apogee
Johnson Controls	Metasys	Metasys

The above list does not indicate order of preference. Inclusion on this list does not guarantee acceptance of products or installation. Control systems shall comply with the terms of this specification.

1. The Contractor shall use only operator workstation software, controller software, custom application programming language, and controllers from the corresponding manufacturer and product line unless Owner approves use of multiple manufacturers.
2. Other products specified herein (such as sensors, valves, dampers, and actuators) need not be manufactured by the above manufacturers.

1.7 Quality Assurance

A. Installer and Manufacturer Qualifications
   1. Installer shall have an established working relationship with Control System Manufacturer.
   2. Installer shall have successfully completed Control System Manufacturer's control system training. Upon request, Installer shall present record of completed training including course outlines.

1.8 Codes and Standards

A. Work, materials, and equipment shall comply with the most restrictive of local, state, and federal authorities' codes and ordinances or these plans and specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to the receipt of bids of the following codes:
   1. National Electric Code (NEC)
   2. International Building Code (IBC)
      a. Section 719 Ducts and Air Transfer Openings
      b. Section 907 Fire Alarm and Detection Systems
      c. Section 909 Smoke Control Systems
      d. Chapter 28 Mechanical
   3. International Mechanical Code (IMC)
   4. ANSI/ASHRAE Standard 135, BACnet - A Data Communication Protocol for Building Automation and Control Systems

1.9 System Performance

A. Performance Standards. System shall conform to the following minimum standards over network connections. Systems shall be tested using

manufacturer's recommended hardware and software for operator workstation (server and browser for web-based systems).

1. Graphic Display. A graphic with 20 dynamic points shall display with current data within 10 sec.
2. Graphic Refresh. A graphic with 20 dynamic points shall update with current data within 8 sec.and shall automatically refresh every 15 sec.
3. Configuration and Tuning Screens. Screens used for configuring, calibrating, or tuning points, PID loops, and similar control logic shall automatically refresh within 6 sec.
4. Object Command. Devices shall react to command of a binary object within 2 sec. Devices shall begin reacting to command of an analog object within 2 sec.
5. Alarm Response Time. An object that goes into alarm shall be annunciated at the workstation within 45 sec.
6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 sec. Select execution times consistent with the mechanical process under control.
7. Performance. Programmable controllers shall be able to completely execute DDC PID control loops at a frequency adjustable down to once per sec. Select execution times consistent with the mechanical process under control.
8. Multiple Alarm Annunciation. Each workstation on the network shall receive alarms within 5 sec of other workstations.
9. Reporting Accuracy. System shall report values with minimum end-to-end accuracy listed in Table 1.
10. Control Stability and Accuracy. Control loops shall maintain measured variable at setpoint within tolerances listed in Table 2.

Table-1
Reporting Accuracy

Measured Variable	Reported Accuracy
Space Temperature	±0.5°C (±1°F)
Ducted Air	±0.5°C (±1°F)
Outside Air	±1.0°C (±2°F)
Dew Point	±1.5°C (±3°F)
Water Temperature	±0.5°C (±1°F)
Delta-T	±0.15° (±0.25°F)
Relative Humidity	±5% RH
Water Flow	±2% of full scale
Airflow (terminal)	±10% of full scale (see Note 1)
Airflow (measuring stations)	±5% of full scale
Airflow (pressurized spaces)	±3% of full scale
Air Pressure (ducts)	±25 Pa (±0.1 in. w.g.)
Air Pressure (space)	±3 Pa (±0.01 in. w.g.)
Water Pressure	±2% of full scale (see Note 2)
Electrical	±1% of reading (see Note 3)
Carbon Monoxide (CO)	±5% of reading
Carbon Dioxide (CO2)	±50 ppm

Note 1: Accuracy applies to 10%–100% of scale
Note 2: For both absolute and differential pressure
Note 3: Not including utility-supplied meters

Table 2
Control Stability and Accuracy

Controlled Variable	Control Accuracy	Range of Medium
Air Pressure	±50 Pa (±0.2 in. w.g.) ±3 Pa (±0.01 in. w.g.)	0–1.5 kPa (0–6 in. w.g.) -25 to 25 Pa (-0.1 to 0.1 in. w.g.)
Airflow	±10% of full scale	
Space Temperature	±1.0°C (±2.0°F)	
Duct Temperature	±1.5°C (±3°F)	
Humidity	±5% RH	
Fluid Pressure	±10 kPa (±1.5 psi) ±250 Pa (±1.0 in. w.g.)	MPa (1–150 psi) 0–12.5 kPa (0–50 in. w.g.) differential

1.10 Submittals

A. Product Data and Shop Drawings: Meet requirements of Section 01 30 00 on Shop Drawings, Product Data, and Samples. In addition, the contractor shall provide shop drawings or other submittals on hardware, software, and equipment to be installed or provided. No work may begin on any segment of this project until submittals have been approved for conformity with design intent. Provide drawings as AutoCAD 2006 (or newer) compatible files on magnetic or optical disk (file format: .DWG, .DXF, .VSD, or comparable) and three 11" x 17" prints of each drawing. When manufacturer's cutsheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawing shall clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cutsheets to fulfill submittal requirements. Select and show submittal quantities appropriate to scope of work. Submittal approval does not relieve Contractor of responsibility to supply sufficient quantities to complete work. Submittals shall be provided within 12 weeks of contract award. Submittals shall include:
   1. DDC System Hardware
      a. A complete bill of materials to be used indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.
      b. Manufacturer's description and technical data such as performance curves, product specifications, and installation and maintenance instructions for items listed below and for relevant items not listed below:
         i. Direct digital controllers (controller panels)
         ii. Transducers and transmitters
         iii. Sensors (including accuracy data)
         iv. Actuators
         v. Valves
         vi. Relays and switches
         vii. Control panels
         viii. Power supplies
         ix. Batteries
         x. Operator interface equipment
         xi. Wiring
      c. Wiring diagrams and layouts for each control panel. Show termination numbers.
      d. Schematic diagrams for all field sensors and controllers. Provide floor plans of all sensor locations and control hardware. Riser diagrams showing control network layout, communication protocol, and wire types.
   2. Central System Hardware and Software
      a. A complete bill of material of equipment used indicating quantity, manufacturer, model number, and relevant technical.

b. Manufacturer's description and technical data such as product specifications and installation and maintenance instructions for items listed below and for relevant items furnished under this contract not listed below:
   i. Central Processing Unit (CPU) or web server
   ii. Monitors
   iii. Keyboards
   iv. Power supplies
   v. Battery backups
   vi. Interface equipment between CPU or server and control panels
   vii. Operating System software
   viii. Operator interface software
   ix. Color graphic software
   x. Third-party software
c. Schematic diagrams for all control, communication, and power wiring. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers and functions. Show interface wiring to control system.
d. Network riser diagrams of wiring between central control unit and control panels.

3. Controlled Systems
   a. Riser diagrams showing control network layout, communication protocol, and wire types.
   b. A schematic diagram of each controlled system. The schematics shall have all control points labeled with point names shown or listed. The schematics shall graphically show the location of all control elements in the system.
   c. A schematic wiring diagram of each controlled system. Label control elements and terminals. Where a control element is also shown on control system schematic, use the same name.
   d. An instrumentation list (Bill of Materials) for each controlled system. List each control system element in a table. Show element name, type of device, manufacturer, model number, and product data sheet number.
   e. A mounting, wiring, and routing plan-view drawing. The design shall take into account HVAC, electrical, and other systems' design and elevation requirements. The drawing shall show the specific location of all concrete pads and bases and any special wall bracing for panels to accommodate this work.
   f. A complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system.
   g. A point list for each control system. List I/O points and software points specified in Section 23 09 93. Indicate alarmed and trended points.
4. Quantities of items submitted shall be reviewed but are the responsibility of the Contractor.

5. Description of process, report formats, and checklists to be used in Section 23 09 23 Article 3.17 (Control System Demonstration and Acceptance).
6. BACnet Protocol Implementation Conformance Statement (PICS) for each submitted type of controller and operator interface.

B. Schedules
1. Within one month of contract award, provide a schedule of the work indicating the following:
   a. Intended sequence of work items
   b. Start date of each work item
   c. Duration of each work item
   d. Planned delivery dates for ordered material and equipment and expected lead times
   e. Milestones indicating possible restraints on work by other trades or situations
2. Monthly written status reports indicating work completed and revisions to expected delivery dates. Include updated schedule of work.

C. Project Record Documents. Upon completion of installation, submit three copies of record (as-built) documents of the documents shall be submitted for approval prior to final completion and shall include:
1. Project Record Drawings. As-built versions of submittal shop drawings provided as AutoCAD 2006 (or newer) compatible files on magnetic or optical media (file format: .DWG, .DXF, .VSD, or comparable) and as 11" x 17" prints.
2. Testing and Commissioning Reports and Checklists. Completed versions of reports, checklists, and trend logs used to meet requirements of Section 23 09 23 Article 3.17 (Control System Demonstration and Acceptance).
3. Operation and Maintenance (O&M) Manual.
4. As-built versions of submittal product data.
5. Names, addresses, and telephone numbers of installing contractors and service representatives for equipment and control systems.
6. Operator's manual with procedures for operating control systems: logging on and off, handling alarms, producing point reports, trending data, overriding computer control, and changing setpoints and variables.
7. Programming manual or set of manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.
8. Engineering, installation, and maintenance manual or set of manuals that explains how to design and install new points, panels, and other hardware; how to perform preventive maintenance and calibration; how to debug hardware problems; and how to repair or replace hardware.
9. Documentation of programs created using custom programming language including setpoints, tuning parameters, and object database. Electronic copies of programs shall meet this requirement if control logic, setpoints, tuning parameters, and objects can be viewed using furnished programming tools.
10. Graphic files, programs, and database on magnetic or optical media.

11. List of recommended spare parts with part numbers and suppliers.
12. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.
13. Complete original-issue copies of furnished software, including operating systems, custom programming language, operator workstation or web server software, and graphics software.
14. Licenses, guarantees, and warranty documents for equipment and systems.
15. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.

D. Training Materials: Provide course outline and materials for each class at least six weeks before first class. Training shall be furnished via instructor-led sessions, computer-based training, or web-based training. Engineer will modify course outlines and materials if necessary to meet Owner's needs. Engineer will review and approve course outlines and materials at least three weeks before first class.

1.11 Warranty

A. Warrant work as follows:
1. Warrant labor and materials for specified control system free from defects for a period of 12 months after final acceptance. Control system failures during warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to Owner. Respond during normal business hours within 24 hours of Owner's warranty service request.
2. Work shall have a single warranty date, even if Owner receives beneficial use due to early system start-up. If specified work is split into multiple contracts or a multi-phase contract, each contract or phase shall have a separate warranty start date and period.
3. If the engineer determines that equipment and systems operate satisfactorily at the end of final start-up, testing, and commissioning phase, the engineer will certify in writing that control system operation has been tested and accepted in accordance with the terms of this specification. Date of acceptance shall begin warranty period.
4. Provide updates to operator workstation or web server software, project-specific software, graphic software, database software, and firmware that resolve the contractor-identified software deficiencies at no charge during warranty period. If available, Owner can purchase in-warranty service agreement to receive upgrades for functional enhancements associated with above-mentioned items. Do not install updates or upgrades without Owner's written authorization.
5. Exception: Contractor shall not be required to warrant reused devices except those that have been rebuilt or repaired. Installation labor and

materials shall be warranted. Demonstrate operable condition of reused devices at time of Engineer's acceptance.

1.12 Ownership of Proprietary Material

A. Project-specific software and documentation shall become Owner's property. This includes, but is not limited to:
   1. Graphics
   2. Record drawings
   3. Database
   4. Application programming code
   5. Documentation

1.13 Definitions

Term	Definition
BACnet Interoperability Building Blocks (BIBB)	A BIBB defines a small portion of BACnet functionality that is needed to perform a particular task. BIBBS are combined to build the BACnet functional requirements for a device in a specification.
BACnet/BACnet Standard	BACnet communication requirements as defined by the latest version of ASHRAE/ANSI 135 and approved addenda.
Control Systems Server	A computer(s) that maintain(s) the systems configuration and programming database.
Controller	Intelligent stand-alone control device. Controller is a generic reference to building controllers, custom application controllers, and application specific controllers.
Direct Digital Control	Microprocessor-based control including Analog/Digital conversion and program logic.
Gateway	Bi-directional protocol translator connecting control systems that use different communication protocols.
Local Area Network	Computer or control system communications network limited to local building or campus.
Master-Slave/Token Passing	Data link protocol as defined by the BACnet standard.
Point-to-Point	Serial communication as defined in the BACnet standard.
Primary Controlling LAN	High speed, peer-to-peer controller LAN connecting BCs and optionally AACs and ASCs. Refer to System Architecture below.
Protocol Implementation Conformance Statement	A written document that identifies the particular options specified by BACnet that are implemented in a device.
Router	A device that connects two or more networks at the network layer.
Wiring	Raceway, fittings, wire, boxes and related items.

PART 2: PRODUCTS

2.0 Section Includes
2.1 Materials
2.2 Communication
2.3 Operator Interface
2.4 Controller Software
2.5 Controllers
2.6 Input and Output Interfaces
2.7 Power Supplies and Line Filtering
2.8 Auxiliary Control Devices
2.9 Wiring and Raceways
2.10 Fiber Optic Cable System
2.11 Compressed Air Supply - Pneumatic

2.1 Materials

A. Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least five years after completion of this contract.

2.2 Communication

A. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135, BACnet.
B. Install new wiring and network devices as required to provide a complete and workable control network.
C. Use existing Ethernet backbone for network segments marked "existing" on project drawings.
D. Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.
E. Internetwork operator interface and value passing shall be transparent to internetwork architecture.
    1. An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, status, and control algorithms shall be viewable and editable from each internetwork controller.
    2. Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. Program and test all cross-controller links required to execute control strategies specified in Section 23 09 93. An authorized operator shall be able to edit cross-controller links by typing a standard object address or by using a point-and-click interface.
F. Workstations, Building Control Panels, and Controllers with real-time clocks shall use the BACnet Time Synchronization service. System shall automatically synchronize system clocks daily from an operator-designated device via the internetwork. The system shall automatically adjust for daylight saving and standard time as applicable.
G. System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring.
H. System shall support Web services data exchange with any other system that complies with XML (extensible markup language) and SOAP (simple object

access protocol) standards specified by the Web Services Interoperability Organization(WS-I) Basic Profile 1.0 or higher. Web services support shall as a minimum be provided at the workstation or web server level and shall enable data to be read from or written to the system.

1. System shall support Web services read data requests by retrieving requested trend data or point values (I/O hardware points, analog value software points, or binary value software points) from any system controller or from the trend history database.
2. System shall support Web services write data request to each analog and binary object that can be edited through the system operator interface by downloading a numeric value to the specified object.
3. For read or write requests, the system shall require user name and password authentication and shall support SSL (Secure Socket Layer) or equivalent data encryption.
4. System shall support discovery through a Web services connection or shall provide a tool available through the Operator Interface that will reveal the path/identifier needed to allow a third party Web services device to read data from or write data to any object in the system which supports this service.

2.3 Operator Interface

A. The Operator Workstation or server shall conform to the BACnet Operator Workstation (B-OWS) or BACnet Advanced Workstation (B-AWS) device profile as specified in ASHRAE/ANSI 135 BACnet Annex L.

B. Operator Interface. Web server shall reside on high-speed network with building controllers. Each standard browser connected to server shall be able to access all system information.

C. In addition to the primary operator interface, the system shall include a secondary interface compatible with a locally available commercial wireless network and viewable on a commercially available wireless device such as a Wireless Access Protocol (WAP) enabled cellular telephone. This secondary interface may be text-based and shall provide a summary of the most important data. As a minimum, the following capabilities shall be provided through this interface:

1. An operator authentication system that requires an operator to log in before viewing or editing any data, and which can be configured to limit the privileges of an individual operator.
2. The ability to view and acknowledge any alarm in the system. Alarms or links to alarms shall be provided on a contiguous list so the operator can quickly view all alarms.

3. A summary page or pages for each piece of equipment in the system. This page shall include the current values of all critical I/O points and shall allow the operator to lock binary points on or off and to lock analog points to any value within their range.
4. Navigation links that allow the operator to quickly navigate from the home screen to any piece of equipment in the system, and then return to the home screen. These links may be arranged in a hierarchical fashion, such as navigating from the home screen to a particular building, then to a specific floor in the building, and then to a specific room or piece of equipment.

D. Communication. Web server or workstation and controllers shall communicate using BACnet protocol. Web server or workstation and control network backbone shall communicate using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing as specified in ANSI/ASHRAE 135, BACnet Annex J.

E. Hardware. Each workstation or web server shall consist of the following:
   1. Computer. Industry-standard hardware shall meet or exceed DDC system manufacturer's recommended specifications and shall meet response times specified elsewhere in this document. The following hardware requirements also apply:
      a. The hard disk shall have sufficient memory to store:
         i. All required operator workstation software.
         ii. A DDC database at least twice the size of the delivered system database.
         iii. One year of trend data based on the points specified to be trended at their specified trend intervals.
      b. Provide additional hardware (communication ports, video drivers, network interface cards, cabling, etc.) to facilitate all control functions and software requirements specified for the DDC system.
      c. Minimum hardware configuration shall include the following:
         i. Dual or Quad Core Processor
         ii. 6 GB RAM
         iii. 500 GB hard disk providing data at 3.0 Gb/sec
         iv. 16x DVD-RW drive
         v. Serial, parallel, and network communication ports and cables as required for proper DDC system operation

F. System Software.
   1. Operating System. Web server or workstation shall have an industry-standard professional-grade operating system. Operating system shall meet or exceed the DDC System manufacturers minimum

requirements for their software. Typically acceptable systems include Microsoft Windows7,Microsoft Vista, Microsoft Windows XP Pro, Windows Server 2003 or 2008, Red Hat Enterprise Linux, or Ubuntu Desktop 10.04.

2. System Graphics. The operator interface software shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using dynamic colors to represent zone temperature relative to zone setpoint.
    a. Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point-and-click navigation between zones or equipment, and to edit setpoints and other specified parameters.
    b. Animation. Graphics shall be able to animate by displaying different image files for changed object status.
    c. Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.
    d. Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only require widely available no-cost plug-ins (such as Active-X and Adobe Flash).
3. Custom Graphics. Custom graphic files shall be created with the use of a graphics generation package furnished with the system. The graphics generation package shall be a graphically based system that uses the mouse to create and modify graphics that are saved in the same formats as are used for system graphics.
4. Graphics Library. Furnish a complete library of standard HVAC equipment graphics such as chillers, boilers, air handlers, terminals, fan coils, and unit ventilators. This library also shall include standard symbols for other equipment including fans, pumps, coils, valves, piping, dampers, and ductwork. The library shall be furnished in a file format compatible with the graphics generation package program.

G. System Applications. System shall provide the following functionality to authorized operators as an integral part of the operator interface or as stand-alone software programs. If furnished as part of the interface, the tool shall be

available from each workstation or web browser interface. If furnished as a stand-alone program, software shall be installable on standard IBM-compatible PCs with no limit on the number of copies that can be installed under the system license.

1. Automatic System Database Configuration. Each workstation or web server shall store on its hard disk a copy of the current system database, including controller firmware and software. Stored database shall be automatically updated with each system configuration or controller firmware or software change.
2. Manual Controller Memory Download. Operators shall be able to download memory from the system database to each controller.
3. System Configuration. The workstation software shall provide a method of configuring the system. This shall allow for future system changes or additions by users under proper password protection. Operators shall be able to configure the system.
4. On-Line Help. Provide a context-sensitive, on-line help system to assist the operator in operating and editing the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext.
5. Security. Each operator shall be required to log on to the system with user name and password in order to view, edit, add, or delete data.
    a. Operator Access. The user name and password combination shall define accessible viewing, editing, adding, and deleting privileges for that operator. Users with system administrator rights shall be able to create new users and edit the privileges of all existing users.
    b. Automatic Log Out. Automatically log out each operator if no keyboard or mouse activity is detected. This auto logoff time shall be user adjustable.
    c. Encrypted Security Data. Store system security data including operator passwords in an encrypted format. System shall not display operator passwords.
6. System Diagnostics. The system shall automatically monitor the operation of all building management panels and controllers. The failure of any device shall be annunciated to the operator.
7. Alarm Processing. System input and status objects shall be configurable to alarm on departing from and on returning to normal state. Operator shall be able to enable or disable each alarm and to configure alarm limits, alarm limit differentials, alarm states, and alarm reactions for each system object. Configure and enable alarm points as

specified in Section 23 09 93 (Sequences of Operation). Alarms shall be BACnet alarm objects and shall use BACnet alarm services.

8. Alarm Messages. Alarm messages shall use the English language descriptor for the object in alarm in such a way that the operator will be able to recognize the source, location, and nature of the alarm without relying on acronyms.
9. Alarm Reactions. Operator shall be able to configure (by object) what, if any actions are to be taken during an alarm. As a minimum, the workstation or web server shall be able to log, print, start programs, display messages, send e-mail, send page, and audibly annunciate.
10. Alarm and Event log. Operators shall be able to view all system alarms and changes of state from any location in the system. Events shall be listed chronologically. An operator with the proper security level may acknowledge and delete alarms, and archive closed alarms to the workstation or web server hard disk.
11. Trend Logs. The operator shall be able to configure trend sample or change of value (COV) interval, start time, and stop time for each system data object and shall be able to retrieve data for use in spreadsheets and standard database programs. Controller shall sample and store trend data and shall be able to archive data to the hard disk. Configure trends as specified in Section 23 09 93 (Sequences of Operation). Trends shall be BACnet trend objects.
12. Object and Property Status and Control. Provide a method for the operator to view, and edit if applicable, the status of any object or property in the system. The status shall be available by menu, on graphics, or through custom programs.
13. Reports and Logs. Operator shall be able to select, to modify, to create, and to print reports and logs. Operator shall be able to store report data in a format accessible by standard spreadsheet and word processing programs.
14. Standard Reports. Furnish the following standard system reports:
    a. Objects. System objects and current values filtered by object type, by status (in alarm, locked, normal), by equipment, by geographic location, or by combination of filter criteria.
    b. Alarm Summary. Current alarms and closed alarms. System shall retain closed alarms for an adjustable period.
    c. Logs. System shall log the following to a database or text file and shall retain data for an adjustable period:
        i. Alarm History.
        ii. Trend Data. Operator shall be able to select trends to be logged.

iii. Operator Activity. At a minimum, system shall log operator log in and log out, control parameter changes, schedule changes, and alarm acknowledgment and deletion. System shall date and time stamp logged activity.

15. Energy Reports. System shall include an easily configured energy reporting tool that provides the capabilities described in this section.
    a. The energy reporting tool shall be accessible through the same user interface (Web browser or operator workstation software) as is used to manage the BAS.
    b. The energy reporting tool shall be preconfigured by the Contractor to gather and store energy demand and consumption data from each energy source that provides metered data to the BAS. Meter data shall be stored at 5 minute intervals unless otherwise specified in the Sequence of Operation provided in section 23 09 93. This data shall be maintained in an industry standard SQL database for a period of not less than five years.
    c. The energy reporting tool shall allow the operator to select an energy source and a time period of interest (day, week, month, year, or date range) and shall provide options to view the data in a table, line graph, bar graph, or pie chart. The tool shall also allow the operator to select two or more data sources and display a comparison of the energy used over this period in any of the listed graph formats, or to total the energy used by the selected sources and display that data in the supported formats.
    d. The energy reporting tool shall allow the operator to select and energy source and two time periods of interest (day, week, month, year, or date range) and display a graph that compares the energy use over the two time periods in any of the graph formats listed in the previous paragraph. The tool shall also allow the operator to select multiple energy sources and display a graph that compares the total energy used by these sources over the two time periods.
    e. The energy reporting tool shall allow the operator to easily generate the previously described graphs "on the fly," and shall provide an option to store the report format so the operator can select that format to regenerate the graph at a future date. The tool shall also allow the user to schedule these reports to run on a recurring basis using relative time periods, such as automatically generating a consumption report on the first Monday of each month showing consumption over the previous month. Automatically generated reports shall be archived on the

server in a common industry format such as Adobe PDF or Microsoft Excel with copies e-mailed to a user editable list of recipients.

f. The energy reporting tool shall be capable of collecting and displaying data from the following types of meters:
   i. Electricity
   ii. Gas
   iii. Oil
   iv. Steam
   v. Chilled Water
   vi. Potable Water
   vii. Heating and cooling degree days. (May be calculated from sensor data rather than metered.)

g. The user shall have the option of using Kw (Kwh) or Btu/hr (Btu) as the units for demand and consumption reports. Multiples of these units (MWH, kBtu, etc.) shall be used as appropriate. All selected sources shall be automatically converted to the selected units. The user shall similarly have the option of entering facility area and occupancy hours and creating reports that are normalized on an area basis, an annual use basis, or an occupied hour basis.

h. The user shall have the option of entering benchmark data for an individual facility or a group of facilities.

i. The user shall have the option of displaying any or all of the following data on any chart, line, or bar graph generated by the energy reporting tool:
   i. Low/High/Average value of the metered value being displayed.
   ii. Heating and/or Cooling Degree Days for the time period(s) being displayed.
   iii. The Environmental Index for the facilities and time periods being displayed.

16. Environmental Index. System shall monitor all occupied zones and compile an index that provides a numerical indication of the environmental comfort within the zone. As a minimum, this indication shall be based upon the deviation of the zone temperature from the heating or cooling setpoint. If humidity is being measured within the zone then the environmental index shall be adjusted to reflect a lower comfort level for high or low humidity levels. Similarly, if carbon dioxide levels are being measured as an indication of ventilation effectiveness then the environmental index shall be adjusted to indicate degraded

comfort at high carbon dioxide levels. Other adjustments may be made to the environmental index based upon additional measurements. The system shall maintain a trend of the environmental index for each zone in the trend log. The system shall also compute an average comfort index for every building included in this contract and maintain trendlogs of these building environmental indices. Similarly, the system shall compute the percentage of occupied time that comfortable conditions were maintained within the zones. Through the UI the user shall be able to add a weighting factor to adjust the contribution of each zone to the average index based upon the floor area of the zone, importance of the zone, or other static criteria.

17. Custom Reports. Operator shall be able to create custom reports that retrieve data, including archived trend data, from the system, that analyze data using common algebraic calculations, and that present results in tabular or graphical format. Reports shall be launched from the operator interface.

H. Workstation Application Editors. Each PC or browser workstation shall support editing of all system applications. The applications shall be downloaded and executed at one or more of the controller panels.
   1. Controller. Provide a full-screen editor for each type of application that shall allow the operator to view and change the configuration, name, control parameters, and set points for all controllers.
   2. Scheduling. An editor for the scheduling application shall be provided at each workstation. Provide a method of selecting the desired schedule and schedule type. Exception schedules and holidays shall be shown clearly on the calendar. The start and stop times for each object shall be adjustable from this interface.
   3. Custom Application Programming. Provide the tools to create, edit, debug, and download custom programs. System shall be fully operable while custom programs are edited, compiled, and downloaded. Programming language shall have the following features:
      a. Language. Language shall be graphically based and shall use function blocks arranged in a logic diagram that clearly shows control logic flow. Function blocks shall directly provide functions listed below, and operators shall be able to create custom or compound function blocks.
      b. Programming Environment. Tool shall provide a full-screen, cursor-and-mouse-driven programming environment that incorporates word processing features such as cut and paste. Operators shall be able to insert, add, modify, and delete custom

programming code, and to copy blocks of code to a file library for reuse in other control programs.

c. Independent Program Modules. Operator shall be able to develop independently executing program modules that can disable, enable and exchange data with other program modules.
d. Debugging and Simulation. Operator shall be able to step through the program observing intermediate values and results. Operator shall be able to adjust input variables to simulate actual operating conditions. Operator shall be able to adjust each step's time increment to observe operation of delays, integrators, and other time-sensitive control logic. Debugger shall provide error messages for syntax and for execution errors.
e. Conditional Statements. Operator shall be able to program conditional logic using compound Boolean (AND, OR, and NOT) and relational (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
f. Mathematical Functions. Language shall support floating-point addition, subtraction, multiplication, division, and square root operations, as well as absolute value calculation and programmatic selection of minimum and maximum values from a list of values.
g. Variables. Operator shall be able to use variable values in program conditional statements and mathematical functions.
    i. Time Variables. Operator shall be able to use predefined variables to represent time of day, day of the week, month of the year, and date. Other predefined variables or simple control logic shall provide elapsed time in seconds, minutes, hours, and days. Operator shall be able to start, stop, and reset elapsed time variables using the program language.
    ii. System Variables. Operator shall be able to use predefined variables to represent status and results of Controller Software and shall be able to enable, disable, and change setpoints of Controller Software as described in Controller Software section.

l. Portable Operator's Terminal. Provide all necessary software to configure an IBM-compatible laptop computer for use as a Portable Operator's Terminal. Operator shall be able to connect configured Terminal to the system network or directly to each controller for programming, setting up, and troubleshooting.

2.4 Controller Software

A. Furnish the following applications for building and energy management. All software application shall reside and operate in the system controllers. Applications shall be editable through operator workstation, web browser interface, or engineering workstation.
B. System Security. See Paragraph 2.3.E.5 (Security) and Paragraph 2.3.E.14.c.iii (Operator Activity).
C. Scheduling. Provide the capability to execute control functions according to a user created or edited schedule. Each schedule shall provide the following schedule options as a minimum:
    1. Weekly Schedule. Provide separate schedules for each day of the week. Each schedule shall be able to include up to 5 occupied periods (5 start-stop pairs or 10 events).
    2. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. Exception schedules may be defined up to a year in advance. Once an exception schedule has executed, the system shall discard and replace the exception schedule with the standard schedule for that day of the week.
    3. Holiday Schedules. Provide the capability for the operator to define up to 24 special or holiday schedules. These schedules will be repeated each year. The operator shall be able to define the length of each holiday period.
D. System Coordination. Operator shall be able to group related equipment based on function and location and to use these groups for scheduling and other applications.
E. Binary Alarms. Each binary object shall have the capability to be configured to alarm based on the operator-specified state. Provide the capability to automatically and manually disable alarming.
F. Analog Alarms. Each analog object shall have both high and low alarm limits. The operator shall be able to enable or disable these alarms.
G. Alarm Reporting. The operator shall be able to determine the action to be taken in the event of an alarm. An alarm shall be able to start programs, print, be logged in the event log, generate custom messages, and display on graphics.
H. Remote Communication. System shall automatically contact operator workstation or server on receipt of critical alarms. If no network connection is available, system shall use a modem connection.
I. Demand Limiting.
    1. The demand-limiting program shall monitor building power consumption from a building power meter (provided by others) which generates pulse signals or a BACnet communications interface. An

acceptable alternative is for the system to monitor a watt transducer or current transformer attached to the building feeder lines.

2. When power consumption exceeds adjustable levels, system shall automatically adjust setpoints, de-energize low-priority equipment, and take other programmatic actions to reduce demand as specified in Section 23 09 93 (Sequences of Operation). When demand drops below adjustable levels, system shall restore loads as specified.

J. Maintenance Management. The system shall be capable of generating maintenance alarms when equipment exceeds adjustable runtime, equipment starts, or performance limits. Configure and enable maintenance alarms as specified in 23 09 93 (Sequences of Operation).

K. Sequencing. Application software shall sequence chillers, boilers, and pumps as specified in Section 23 09 93 (Sequences of Operation).

L. PID Control. System shall provide direct- and reverse-acting PID (proportional-integral-derivative) algorithms. Each algorithm shall have anti-windup and selectable controlled variable, setpoint, and PID gains. Each algorithm shall calculate a time-varying analog value that can be used to position an output or to stage a series of outputs. The calculation interval, PID gains, and other tuning parameters shall be adjustable by a user with the correct security level.

M. Staggered Start. System shall stagger controlled equipment restart after power outage. Operator shall be able to adjust equipment restart order and time delay between equipment restarts.

N. Energy Calculations.

1. The system shall accumulate and convert instantaneous power (kW) or flow rates (L/s [gpm]) to energy usage data.
2. The system shall calculate a sliding-window average (rolling average). Operator shall be able to adjust window interval to 15 minutes, 30 minutes, or 60 minutes.

O. Anti-Short Cycling. All binary output objects shall be protected from short cycling by means of adjustable minimum on-time and off-time settings.

P. On and Off Control with Differential. Provide an algorithm that allows a binary output to be cycled based on a controlled variable and a setpoint. The algorithm shall be direct-acting or reverse-acting.

Q. Runtime Totalization. Provide software to totalize runtime for each binary input and output. Operator shall be able to enable runtime alarm based on exceeded adjustable runtime limit. Configure and enable runtime totalization and alarms as specified in Section 23 09 93 (Sequence of Operations).

2.5 Controllers

A. General. Provide an adequate number of Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), Smart Actuators (SA), and Smart Sensors (SS) as required to achieve performance specified in Section 23 09 23 Article 1.9 (System Performance). Every device in the system which executes control logic and directly controls HVAC equipment must conform to a standard BACnet Device profile as specified in ANSI/ASHRAE 135, BACnet Annex L. Unless otherwise specified, hardwired actuators and sensors may be used in lieu of BACnet Smart Actuators and Smart Sensors.

B. BACnet.
   1. Building Controllers (BCs). Each BC shall conform to BACnet Building Controller (B-BC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L, and shall be listed as a certified B-BC in the BACnet Testing Laboratories (BTL) Product Listing.
   2. Advanced Application Controllers (AACs). Each AAC shall conform to BACnet Advanced Application Controller (B-AAC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-AAC in the BACnet Testing Laboratories (BTL) Product Listing.
   3. Application Specific Controllers (ASCs). Each ASC shall conform to BACnet Application Specific Controller (B-ASC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-ASC in the BACnet Testing Laboratories (BTL) Product Listing.
   4. Smart Sensors (SSs). Each SS shall conform to BACnet Smart Sensor (B-SS) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-SS in the BACnet Testing Laboratories (BTL) Product Listing.
   5. BACnet Communication.
      a. Each BC shall reside on or be connected to a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing.
      b. BACnet routing shall be performed by BCs or other BACnet device routers as necessary to connect BCs to networks of AACs and ASCs.
      c. Each AAC shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
      d. Each ASC shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.

e. Each SA shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
f. Each SS shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using ARCNET or MS/TP Data Link/Physical layer protocol.

C. Communication
1. Service Port. Each controller shall provide a service communication port for connection to a Portable Operator's Terminal. Connection shall be extended to space temperature sensor ports where shown on drawings.
2. Signal Management. BC and ASC operating systems shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and to allow for central monitoring and alarms.
3. Data Sharing. Each BC and AAC shall share data as required with each networked BC and AAC.
4. Stand-Alone Operation. Each piece of equipment specified in Section 23 09 93 shall be controlled by a single controller to provide stand-alone control in the event of communication failure. All I/O points specified for a piece of equipment shall be integral to its controller. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network such as outdoor air conditions, supply air or water temperature coming from source equipment, etc.

D. Environment. Controller hardware shall be suitable for anticipated ambient conditions.
1. Controllers used outdoors or in wet ambient conditions shall be mounted in waterproof enclosures and shall be rated for operation at -29°C to 60°C (-20°F to 140°F).
2. Controllers used in conditioned space shall be mounted in dust-protective enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).

E. Keypad. Provide a local keypad and display for each BC and AAC. Operator shall be able to use keypad to view and edit data. Keypad and display shall require password to prevent unauthorized use. If the manufacturer does not normally provide a keypad and display for each BC and AAC, provide the software and any interface cabling needed to use a laptop computer as a Portable Operator's Terminal for the system.

F. Real-Time Clock. Controllers that perform scheduling shall have a real-time clock.

G. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to a field-removable modular terminal strip or to a termination card connected by a ribbon cable. Each BC and AAC shall continually check its processor and memory circuit status and shall generate an alarm on abnormal operation. System shall continuously check controller network and generate alarm for each controller that fails to respond.
H. Memory.
    1. Controller memory shall support operating system, database, and programming requirements.
    2. Each BC and AAC shall retain BIOS and application programming for at least 72 hours in the event of power loss.
    3. Each ASC and SA shall use nonvolatile memory and shall retain BIOS and application programming in the event of power loss. System shall automatically download dynamic control parameters following power loss.
I. Immunity to Power and Noise. Controllers shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).
J. Transformer. ASC power supply shall be fused or current limiting and shall be rated at a minimum of 125% of ASC power consumption.

2.6 Input and Output Interface

A. General. Hard-wire input and output points to BCs, AACs, ASCs, or SAs.
B. Protection. All input points and output points shall be protected such that shorting of the point to itself, to another point, or to ground shall cause no damage to the controller. All input and output points shall be protected from voltage up to 24 V of any duration, such that contact with this voltage will cause no controller damage.
C. Binary Inputs. Binary inputs shall allow the monitoring of ON/OFF signals from remote devices. The binary inputs shall provide a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against contact bounce and noise. Binary inputs shall sense dry contact closure without application of power external to the controller.
D. Pulse Accumulation Inputs. Pulse accumulation inputs shall conform to binary input requirements and shall also accumulate up to 10 pulses per second.
E. Analog Inputs. Analog inputs shall monitor low-voltage (0–10 Vdc), current (4–20 mA), or resistance (thermistor or RTD) signals. Analog inputs shall be compatible with and field configurable to commonly available sensing devices.
F. Binary Outputs. Binary outputs shall provide for ON/OFF operation or a pulsed low-voltage signal for pulse width modulation control. Binary outputs on Building Controllers shall have three-position (on-off-auto) override switches and status lights. Outputs shall be selectable for normally open or normally closed operation.

G. Analog Outputs. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0–10 Vdc or a 4–20 mA signal as required to properly control output devices. Each Building Controller analog output shall have a two-position (auto-manual) switch, a manually adjustable potentiometer, and status lights. Analog outputs shall not drift more than 0.4% of range annually.

H. Tri-State Outputs. Control three-point floating electronic actuators without feedback with tri-state outputs (two coordinated binary outputs). Tri-State outputs may be used to provide analog output control in zone control and terminal unit control applications such as VAV terminal units, duct-mounted heating coils, and zone dampers.

I. System Object Capacity. The system size shall be expandable to at least twice the number of input/ output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The operator interfaces installed for this project shall not require any hardware additions or software revisions in order to expand the system

2.7 Power Supplies and Line Filtering

A. Power Supplies. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish over-current protection in primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.
   1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in over-voltage and over-current protection and shall be able to withstand 150% current overload for at least three seconds without trip-out or failure.
      a. Unit shall operate between 0°C and 50°C (32°F and 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MILSTD 810C for shock and vibration.
      b. Line voltage units shall be UL recognized and CSA listed.

B. Power Line Filtering.
   1. Provide internal or external transient voltage and surge suppression for workstations and controllers. Surge protection shall have:
      a. Dielectric strength of 1000 V minimum
      b. Response time of 10 nanoseconds or less
      c. Transverse mode noise attenuation of 65 dB or greater
      d. Common mode noise attenuation of 150 dB or greater at 40–100 Hz

2.8 Auxiliary Control Devices

A. Motorized Control Dampers, unless otherwise specified elsewhere, shall be as follow.

1. Type. Control dampers shall be the parallel or opposed-blade type as specified below or as scheduled on drawings.
   a. Outdoor and return air mixing dampers and face-and-bypass dampers shall be parallel-blade and shall direct airstreams toward each other.
   b. Other modulating dampers shall be opposed-blade.
   c. Two-position shutoff dampers shall be parallel- or opposed-blade with blade and side seals.
2. Frame. Damper frames shall be 2.38 mm (13 gauge) galvanized steel channel or 3.175 mm (⅛ in.) extruded aluminum with reinforced corner bracing.
3. Blades. Damper blades shall not exceed 20 cm (8 in.) in width or 125 cm (48 in.) in length. Blades shall be suitable for medium velocity (10 m/s [2000 fpm]) performance. Blades shall be not less than 1.5875 mm (16 gauge).
4. Shaft Bearings. Damper shaft bearings shall be as recommended by manufacturer for application, oil impregnated sintered bronze, or better.
5. Seals. Blade edges and frame top and bottom shall have replaceable seals of butyl rubber or neoprene. Side seals shall be spring-loaded stainless steel. Blade seals shall leak no more than 50 L/s·m^2(10 cfm per ft^2) at 1000 Pa (4 in. w.g.) differential pressure. Blades shall be airfoil type suitable for wide-open face velocity of 7.5 m/s (1500 fpm).
6. Sections. Individual damper sections shall not exceed 125 cm × 150 cm (48 in. × 60 in.). Each section shall have at least one damper actuator.
7. Modulating dampers shall provide a linear flow characteristic where possible.
8. Linkages. Dampers shall have exposed linkages.

B. Electric Damper and Valve Actuators.
1. Stall Protection. Mechanical or electronic stall protection shall prevent actuator damage throughout the actuator's rotation.
2. Spring-return Mechanism. Actuators used for power-failure and safety applications shall have an internal mechanical spring-return mechanism or an uninterruptible power supply (UPS).
3. Signal and Range. Proportional actuators shall accept a 0–10 Vdc or a 0–20 mA control signal and shall have a 2–10 Vdc or 4–20 mA operating range. (Floating motor actuators may be substituted for proportional actuators in terminal unit applications as described in paragraph 2.6H.)
4. Wiring. 24 Vac and 24 Vdc actuators shall operate on Class 2 wiring.
5. Manual Positioning. Operators shall be able to manually position each actuator when the actuator is not powered. Non-spring-return actuators shall have an external manual gear release. Spring-return actuators with more than 7 N·m (60 in.-lb) torque capacity shall have a manual crank.

C. Control Valves.
1. Control valves shall be two-way or three-way type for two-position or modulating service as shown.
2. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
   a. Water Valves:

i. Two-way: 150% of total system (pump) head.
ii. Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.

b. Steam Valves: 150% of operating (inlet) pressure.

3. Water Valves.
   a. Body and trim style and materials shall be in accordance with manufacturer's recommendations for design conditions and service shown, with equal percentage ports for modulating service.
   b. Sizing Criteria:
      i. Two-position service: Line size.
      ii. Two-way modulating service: Pressure drop shall be equal to twice the pressure drop through heat exchanger (load), 50% of the pressure difference between supply and return mains, or 5 psi, whichever is greater.
      iii. Three-way modulating service: Pressure drop equal to twice the pressure drop through the coil exchanger (load), 35 kPa (5 psi) maximum.
      iv. Valves ½ in. through 2 in. shall be bronze body or cast brass ANSI Class 250, spring-loaded, PTFE packing, quick opening for two-position service. Two-way valves to have replaceable composition disc or stainless steel ball.
      v. Valves 2½ in. and larger shall be cast iron ANSI Class 125 with guided plug and PTFE packing.
   c. Water valves shall fail normally open or closed, as scheduled on plans, or as follows:
      i. Water zone valves—normally open preferred.
      ii. Heating coils in air handlers—normally open.
      iii. Chilled water control valves—normally closed.
      iv. Other applications—as scheduled or as required by sequences of operation.

4. Steam Valves.
   a. Body and trim materials shall be in accordance with manufacturer's recommendations for design conditions and service with linear ports for modulating service.
   b. Sizing Criteria:
      i. Two-position service: pressure drop 10% to 20% of inlet psig.
      ii. Modulating service: 100 kPa (15 psig) or less; pressure drop 80% of inlet psig.
      iii. Modulating service: 101 to 350 kPa (16 to 50 psig); pressure drop 50% of inlet psig.
      iv. Modulating service: over 350 kPa (50 psig); pressure drop as scheduled on plans.

D. Binary Temperature Devices.
   1. Low-Voltage Space Thermostats. Low-voltage space thermostats shall be 24 V, bimetal-operated, mercury-switch type, with adjustable or fixed

anticipation heater, concealed setpoint adjustment, 13°C–30°C (55°F–85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.

2. Line-Voltage Space Thermostats. Line-voltage space thermostats shall be bimetal-actuated, open-contact type or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type, with heat anticipator, UL listing for electrical rating, concealed setpoint adjustment, 13°C–30°C (55°F–85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
3. Low-Limit Thermostats. Low-limit airstream thermostats shall be UL listed, vapor pressure type. Element shall be at least 6 m (20 ft) long. Element shall sense temperature in each 30 cm (1 ft) section and shall respond to lowest sensed temperature. Low-limit thermostat shall be manual reset only.

E. Temperature Sensors.
1. Type. Temperature sensors shall be Resistance Temperature Device (RTD) or thermistor.
2. Duct Sensors. Duct sensors shall be single point or averaging as shown. Averaging sensors shall be a minimum of 1.5 m (5 ft) in length per 1 m^2(10 ft^2) of duct cross-section.
3. Immersion Sensors. Provide immersion sensors with a separable stainless steel well. Well pressure rating shall be consistent with system pressure it will be immersed in. Well shall withstand pipe design flow velocities.
4. Space Sensors. Space sensors shall have setpoint adjustment, override switch, display, and communication port as shown.
5. Differential Sensors. Provide matched sensors for differential temperature measurement.

F. Humidity Sensors.
1. Duct and room sensors shall have a sensing range of 20%–80%.
2. Duct sensors shall have a sampling chamber.
3. Outdoor air humidity sensors shall have a sensing range of 20%–95% RH and shall be suitable for ambient conditions of -40°C–75°C (-40°F–170°F).
4. Humidity sensors shall not drift more than 1% of full scale annually.

G. Flow Switches. Flow-proving switches shall be paddle (water service only) or differential pressure type (air or water service) as shown. Switches shall be UL listed, SPDT snap-acting, and pilot duty rated (125 VA minimum).
1. Paddle switches shall have adjustable sensitivity and NEMA 1 enclosure unless otherwise specified.
2. Differential pressure switches shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.

H. Relays.
1. Control Relays. Control relays shall be plug-in type, UL listed, and shall have dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage shall be suitable for application.
2. Time Delay Relays. Time delay relays shall be solid-state plug-in type, UL listed, and shall have adjustable time delay. Delay shall be adjustable ±100%

from setpoint shown. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure for relays not installed in local control panel.

I. Override Timers.
   1. Unless implemented in control software, override timers shall be spring-wound line voltage, UL Listed, with contact rating and configuration required by application. Provide 0–6 hour calibrated dial unless otherwise specified. Flush mount timer on local control panel face or where shown.

J. Current Transmitters.
   1. AC current transmitters shall be self-powered, combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 4–20 mA two-wire output. Full-scale unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A, with internal zero and span adjustment. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
   2. Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized.
   3. Unit shall be split-core type for clamp-on installation on existing wiring.

K. Current Transformers.
   1. AC current transformers shall be UL/CSA recognized and shall be completely encased (except for terminals) in approved plastic material.
   2. Transformers shall be available in various current ratios and shall be selected for ±1% accuracy at 5 A full-scale output.
   3. Use fixed-core transformers for new wiring installation and split-core transformers for existing wiring installation.

L. Voltage Transmitters.
   1. AC voltage transmitters shall be self-powered single-loop (two-wire) type, 4–20 mA output with zero and span adjustment.
   2. Adjustable full-scale unit ranges shall be 100–130 Vac, 200–250 Vac, 250–330 Vac, and 400–600 Vac. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
   3. Transmitters shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized at 600 Vac rating.

M. Voltage Transformers.
   1. AC voltage transformers shall be UL/CSA recognized, 600 Vac rated, and shall have built-in fuse protection.
   2. Transformers shall be suitable for ambient temperatures of 4°C–55°C (40°F–130°F) and shall provide ±0.5% accuracy at 24 Vac and 5 VA load.
   3. Windings (except for terminals) shall be completely enclosed with metal or plastic.

N. Power Monitors.
   1. Selectable rate pulse output for kWh reading, 4–20 mA output for kW reading, N.O. alarm contact, and ability to operate with 5.0 amp current inputs or 0–0.33 volt inputs.
   2. 1.0% full-scale true RMS power accuracy, +0.5 Hz, voltage input range 120–600 V, and auto range select.

3. Under voltage/phase monitor circuitry.
4. NEMA 1 enclosure.
5. Current transformers having a 0.5% FS accuracy, 600 VAC isolation voltage with 0–0.33 V output. If 0–5 A current transformers are provided, a three-phase disconnect/shorting switch assembly is required.

O. Hydronic Flowmeters
1. Insertion-Type Turbine Meter
   a. Dual counter-rotating axial turbine elements, each with its own rotational sensing system, and an averaging circuit to reduce measurement errors due to swirl and flow profile distortion. Single turbine for piping 2 inches and smaller. Flow sensing turbine rotors shall be non-metallic and not impaired by magnetic drag.
   b. Insertion type complete with 'hot-tap' isolation valves to enable sensor removal without water supply system shutdown.
   c. Sensing method shall be impedance sensing (non magnetic and non photoelectric)
   d. Volumetric accuracy
      i. ± 0.5% of reading at calibrated velocity
      ii. ± 1% of reading from 3 to 30 ft/s (10:1 range)
      iii. ± 2% of reading from 0.4 to 20 ft/s (50:1 range)
   e. Each sensor shall be individually calibrated and tagged accordingly against the manufacturer's primary standards which must be accurate to within 0.1% of flow rate and traceable to the National Institute of Standards and Technology (NIST).
   f. Maximum operating pressure of 400 psi and maximum operating temperature of 200°F continuous (220°F peak).
   g. All wetted metal parts shall be constructed of 316 stainless steel.
   h. Analog outputs shall consist of non interactive zero and span adjustments, a DC linearly of 0.1% of span, voltage output of 0-10 Vdc, and current output of 4-20 mA.
2. Magnetic Flow-Tube Type Flowmeter
   a. Sensor shall be a magnetic flowmeter, which utilizes Faraday's Law to measure volumetric fluid flow through a pipe. The flowmeter shall consist of two elements, the sensor and the electronics. The sensor shall generate a measuring signal proportional to the flow velocity in the pipe. The electronics shall convert this EMF into a standard current output.
   b. Electronic replacement shall not affect meter accuracy (electronic units are not matched with specific sensors).
   c. Four-wire, externally powered, magnetic type flow transmitter with adjustable span and zero, integrally mounted to flow tube. Output signal shall be a digital pulse proportional to the flow rate (to provide maximum accuracy and to handle abrupt changes in flow). Standard 4-20 mA or 0-10 Vdc outputs may be used provided accuracy is as specified.

d. Flow Tube:
    i. ANSI class 150 psig steel
    ii. ANSI flanges
    iii. Protected with PTFE, PFA, or ETFE liner rated for 245°F minimum fluid temperature
e. Electrode and grounding material
    i. 316L Stainless steel or Hastelloy C
    ii. Electrodes shall be fused to ceramic liner and not require o-rings.
f. Electrical Enclosure: NEMA 4, 7
g. Approvals:
    i. UL or CSA
    ii. NSF Drinking Water approval for domestic water applications
h. Performance
    i. Accuracy shall be ±0.5% of actual reading from 3 to 30 ft/s flow velocities, and 0.015 ft/s from 0.04 to 3 ft/s.
    ii. Stability: 0.1% of rate over six months.
    iii. Meter repeatability shall be ±0.1% of rate at velocities > 3 ft/s.

3. Magnetic Insertion-Type Flowmeter
    a. Magnetic Faraday point velocity measuring device.
    b. Insertion type complete with hot-tap isolation valves to enable sensor removal without water supply system shutdown.
    c. 4-20 mA transmitter proportional to flow or velocity.
    d. Accuracy: larger of 1% of reading and 0.2 ft/s.
    e. Flow range: 0.2 to 20 ft/s, bidirectional.
    f. Each sensor shall be individually calibrated and tagged accordingly against the manufacturer's primary standards which must be accurate to within 0.1% of flow rate and traceable to the National Institute of Standards and Technology (NIST).
4. Vortex Shedding Flowmeter
    a. Output: 4-20 mA, 0-10 Vdc, 0-5 Vdc.
    b. Maximum Fluid Temperature: 800ºF (427 °C).
    c. Wetted Parts: Stainless Steel.
    d. Housing: NEMA 4X.
    e. Turndown: 25:1 minimum.
    f. Accuracy: 0.5% of calibrated span for liquids, 1% of calibrated span for steam and gases.
    g. Body: Wafer style or ANSI flanged to match piping specification.
5. Transit-Time Ultrasonic Flowmeter
    a. Clamp-On transit-time ultrasonic flowmeter
    b. Wide-Beam transducer technology
    c. 4-20 mA transmitter proportional to flow or velocity.
    d. Accuracy: 0.5% of reading in range 1 to 30 ft/s, 0.001 ft/s sensitivity.

P. Thermal Energy Meters

1. Matched RTD, solid state, or thermistor temperature sensors with a differential temperature accuracy of ±0.15°F.
2. Flow meter : See "Hydronic Flowmeters" section.
3. Unit accuracy of ±1% factory calibrated, traceable to NIST with certification.
4. NEMA 1 enclosure.
5. Panel mounted display.
6. UL listed.
7. Isolated 4–20 ma signals for energy rate and supply and return temperatures and flow.

Q. Current Switches.
1. Current-operated switches shall be self-powered, solid-state with adjustable trip current. Select switches to match application current and DDC system output requirements.

R. Pressure Transducers.
1. Transducers shall have linear output signal and field-adjustable zero and span.
2. Transducer sensing elements shall withstand continuous operating conditions of positive or negative pressure 50% greater than calibrated span without damage.
3. Water pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Transducer shall have 4–20 mA output, suitable mounting provisions, and block and bleed valves.
4. Water differential pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Over-range limit (differential pressure) and maximum static pressure shall be 2000 kPa (300 psi.)Transducer shall have 4–20 mA output, suitable mounting provisions, and 5-valve manifold.

S. Differential Pressure Switches. Differential pressure switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum) and shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.

T. Pressure-Electric (PE) Switches.
1. Shall be metal or neoprene diaphragm actuated, operating pressure rated for 0–175 kPa (0–25 psig), with calibrated scale minimum setpoint range of 14–125 kPa (2–18 psig) minimum, UL listed.
2. Provide one- or two-stage switch action (SPDT, DPST, or DPDT) as required by application Electrically rated for pilot duty service (125 VA minimum) and/or for motor control.
3. Switches shall be open type (panel-mounted) or enclosed type for remote installation. Enclosed type shall be NEMA 1 unless otherwise specified.
4. Each pneumatic signal line to PE switches shall have permanent indicating gauge.

U. Occupancy Sensors. Occupancy sensors shall utilize Passive Infrared (PIR) and/or Microphonic Passive technology to detect the presence of people within a room. Sensors shall be mounted as indicated on the approved drawings. The sensor

output shall be accessible by any lighting and/or HVAC controller in the system. Occupancy sensors shall be capable of being powered from the lighting or HVAC control panel, as shown on the drawings. Occupancy sensor delay shall be software adjustable through the user interface and shall not require manual adjustment at the sensor.

V. Local Control Panels.
   1. All indoor control cabinets shall be fully enclosed NEMA 1 construction with (hinged door) key-lock latch and removable subpanels. A single key shall be common to all field panels and subpanels.
   2. Interconnections between internal and face-mounted devices shall be prewired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL listed for 600 volt service, individually identified per control/ interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.
   3. Provide ON/OFF power switch with overcurrent protection for control power sources to each local panel.

2.9 Wiring and Raceways

A. General. Provide copper wiring, plenum cable, and raceways as specified in applicable sections of Division 26.
B. Insulated wire shall use copper conductors and shall be UL listed for 90°C (200°F) minimum service.

2.10 Fiber Optic Cable System

A. Optical Cable. Optical cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. Sheath shall be UL listed OFNP in accordance with NEC Article 770. Optical fiber shall meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125mm.
B. Connectors. Field terminate optical fibers with ST type connectors. Connectors shall have ceramic ferrules and metal bayonet latching bodies.

PART 3: EXECUTION

3.0 Section Includes
3.1 Examination
3.2 Protection
3.3 Coordination
3.4 General Workmanship
3.5 Field Quality Control
3.6 Existing Equipment
3.7 Wiring
3.8 Communication Wiring
3.9 Fiber Optic Cable
3.10 Control Air Tubing
3.11 Installation of Sensors
3.12 Flow Switch Installation
3.13 Actuators
3.14 Warning Labels
3.15 Identification of Hardware and Wiring
3.16 Controllers
3.17 Programming
3.18 Control system Checkout and Testing
3.19 Control System Demonstration and Acceptance
3.20 Cleaning
3.21 Training
3.22 Sequences of Operation
3.23 Control Valve Installation
3.24 Control Damper Installation
3.25 Smoke Damper Installation
3.26 Duct Smoke Detection
3.27 Controls Communication Protocol
3.28 Start-Up and Checkout Procedures

3.1 Examination

A. The contractor shall inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the engineer for resolution before rough-in work is started.
B. The contractor shall examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate—or if any discrepancies occur between the plans and the contractor's work and the plans and the work of others—the contractor shall report these discrepancies to the engineer and shall obtain written instructions for any changes necessary to accommodate the contractor's work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the contractor to report such discrepancies shall be made by—and at the expense of—this contractor.

3.2 Protection

A. The contractor shall protect all work and material from damage by his/her work or employees and shall be liable for all damage thus caused.
B. The contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted. The contractor shall protect any material that is not immediately installed. The contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.3 Coordination

A. Site
    1. Where the mechanical work will be installed in close proximity to, or will interfere with, work of other trades, the contractor shall assist in working out space conditions to make a satisfactory adjustment. If the contractor installs his/her work before coordinating with other trades, so as to cause any interference with work of other trades, the contractor shall make the necessary changes in his/her work to correct the condition without extra charge.
    2. Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.
B. Submittals. See Section 23 09 23 Article 1.10 (Submittals).
C. Test and Balance.
    1. The contractor shall furnish a single set of all tools necessary to interface to the control system for test and balance purposes.
    2. The contractor shall provide training in the use of these tools. This training will be planned for a minimum of 4 hours.
    3. In addition, the contractor shall provide a qualified technician to assist in the test and balance process, until the first 20 terminal units are balanced.
    4. The tools used during the test and balance process will be returned at the completion of the testing and balancing.

D. Life Safety.
   1. Duct smoke detectors required for air handler shutdown are provided under Division 28. Interlock smoke detectors to air handlers for shutdown as specified in Section 23 09 93 (Sequences of Operation).
   2. Smoke dampers and actuators required for duct smoke isolation are provided under Division 23. Interlock smoke dampers to air handlers as specified in Section 23 09 93 (Sequences of Operation).
   3. Fire and smoke dampers and actuators required for fire-rated walls are provided under Division 23. Fire and smoke damper control is provided under Division 28.

E. Coordination with controls specified in other sections or divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the contractor as follows:
   1. All communication media and equipment shall be provided as specified in Section 23 09 23 Article 2.2 (Communication).
   2. Each supplier of a controls product is responsible for the configuration, programming, start up, and testing of that product to meet the sequences of operation described in Section 23 09 93.
   3. The contractor shall coordinate and resolve any incompatibility issues that arise between control products provided under this section and those provided under other sections or divisions of this specification.
   4. The contractor is responsible for providing all controls described in the contract documents regardless of where within the contract documents these controls are described.
   5. The contractor is responsible for the interface of control products provided by multiple suppliers regardless of where this interface is described within the contract documents.

3.4 General Workmanship

A. Install equipment, piping, and wiring/raceway parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.
B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.
C. Install equipment in readily accessible locations as defined by Chapter 1 Article 100 Part A of the National Electrical Code (NEC).
D. Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.
E. All equipment, installation, and wiring shall comply with industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.5 Field Quality Control

A. All work, materials, and equipment shall comply with rules and regulations of applicable local, state, and federal codes and ordinances as identified in Section 23 09 23 Article 1.8 (Codes and Standards).
B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship.
C. Contractor shall have work inspection by local and/or state authorities having jurisdiction over the work.

3.6 Existing Equipment

A. Wiring. The contractor may reuse any abandoned wires. The integrity of the wire and its proper application to the installation are the responsibility of the contractor. The wire shall be properly identified and tested in accordance with this specification. Unused or redundant wiring must be properly identified as such.
B. Local Control Panels. The contractor may reuse any existing local control panel to locate new equipment. All redundant equipment within these panels must be removed. Panel face cover must be patched to fill all holes caused by removal of unused equipment or replaced with new.
C. Repair. Unless otherwise directed, the contractor is not responsible for repair or replacement of existing energy equipment and systems, valves, dampers, or actuators. Should the contractor find existing equipment that requires maintenance, the engineer is to be notified immediately.
D. Temperature Sensor Wells. The contractor may reuse any existing wells in piping for temperature sensors. These wells shall be modified as required for proper fit of new sensors.
E. Indicator Gauges. Where these devices remain and are not removed, they must be made operational and recalibrated to ensure reasonable accuracy.
F. Room Thermostats. Room thermostats may be reused. Remove and deliver unnecessary thermostats to Owner unless otherwise noted. Patch and finish holes and marks left by removal to match existing walls.
G. Electronic Sensors and Transmitters. Unless specifically noted otherwise, existing sensors and transmitters may be reused. Remove and deliver unnecessary sensors and transmitters to Owner.
H. Controllers and Auxiliary Electronic Devices. Existing controllers and auxiliary electronic devices may be reused unless specifically noted otherwise. Recondition as necessary. Remove unnecessary sensors and transmitters.
I. Damper Actuators, Linkages, and Appurtenances. Existing damper actuators, linkages, and appurtenances may be reused unless specifically noted otherwise. Recondition as necessary. Remove and deliver unnecessary equipment to Owner.
J. Control Valves. Existing control valves may be reused unless specifically noted otherwise. Recondition as necessary.
K. Control Compressed Air Systems. Existing control compressed air systems may be reused unless specifically noted otherwise. Recondition as necessary.
L. Existing System Operating Schedule. The mechanical system must remain in operation and shall maintain space comfort at all times between the hours of 6 a.m. and 9 p.m., Monday through Sunday. No modifications to the system shall cause

mechanical system to be shut down for more than 15 minutes or to fail to maintain space comfort conditions during any such period. Perform cut-over of controls that cannot meet these conditions outside of operational hours.

M. The scheduling of fans through existing or temporary time clocks or control system shall be maintained throughout the DDC system installation
N. Install control panels where shown.
O. Modify existing starter control circuits, if necessary, to provide hand-off-auto control of each controlled starter. If new starters or starter control packages are required, these shall be included as part of this contract.
P. Patch holes and finish to match existing walls.

3.7 Wiring

A. All control and interlock wiring shall comply with national and local electrical codes, and Division 26 of this specification, Where the requirements of this section differ from Division 26, the requirements of this section shall take precedence.
B. All NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway according to NEC and Division 26 requirements.
C. All low-voltage wiring shall meet NEC Class 2 requirements. Low-voltage power circuits shall be subfused when required to meet Class 2 current limit.
D. Where NEC Class 2 (current-limited) wires are in concealed and accessible locations, including ceiling return air plenums, approved cables not in raceway may be used provided that cables are UL listed for the intended application.
E. All wiring in mechanical, electrical, or service rooms – or where subject to mechanical damage – shall be installed in raceway at levels below 3 m (10ft).
F. Do not install Class 2 wiring in raceways containing Class 1 wiring. Boxes and panels containing high-voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two (e.g. relays and transformers).
G. Do not install wiring in raceway containing tubing.
H. Where Class 2 wiring is run exposed, wiring is to be run parallel along a surface or perpendicular to it and neatly tied at 3 m (10 ft) intervals.
I. Where plenum cables are used without raceway, they shall be supported from or anchored to structural members. Cables shall not be supported by or anchored to ductwork, electrical raceways, piping, or ceiling suspension systems.
J. All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to-wire connections shall be at a terminal block.
K. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.
L. Maximum allowable voltage for control wiring shall be 120 V. If only higher voltages are available, the contractor shall provide step-down transformers.
M. All wiring shall be installed as continuous lengths, with no splices permitted between termination points.
N. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations.

O. Size of raceway and size and type of wire type shall be the responsibility of the contractor in keeping with the manufacturer's recommendations and NEC requirements, except as noted elsewhere.
P. Include one pull string in each raceway 2.5 cm (1 in.) or larger.
Q. Use color-coded conductors throughout with conductors of different colors.
R. Control and status relays are to be located in designated enclosures only. These enclosures include packaged equipment control panel enclosures unless they also contain Class 1 starters.
S. Conceal all raceways except within mechanical, electrical, or service rooms. Install raceway to maintain a minimum clearance of 15 cm (6 in.) from high-temperature equipment (e.g. steam pipes or flues).
T. Secure raceways with raceway clamps fastened to the structure and spaced according to code requirements. Raceways and pull boxes may not be hung on flexible duct strap or tie rods. Raceways may not be run on or attached to ductwork.
U. Adhere to this specification's Division 26 requirements where raceway crosses building expansion joints.
V. Install insulated bushings on all raceway ends and openings to enclosures. Seal top end of vertical raceways.
W. The contractor shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.
X. Flexible metal raceways and liquid-tight flexible metal raceways shall not exceed 1 m (3 ft) in length and shall be supported at each end. Flexible metal raceway less than ½ in. electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal raceways shall be used.
Y. Raceway must be rigidly installed, adequately supported, properly reamed at both ends, and left clean and free of obstructions. Raceway sections shall be joined with couplings (according to code). Terminations must be made with fittings at boxes, and ends not terminating in boxes shall have bushings installed.

3.8 Communication Wiring

A. The contractor shall adhere to the items listed in the "Wiring" article in Part 3 of the specification.
B. All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling
C. Do not install communication wiring in raceways and enclosures containing Class 1 or other Class 2 wiring.
D. Maximum pulling, tension, and bend radius for the cable installation, as specified by the cable manufacturer, shall not be exceeded during installation.
E. Contractor shall verify the integrity of the entire network following cable installation. Use appropriate test measures for each particular cable.
F. When a cable enters or exits a building, a lightning arrestor must be installed between the lines and ground. The lighting arrestor shall be installed according to manufacturer's instructions.
G. All runs of communication wiring shall be unspliced length when that length is commercially available.

H. All communication wiring shall be labeled to indicate origination and destination data.
I. All communication wiring shall be labeled to indicate origination and destination data.
J. Grounding of coaxial cable shall be in accordance with NEC regulations article on "Communications Circuits, Cable, and Protector Grounding."
K. BACnet MS/TP communications wiring shall be installed in accordance with ASHRAE/ANSI Standard 135. This includes but is not limited to:
    1. The network shall use shielded, twisted-pair cable with characteristic impedance between 100 and 120 ohms. Distributed capacitance between conductors shall be less than 100 pF per meter (30 pF per foot.)
    2. The maximum length of an MS/TP segment is 1200 meters (4000 ft) with AWG 18 cable. The use of greater distances and/or different wire gauges shall comply with the electrical specifications of EIA-485.
    3. The maximum number of nodes per segment shall be 32, as specified in the EIA 485 standard. Additional nodes may be accommodated by the use of repeaters.
    4. An MS/TP EIA-485 network shall have no T connections.

3.9 Fiber Optic Cable

A. Maximum pulling tensions as specified by the cable manufacturer shall not be exceeded during installation. Post-installation residual cable tension shall be within cable manufacturer's specifications.
B. All cabling and associated components shall be installed in accordance with manufacturers' instructions. Minimum cable and unjacketed fiber bend radii, as specified by cable manufacturer, shall be maintained.

3.10 Installation of Sensors

A. Install sensors in accordance with the manufacturer's recommendations.
B. Mount sensors rigidly and adequately for environment within which the sensor operates.
C. Room temperature sensors shall be installed on concealed junction boxes properly supported by wall framing.
D. All wires attached to sensors shall be sealed in their raceways or in the wall to stop air transmitted from other areas from affecting sensor readings.
E. Sensors used in mixing plenums and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner vertically across the duct. Each bend shall be supported with a capillary clip.
F. Low-limit sensors used in mixing plenums shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Provide 3 m (1 ft) of sensing element for each 1 m^2(1 ft^2) of coil area.
G. Do not install temperature sensors within the vapor plume of a humidifier. If installing a sensor downstream of a humidifier, install it at least 3 m (10 ft) downstream.

H. All pipe-mounted temperature sensors shall be installed in wells. Install liquid temperature sensors with heat-conducting fluid in thermal wells.
I. Install outdoor air temperature sensors on north wall, complete with sun shield at designated location.
J. Differential Air Static Pressure.
    1. Supply Duct Static Pressure. Pipe the high-pressure tap to the duct using a pitot tube. Pipe the low-pressure port to a tee in the height-pressure tap tubing of the corresponding building static pressure sensor (if applicable) or to the location of the duct high-pressure tap and leave open to the plenum.
    2. Return Duct Static Pressure. Pipe high-pressure tap to duct using a pitot tube. Pipe the low-pressure port to a tee in the low-pressure tap tubing of the corresponding building static pressure sensor.
    3. Building Static Pressure. Pipe the low-pressure port of the pressure sensor to the static pressure port located on the outside of the building through a high-volume accumulator. Pipe the high-pressure port to a location behind a thermostat cover.
    4. The piping to the pressure ports on all pressure transducers shall contain a capped test port located adjacent to the transducer.
    5. All pressure transducers, other than those controlling VAV boxes, shall be located in field device panels, not on the equipment monitored or on ductwork. Mount transducers in a location accessible for service without use of ladders or special equipment.
    6. All air and water differential pressure sensors shall have gauge tees mounted adjacent to the taps. Water gauges shall also have shut-off valves installed before the tee.
K. Smoke detectors, freezestats, high-pressure cut-offs, and other safety switches shall be hard-wired to de-energize equipment as described in the sequence of operation. Switches shall require manual reset. Provide contacts that allow DDC software to monitor safety switch status.
L. Install humidity sensors for duct mounted humidifiers at least 3 m (10 ft) downstream of the humidifier. Do not install filters between the humidifier and the sensor.

3.11 Flow Switch Installation

A. Use correct paddle for pipe diameter.
B. Adjust flow switch according to manufacturer's instructions.

3.12 Actuators

A. General. Mount and link control damper actuators according to manufacturer's instructions.
    1. To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately 5° open position, manually close the damper, and then tighten the linkage.

2. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.
3. Provide all mounting hardware and linkages for actuator installation.

B. Electric/Electronic
1. Dampers: Actuators shall be direct mounted on damper shaft or jackshaft unless shown as a linkage installation. For low-leakage dampers with seals, the actuator shall be mounted with a minimum 5° travel available for tightening the damper seal. Actuators shall be mounted following manufacturer's recommendations.
2. Valves: Actuators shall be connected to valves with adapters approved by the actuator manufacturer. Actuators and adapters shall be mounted following the actuator manufacturer's recommendations.

C. Pneumatic Actuators.
1. Size pneumatic damper actuator to operate the related control damper(s) with sufficient reserve power to provide smooth modulating action or two-position action. Actuator also shall be sized for proper speed of response at the velocity and pressure conditions to which the control damper is subject.
2. Pneumatic damper actuators shall produce sufficient torque to close off against the maximum system pressures encountered. Size the pneumatic damper actuator to close off against the fan shutoff pressure, as a minimum.
3. Where two or more pneumatic damper actuators are installed for interrelated operation in unison, such as dampers used for mixing, provide the dampers with a positive pilot positioner. The positive pilot positioner shall be directly mounted to the pneumatic damper actuator and have pressure gauges for supply input and output pressures.
4. The total damper area operated by an actuator shall not exceed 80% of the manufacturer's maximum area rating. Provide at least one actuator for each damper section. Each damper actuator shall not power more than 2 m^2(20 ft^2) of damper.
5. Use line shafting or shaft couplings (jackshafting) in lieu of blade-to-blade linkages or shaft coupling when driving axially aligned damper sections.

3.13 Warning Labels

A. Permanent warning labels shall be affixed to all equipment that can be automatically started by the control system.
1. Labels shall use white lettering (12-point type or larger) on a red background.
2. Warning labels shall read as follows.

C A U T I O N

This equipment is operating under automatic control and may start or stop at any time without warning. Switch disconnect to"Off"position before servicing.

B. Permanent warning labels shall be affixed to all motor starters and control panels that are connected to multiple power sources utilizing separate disconnects.

1. Labels shall use white lettering (12-point type or larger) on a red background.
2. Warning labels shall read as follows.

C A U T I O N
This equipment is fed from more than one power source with separate disconnects. Disconnect all power sources before servicing.

3.14 Identification of Hardware and Wiring

A. All wiring and cabling, including that within factory-fabricated panels shall be labeled at each end within 5 cm (2 in.) of termination with control system address or termination number.
B. All pneumatic tubing shall be labeled at each end within 5 cm (2 in.) of termination with a descriptive identifier.
C. Permanently label or code each point of field terminal strips to show the instrument or item served.
D. Identify control panels with minimum 1 cm (½ in.) letters on laminated plastic nameplates.
E. Identify all other control components with permanent labels. All plug-in components shall be labeled such that label removal of the component does not remove the label.
F. Identify room sensors related to terminal boxes or valves with nameplates.
G. Manufacturers' nameplates and UL or CSA labels shall be visible and legible after equipment is installed.
H. Identifiers shall match record documents.

3.15 Controllers

A. Provide a separate controller for each AHU or other HVAC system. A DDC controller may control more than one system provided that all points associated with the system are assigned to the same DDC controller. Points used for control loop reset, such as outside air or space temperature, are exempt from this requirement.
B. Building Controllers and Custom Application Controllers shall be selected to provide the required I/O point capacity required to monitor all of the hardware points listed in Section 23 09 93 (Sequences of Operation).

3.16 Programming

A. Provide sufficient internal memory for the specified sequences of operation and trend logging.
B. Point Naming. Name points as shown on the equipment points list provided with each sequence of operation. See Section 23 09 93 (Sequences of Operation). If character limitations or space restrictions make it advisable to shorten the name, the abbreviations given in Appendix B to Section 23 09 93 may be used. Where multiple points with the same name reside in the same controller, each point name

may be customized with its associated Program Object number. For example, "Zone Temp 1" for Zone 1, "Zone Temp 2" for Zone 2.

C. Software Programming.
   1. Provide programming for the system and adhere to the sequences of operation provided. All other system programming necessary for the operation of the system, but not specified in this document, also shall be provided by the contractor. Embed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequences of operation. Use the appropriate technique based on the following programming types:
      a. Text-based:
         i. Must provide actions for all possible situations
         ii. Must be modular and structured
         iii. Must be commented
      b. Graphic-based:
         i. Must provide actions for all possible situations
         ii. Must be documented
      c. Parameter-based:
         i. Must provide actions for all possible situations
         ii. Must be documented.

D. Operator Interface.
   1. Standard Graphics. Provide graphics for all mechanical systems and floor plans of the building. This includes each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. Point information on the graphic displays shall dynamically update. Show on each graphic all input and output points for the system. Also show relevant calculated points such as setpoints. As a minimum, show on each equipment graphic the input and output points and relevant calculated points as indicated on the applicable Points List in Section 23 09 93.
   2. The contractor shall provide all the labor necessary to install, initialize, start up, and troubleshoot all operator interface software and its functions as described in this section. This includes any operating system software, the operator interface database, and any third-party software installation and integration required for successful operation of the operator interface.

3.17 Control System Checkout and Testing

A. Startup Testing. All testing listed in this article shall be performed by the contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the owner's representative is notified of the system demonstration.
   1. The contractor shall furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification.

2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
3. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures according to manufacturers' recommendations.
4. Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct.
5. Verify that all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The contractor shall check all control valves and automatic dampers to ensure proper action and closure. The contractor shall make any necessary adjustments to valve stem and damper blade travel.
6. Verify that the system operation adheres to the sequences of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops.
7. Alarms and Interlocks:
    a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
    b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
    c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action

3.18 Control System Demonstration and Acceptance

A. Demonstration.
1. Prior to acceptance, the control system shall undergo a series of performance tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed his/her own tests.
2. The tests described in this section are to be performed in addition to the tests that the contractor performs as a necessary part of the installation, start-up, and debugging process and as specified in the "Control System Checkout and Testing" article in Part 3 of this specification. The engineer will be present to observe and review these tests. The engineer shall be notified at least 10 days in advance of the start of the testing procedures.
3. The demonstration process shall follow that approved in Part 1, "Submittals." The approved checklists and forms shall be completed for all systems as part of the demonstration.
4. The contractor shall provide at least two persons equipped with two-way communication and shall demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover, and power failure modes. The purpose is to demonstrate the calibration, response, and action

of every point and system. Any test equipment required to prove the proper operation shall be provided by and operated by the contractor.

5. As each control input and output is checked, a log shall be completed showing the date, technician's initials, and any corrective action taken or needed.
6. Demonstrate compliance with Part 1, "System Performance."
7. Demonstrate compliance with sequences of operation through all modes of operation.
8. Demonstrate complete operation of operator interface.
9. Additionally, the following items shall be demonstrated:
    a. DDC loop response. The contractor shall supply trend data output in a graphical form showing the step response of each DDC loop. The test shall show the loop's response to a change in set point, which represents a change of actuator position of at least 25% of its full range. The sampling rate of the trend shall be from 10 seconds to 3 minutes, depending on the speed of the loop. The trend data shall show for each sample the set point, actuator position, and controlled variable values. Any loop that yields unreasonably under-damped or over-damped control shall require further tuning by the Contractor.
    b. Demand limiting. The contractor shall supply a trend data output showing the action of the demand limiting algorithm. The data shall document the action on a minute-by-minute basis over at least a 30-minute period. Included in the trend shall be building kW, demand limiting set point, and the status of sheddable equipment outputs.
    c. Optimum start/stop. The contractor shall supply a trend data output showing the capability of the algorithm. The change-of-value or change-of-state trends shall include the output status of all optimally started and stopped equipment, as well as temperature sensor inputs of affected areas.
    d. Interface to the building fire alarm system.
    e. Operational logs for each system that indicate all set points, operating points, valve positions, mode, and equipment status shall be submitted to the architect/engineer. These logs shall cover three 48-hour periods and have a sample frequency of not more than 10 minutes. The logs shall be provided in both printed and disk formats.
10. Any tests that fail to demonstrate the operation of the system shall be repeated at a later date. The contractor shall be responsible for any necessary repairs or revisions to the hardware or software to successfully complete all tests.

B. Acceptance.

1. All tests described in this specification shall have been performed to the satisfaction of both the engineer and owner prior to the acceptance of the control system as meeting the requirements of completion. Any tests that cannot be performed due to circumstances beyond the control of the contractor may be exempt from the completion requirements if stated as

such in writing by the engineer. Such tests shall then be performed as part of the warranty.

2. The system shall not be accepted until all forms and checklists completed as part of the demonstration are submitted and approved as required in Part 1, "Submittals."

3.19 Cleaning

A. The contractor shall clean up all debris resulting from his/her activities daily. The contractor shall remove all cartons, containers, crates, etc., under his/her control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.

B. At the completion of work in any area, the contractor shall clean all work, equipment, etc., keeping it free from dust, dirt, and debris, etc.

C. At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.20 Training

A. Provide training for a designated staff of Owner's representatives. Training shall be provided via self-paced training, web-based or computer-based training, classroom training, or a combination of training methods.

B. Training shall enable students to accomplish the following objectives.

1. Day-to-day Operators:
    a. Proficiently operate the system
    b. Understand control system architecture and configuration
    c. Understand DDC system components
    d. Understand system operation, including DDC system control and optimizing routines (algorithms)
    e. Operate the workstation and peripherals
    f. Log on and off the system
    g. Access graphics, point reports, and logs
    h. Adjust and change system set points, time schedules, and holiday schedules
    i. Recognize malfunctions of the system by observation of the printed copy and graphical visual signals
    j. Understand system drawings and Operation and Maintenance manual
    k. Understand the job layout and location of control components
    l. Access data from DDC controllers and ASCs
    m. Operate portable operator's terminals
2. Advanced Operators:
    a. Make and change graphics on the workstation

b. Create, delete, and modify alarms, including annunciation and routing of these
c. Create, delete, and modify point trend logs and graph or print these both on an ad-hoc basis and at user-definable time intervals
d. Create, delete, and modify reports
e. Add, remove, and modify system's physical points
f. Create, modify, and delete programming
g. Add panels when required
h. Add operator interface stations
i. Create, delete, and modify system displays, both graphical and others
j. Perform DDC system field checkout procedures
k. Perform DDC controller unit operation and maintenance procedures
l. Perform workstation and peripheral operation and maintenance procedures
m. Perform DDC system diagnostic procedures
n. Configure hardware including PC boards, switches, communication, and I/O points
o. Maintain, calibrate, troubleshoot, diagnose, and repair hardware
p. Adjust, calibrate, and replace system components

3. System Managers/Administrators:
   a. Maintain software and prepare backups
   b. Interface with job-specific, third-party operator software
   c. Add new users and understand password security procedures

C. Organize the training into sessions or modules for the three levels of operators listed above. (Day-to-Day Operators, Advanced Operators, System Managers and Administrators). Students will receive one or more of the training packages, depending on knowledge level required.
D. Provide course outline and materials according to the "Submittals" article in Part 1 of this specification. Provide one copy of training material per student.
E. The instructor(s) shall be factory-trained and experienced in presenting this material.
F. Classroom training shall be done using a network of working controllers representative of installed hardware.

3.21 Sequences of Operation

See Section 23, Appendix A (Sequences of Operation, With Points Lists).

3.22 Control Valve Installation

A. Valve submittals shall be coordinated for type, quantity, size, and piping configuration to ensure compatibility with pipe design.
B. Slip-stem control valves shall be installed so that the stem position is not more than 60 degrees from the vertical up position. Ball type control valves shall be installed with the stem in the horizontal position.
C. Valves shall be installed in accordance with the manufacturer's recommendations.

D. Control valves shall be installed so that they are accessible and serviceable and so that actuators may be serviced and removed without interference from structure or other pipes and/or equipment.
E. Isolation valves shall be installed so that the control valve body may be serviced without draining the supply/return side piping system. Unions shall be installed at all connections to screw-type control valves.
F. Provide tags for all control valves indicating service and number. Tags shall be brass, 1.5 inch in diameter, with ¼ inch high letters. Securely fasten with chain and hook. Match identification numbers as shown on approved controls shop drawings.

3.23 Control Damper Installation

A. Damper submittals shall be coordinated for type, quantity, and size to ensure compatibility with sheet metal design.
B. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure ¼ in. larger than damper dimensions and shall be square, straight, and level.
C. Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be within 0.3 cm (1/8 in.) of each other.
D. Follow the manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal.
E. Install extended shaft or jackshaft according to manufacturer's instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade.)
F. Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to ensure proper operation. On multiple section assemblies, all sections must open and close simultaneously.
G. Provide a visible and accessible indication of damper position on the drive shaft end.
H. Support ductwork in area of damper when required to prevent sagging due to damper weight.
I. After installation of low-leakage dampers with seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.

3.24 Smoke Damper Installation

A. The contractor shall coordinate all smoke and smoke/fire damper installation, wiring, and checkout to ensure that these dampers function properly and that they respond to the proper fire alarm system general, zone, and/or detector trips. The contractor shall immediately report any discrepancies to the engineer no less than two weeks prior to inspection by the code authority having jurisdiction.
B. Provide complete submittal data to controls system subcontractor for coordination of duct smoke detector interface to HVAC systems.

3.25 Duct Smoke Detection

A. Submit data for coordination of duct smoke detector interface to HVAC systems as required in Part 1, "Submittals."
B. This Contractor shall provide a dry-contact alarm output in the same room as the HVAC equipment to be controlled.

3.26 Controls Communication Protocol

A. General. The electronic controls packaged with this equipment shall communicate with the building direct digital control (DDC) system. The DDC system shall communicate with these controls to read the information and change the control setpoints as shown in the points list, sequences of operation, and control schematics. The information to be communicated between the DDC system and these controls shall be in the standard object format as defined in ANSI/ASHRAE Standard 135 (BACnet). Controllers shall communicate with other BACnet objects on the internetwork using the Read (Execute) Property service as defined in Clause 15.5 of Standard 135.
B. Distributed Processing. The controller shall be capable of stand-alone operation and shall continue to provide control functions if the network connection is lost.
C. I/O Capacity. The controller shall contain sufficient I/ O capacity to control the target system.
D. The Controller shall have a physical connection for a laptop computer or a portable operator's tool.
E. Environment. The hardware shall be suitable for the anticipated ambient conditions.
    1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures and shall be rated for operation at 40°C to 60°C (40°F to 140°F).
    2. Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).
F. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field removable, modular terminal strips or to a termination card connected by a ribbon cable.
G. Memory. The Controller shall maintain all BIOS and programming information in the event of a power loss for at least 30 days.
H. Power. Controller shall be able to operate at 90% to 110% of nominal voltage rating.
I. Transformer. Power supply for the Controller must be rated at minimum of 125% of ASC power consumption and shall be fused or current limiting type.

3.27 Start-Up and Checkout Procedures

A. Start up, check out, and test all hardware and software and verify communication between all components.
    1. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
    2. Verify that all analog and binary input/output points read properly.
    3. Verify alarms and interlocks.

4. Verify operation of the integrated system.

23 09 93 Sequence of Operations for HVAC Controls

PART 1: GENERAL

1.1 Fan Coil Units (typical of 0)

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:

- Occupied Mode: The unit shall maintain
  - A 74°F (adj.) cooling setpoint
  - A 70°F (adj.) heating setpoint.
- Unoccupied Mode (night setback): The unit shall maintain
  - A 85°F (adj.) cooling setpoint.
  - A 55°F (adj.) heating setpoint.

Alarms shall be provided as follows:

- High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).

Demand Limiting - Zone Setpoint Optimization:
To lower power consumption, the zone setpoints shall automatically relax when the facility power consumption exceeds definable thresholds. The amount of relaxation shall be individually configurable for each zone. The zone setpoints shall automatically return to their previous settings when the facility power consumption drops below the thresholds.

Zone Setpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize

the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.

Smoke Detection:
The unit shall shut down and generate an alarm upon receiving a smoke detector status.

Fan:
The fan shall run anytime the unit is commanded to run, unless shutdown on safeties.

Cooling Stages:
The controller shall measure the zone temperature and stage the cooling to maintain its cooling setpoint. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.

The cooling shall be enabled whenever:

- Outside air temperature is greater than 60°F (adj.).
- AND the zone temperature is above cooling setpoint.
- AND the fan is on.

Electric Heating Stages:
The controller shall measure the zone temperature and stage the heating to maintain its heating setpoint. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.

The heating shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).

- AND the zone temperature is below heating setpoint.
- AND the fan is on.

Heating - High Discharge Air Temperature Limit:
The controller shall measure the discharge air temperature and, on rising temperature, limit the heating as follows:

- As the discharge air temperature rises from 90°F to 120°F (adj.),
- The controller shall limit the heating output from 100% to 0% (adj.).

Economizer:
The controller shall measure the zone temperature and modulate the mixed air dampers in sequence to maintain the zone cooling setpoint. The outside air dampers shall maintain a minimum adjustable position of 20% (adj.) open whenever occupied.

The economizer shall be enabled whenever:

- Outside air temperature is at least 3°F (adj.) less than the Zone Temperature.
- AND the outside air temperature is less than 75°F (adj.)

The economizer shall close whenever the freezestat (if present) is on.

The outside air dampers shall close and the return air damper shall open when the unit is off. If Optimal Start Up is available the mixed air damper shall operate as described in the occupied mode except that the outside air damper shall modulate to fully closed.

Minimum Outside Air Ventilation - Carbon Dioxide (CO2) Control:
When in the occupied mode, the controller shall measure the zone CO2 levels and open the outside air dampers on rising CO2 concentrations, overriding normal damper operation as CO2 concentrations rise from 750ppm to 800ppm (adj.) and above.

Filter Hours:
The controller shall monitor the fan runtime.

Alarms shall be provided as follows:

- Filter Change Required: Filter has been in use for more than 2200 hrs (adj.).

Discharge Air Temperature:
The controller shall monitor the discharge air temperature.

Alarms shall be provided as follows:

- High Discharge Air Temp: If the discharge air temperature is greater than 120°F (adj.).
- Low Discharge Air Temp: If the discharge air temperature is less than 40°F (adj.).

Fan Status:
The controller shall monitor the fan status.

Alarms shall be provided as follows:

- Fan Failure: Commanded on, but the status is off.
- Fan in Hand: Commanded off, but the status is on.
- Fan Runtime Exceeded: Fan status runtime exceeds a user definable limit (adj.).

Zone Carbon Dioxide (CO2) Concentration Monitoring:
The controller shall measure the zone CO2 levels.

Alarms shall be provided as follows:

- High Zone Carbon Dioxide Concentration: If the zone CO2 concentration is greater than 1000ppm (adj.) when in the occupied mode.

Zone Humidity:
The controller shall monitor the zone humidity.

Alarms shall be provided as follows:

- High Zone Humidity: If the zone humidity is greater than 70% (adj.).
- Low Zone Humidity: If the zone humidity is less than 35% (adj.).

Environmental Index:
When the zone is occupied, the controller will monitor the deviation of the zone temperature from the heating or cooling setpoint. The controller will also monitor the humidity and carbon dioxide levels and compare them to comfort conditions. This data will be used to calculate a 0 - 100% Environmental Index which gives an indication of how well the zone is maintaining comfort. The controller will also calculate the percentage of time since occupancy began that the Environmental Index is 70% or higher. Optionally, a weighting factor can be configured to adjust the contribution of the zone to the rollup average index based upon the floor area of the zone, importance of the zone, or other static criteria.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Zone Temp	x								x		x
Zone Setpoint Adjust	x										x
Discharge Air Temp	x								x		x
Zone Carbon Dioxide PPM	x								x		x
Zone Humidity	x								x		x
Mixed Air Dampers		x							x		x
Zone Override			x						x		x
Smoke Detector			x						x	x	x
Fan Status			x								x
Fan Start/Stop				x					x		x
Cooling Stage 1				x					x		x
Cooling Stage 2				x					x		x
Heating Stage 1				x					x		x
Heating Stage 2				x					x		x
Zone Carbon Dioxide PPM Setpoint					x				x		x
Environmental Index					x				x		
Percent of Time Satisfied					x				x		
Schedule								x			
Heating Setpoint									x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Cooling Setpoint									x		x
High Zone Temp										x	
Low Zone Temp										x	
Compressor Runtime Exceeded										x	
Filter Change Required										x	
High Discharge Air Temp										x	
Low Discharge Air Temp										x	
Fan Failure										x	
Fan in Hand										x	
Fan Runtime Exceeded										x	
High Zone Carbon Dioxide Concentration										x	
High Zone Humidity										x	
Low Zone Humidity										x	
Totals	**5**	**1**	**3**	**5**	**3**	**0**	**0**	**1**	**17**	**13**	**17**

Total Hardware (14) **Total Software (34)**

1.2 Zone Reheat (typical of 0)

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:

- Occupied Mode: The unit shall maintain
  - A 74°F (adj.) cooling setpoint
  - A 70°F (adj.) heating setpoint.

- Unoccupied Mode (night setback): The unit shall maintain
  - A 85°F (adj.) cooling setpoint.
  - A 55°F (adj.) heating setpoint.

Alarms shall be provided as follows:

- High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).

Demand Limiting - Zone Setpoint Optimization:
To lower power consumption, the zone setpoints shall automatically relax when the facility power consumption exceeds definable thresholds. The amount of relaxation shall be individually configurable for each zone. The zone setpoints shall automatically return to their previous settings when the facility power consumption drops below the thresholds.

Zone Setpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize

the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.

Electric Reheating Stages:
The controller shall measure the zone temperature and stage the reheating to maintain its setpoint. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.

The reheating shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).
- AND the zone temperature is below setpoint.
- AND sufficient airflow is provided.

Discharge Air Temperature:
The controller shall monitor the discharge air temperature.

Alarms shall be provided as follows:

- High Discharge Air Temp: If the discharge air temperature is greater than 120°F (adj.).
- Low Discharge Air Temp: If the discharge air temperature is less than 40°F (adj.).

Environmental Index:
When the zone is occupied, the controller will monitor the deviation of the zone temperature from the heating or cooling setpoint and calculate a 0 - 100% Environmental Index which gives an indication of how well the zone is maintaining comfort. The controller will also calculate the percentage of time since occupancy began that the Environmental Index is 70% or higher. Optionally, a weighting factor can be configured to adjust the contribution of the zone to the

rollup average index based upon the floor area of the zone, importance of the zone, or other static criteria.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Zone Temp	x								x		x
Zone Setpoint Adjust	x										x
Discharge Air Temp	x								x		x
Zone Override			x						x		x
Reheating Stage 1				x					x		x
Reheating Stage 2				x					x		x
Environmental Index					x				x		
Percent of Time Satisfied					x				x		
Schedule								x			
Heating Setpoint									x		x
Cooling Setpoint									x		x
High Zone Temp										x	
Low Zone Temp										x	
High Discharge Air Temp										x	
Low Discharge Air Temp										x	
Totals	**3**	**0**	**1**	**2**	**2**	**0**	**0**	**1**	**9**	**4**	**8**

Total Hardware (6) **Total Software (16)**

1.3 Multizone - AHU (typical of 0)

Run Conditions - Requested:
The unit shall run whenever:

- Any zone is occupied.
- OR a definable number of unoccupied zones need heating or cooling.

Freeze Protection:
The unit shall shut down and generate an alarm upon receiving a freezestat status.

Supply Air Smoke Detection:
The unit shall shut down and generate an alarm upon receiving a supply air smoke detector status.

Supply Fan:
The supply fan shall run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a user definable (adj.) minimum runtime.

Alarms shall be provided as follows:

- Supply Fan Failure: Commanded on, but the status is off.
- Supply Fan in Hand: Commanded off, but the status is on.
- Supply Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

Cold Deck - Cooling Supply Air Temperature Setpoint - Optimized:
The cooling supply air temperature setpoint shall be reset using a trim and respond algorithm based on zone cooling requirements. If there is a demand for cooling then the setpoint shall be reset to a lower value (adj.). If the demand for cooling decreases then the setpoint shall reset to a higher value (adj.). Once the zones are satisfied then the setpoint shall gradually moderate over time to reduce cooling energy use.

The supply air temperature setpoint shall be reset based on zone cooling requirements as follows:

- The initial supply air temperature setpoint shall be 55°F (adj.).
- As cooling demand increases, the setpoint shall incrementally reset down to a minimum of 53°F (adj.).
- As cooling demand decreases, the setpoint shall incrementally reset up to a maximum of 72°F (adj.).

Cold Deck - Cooling Coil Valve:
The controller shall measure the cooling supply air temperature and and modulate the cooling coil valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:

- Outside air temperature is greater than 60°F (adj.).
- AND the economizer (if present) is disabled or fully open.
- AND the supply fan status is on.

The cooling coil valve shall open to 50% (adj.) whenever the freezestat (if present) is on.

Alarms shall be provided as follows:

- High Cooling Supply Air Temp: If the cooling supply air temperature is 5°F (adj.) greater than setpoint.

Hot Deck - Heating Supply Air Temperature Setpoint - Optimized:
The heating supply air temperature setpoint shall be reset using a trim and respond algorithm based on zone heating requirements. If there is a demand for heating then the setpoint shall be reset to a higher value (adj.). If the demand for heating decreases then the setpoint shall reset to a lower value (adj.). Once the zones are satisfied then the setpoint shall gradually moderate over time to reduce heating energy use.

The supply air temperature setpoint shall be reset based on zone heating requirements as follows:

- The initial supply air temperature setpoint shall be 82°F (adj.).

- As heating demand increases, the setpoint shall incrementally reset up to a maximum of 90°F (adj.).
- As heating demand decreases, the setpoint shall incrementally reset down to a minimum of 72°F (adj.).

Hot Deck - Heating Coil Valve:
The controller shall measure the heating supply air temperature and modulate the heating coil valve to maintain its setpoint.

The heating shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).
- AND the supply fan status is on.

The heating coil valve shall open whenever:

- Heating supply air temperature drops from 40°F to 35°F (adj.).
- OR the freezestat (if present) is on.

Alarms shall be provided as follows:

- High Heating Supply Air Temp: If the heating supply air temperature is greater than 120°F (adj.).
- Low Heating Supply Air Temp: If the heating supply air temperature is 5°F (adj.) less than setpoint.

Economizer:
The controller shall measure the mixed air temperature and modulate the economizer dampers in sequence to maintain a setpoint 2°F less than the cooling supply air temperature setpoint. The outside air dampers shall maintain a minimum adjustable position of 20% (adj.) open whenever occupied.

The economizer shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).

- AND the outside air temperature is less than the return air temperature.
- AND the supply fan status is on.

The economizer shall close whenever:

- Mixed air temperature drops from 40°F to 35°F (adj.).
- OR on loss of supply fan status.
- OR the freezestat (if present) is on.

The outside and exhaust air dampers shall close and the return air damper shall open when the unit is off. If Optimal Start Up is available the mixed air damper shall operate as described in the occupied mode except that the outside air damper shall modulate to fully closed.

Minimum Outside Air Ventilation - Fixed Percentage:
The outside air dampers shall maintain a minimum position (adj.) during building occupied hours and be closed during unoccupied hours.

Mixed Air Temperature:
The controller shall monitor the mixed air temperature and use as required for economizer control (if present) and preheating control (if present).

Alarms shall be provided as follows:

- High Mixed Air Temp: If the mixed air temperature is greater than 90°F (adj.).
- Low Mixed Air Temp: If the mixed air temperature is less than 45°F (adj.).

Return Air Temperature:
The controller shall monitor the return air temperature and use as required for economizer control (if present).

Alarms shall be provided as follows:

- High Return Air Temp: If the return air temperature is greater than 90°F (adj.).

- Low Return Air Temp: If the return air temperature is less than 45°F (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Cooling Supply Air Temp	x								x		x
Heating Supply Air Temp	x								x		x
Mixed Air Temp	x								x		x
Return Air Temp	x								x		x
Cooling Valve		x							x		x
Heating Valve		x							x		x
Mixed Air Dampers		x							x		x
Freezestat			x						x	x	x
Supply Air Smoke Detector			x						x	x	x
Supply Fan Status			x						x		x
Supply Fan Start/Stop				x					x		x
Cooling Supply Air Temp Setpoint					x				x		x
Heating Supply Air Temp Setpoint					x				x		x
Economizer Mixed Air Temp Set-point					x				x		x
Supply Fan Failure										x	
Supply Fan in Hand										x	
Supply Fan Runtime Exceeded										x	
High Cooling Supply Air Temp										x	
High Heating Supply Air Temp										x	
Low Heating Supply Air Temp										x	
High Mixed Air Temp										x	
Low Mixed Air Temp										x	
Low Return Air Temp										x	
High Return Air Temp										x	
Totals	**4**	**3**	**3**	**1**	**3**	**0**	**0**	**0**	**14**	**12**	**14**

Total Hardware (11) **Total Software (29)**

1.4 Single Air Cooled Chiller (typical of 0)

Chiller - Run Conditions:
The chiller shall be enabled to run whenever the outside air temperature is greater than 54°F (adj.).

To prevent short cycling, the chiller shall run for and be off for minimum adjustable times (both user definable), unless shutdown on safeties or outside air conditions.

The chiller shall run subject to its own internal safeties and controls.

Chilled Water Pump Lead/Standby Operation:
The two chilled water pumps shall run anytime the chiller is called to run. The chilled water pump shall also run for freeze protection whenever the outside air temperature is less than a user definable setpoint (adj.).

The lead pump shall start prior to the chiller being enabled and shall stop only after the chiller is disabled. The pump(s) shall therefore have:

- A user adjustable delay on start.
- AND a user adjustable delay on stop.

The delay times shall be set appropriately to allow for orderly chilled water system start-up, shutdown and sequencing.

The two pumps shall operate in a lead/standby fashion.

- The lead pump shall run first.
- On failure of the lead pump, the standby pump shall run and the lead pump shall turn off.

The designated lead pump shall rotate upon one of the following conditions (user selectable):

- manually through a software switch

- if pump runtime (adj.) is exceeded
- daily
- weekly
- monthly

Alarms shall be provided as follows:

- Chilled Water Pump 1
    - Failure: Commanded on, but the status is off.
    - Running in Hand: Commanded off, but the status is on.
    - Runtime Exceeded: Status runtime exceeds a user definable limit.

- Chilled Water Pump 2
    - Failure: Commanded on, but the status is off.
    - Running in Hand: Commanded off, but the status is on.
    - Runtime Exceeded: Status runtime exceeds a user definable limit.

Chiller:
The chiller shall be enabled a user adjustable time after pump statuses are proven on. The chiller shall therefore have a user adjustable delay on start.

The delay time shall be set appropriately to allow for orderly chilled water system start-up, shutdown and sequencing.

The chiller shall run subject to its own internal safeties and controls.

Alarms shall be provided as follows:

- Chiller Failure: Commanded on, but the status is off.
- Chiller Running in Hand: Commanded off, but the status is on.

- Chiller Runtime Exceeded: Status runtime exceeds a user definable limit.

Chilled Water Supply Temperature Setpoint:
The chilled water supply temperature setpoint shall reset based on outside air temperature.

As outside air temperature drops from 75°F (adj.) to 50°F (adj.) the chilled water supply temperature setpoint shall reset upwards by adding from 0°F (adj.) to 10°F (adj.) to the current setpoint.

Chilled Water Temperature Monitoring:
The following temperatures shall be monitored:

- Chilled water supply.
- Chilled water return.

Alarms shall be provided as follows:

- High Chilled Water Supply Temp: If the chilled water supply temperature is greater than 55°F (adj.).
- Low Chilled Water Supply Temp: If the chilled water supply temperature is less than 38°F (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Chilled Water Return Temp	x								x		x
Chilled Water Supply Temp	x								x		x
Chilled Water Supply Temp Setpoint Reset		x							x		x
Chilled Water Pump 1 Status			x						x		x
Chilled Water Pump 2 Status			x						x		x
Chiller Status			x						x		x
Chilled Water Pump 1 Start/Stop				x							x
Chilled Water Pump 2 Start/Stop				x							x
Chiller Enable				x							x
Outside Air Temp					x						x
Chilled Water Pump 1 Failure										x	

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Chilled Water Pump 1 Running in Hand										x	
Chilled Water Pump 1 Runtime Exceeded										x	
Chilled Water Pump 2 Failure										x	
Chilled Water Pump 2 Running in Hand										x	
Chilled Water Pump 2 Runtime Exceeded										x	
Chiller Failure										x	
Chiller Running in Hand										x	
Chiller Runtime Exceeded										x	
High Chilled Water Supply Temp										x	
Low Chilled Water Supply Temp										x	
Totals	**2**	**1**	**3**	**3**	**1**	**0**	**0**	**0**	**6**	**11**	**10**

Total Hardware (9) **Total Software (18)**

1.5 Chiller Interface (typical of 1)

Chiller Interface Monitor:
Current chiller status and operating conditions will be monitored through its communications interface port. The interface will monitor and trend the points as shown on the Points List.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Chiller kW					x				x		x
Chilled Water Supply Temp Setpoint					x				x		x
Operating Hours					x						x
Chilled Water Supply Temp					x				x		x
Chilled Water Return Temp					x				x		x
Condenser Water Supply Temp					x				x		x
Condenser Water Return Temp					x				x		x
Evaporator Refrigerant Pressure					x				x		x
Condenser Refrigerant Pressure					x				x		x
Oil Differential Pressure					x				x		x
Oil Temp					x				x		x
Chiller Status						x			x		x
Chilled Water Flow Status						x			x		x
Condenser Water Flow Status						x			x		x
Totals	**0**	**0**	**0**	**0**	**11**	**3**	**0**	**0**	**13**	**0**	**14**

Total Hardware (0) **Total Software (27)**

1.6 Boiler Interface (typical of 1)

Boiler Interface Monitor:
Current boiler status and operating conditions will be monitored through its communications interface port. The interface will monitor and trend the points as shown on the Points List.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Burner Cycles					x						x
Operating Hours					x						x
Operating Pressure					x				x		x
Operating Temp					x				x		x
Hot Water Supply Temp Setpoint					x				x		x
Hot Water Supply Temp					x				x		x
Hot Water Return Temp					x				x		x
Boiler Status						x			x		x
Hot Water Flow Status						x			x		x
Totals	**0**	**0**	**0**	**0**	**7**	**2**	**0**	**0**	**7**	**0**	**9**

Total Hardware (0) **Total Software (16)**

1.7 Power Monitoring Interface (typical of 0)

Electrical Power Interface Monitor:
Current electrical power status and operating conditions shall be monitored through the device's communications interface port. The interface shall monitor and trend the points as shown on the Points List.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Current Phase A					x				x		x
Current Phase B					x				x		x
Current Phase C					x				x		x
Current Neutral					x				x		x
Voltage A-B					x				x		x
Voltage B-C					x				x		x
Voltage C-A					x				x		x
Voltage A-N					x				x		x
Voltage B-N					x				x		x
Voltage C-N					x				x		x
Real Power - kW					x				x		x
Apparent Power - kVA					x				x		x
Power Factor					x				x		x
Frequency					x				x		x
Real Energy - kWh					x				x		x
Totals	**0**	**0**	**0**	**0**	**15**	**0**	**0**	**0**	**15**	**0**	**15**

Total Hardware (0) **Total Software (30)**

1.8 Variable Air Volume - Terminal Unit (typical of 0)

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:

- Occupied Mode: The unit shall maintain
  - A 74°F (adj.) cooling setpoint
  - A 70°F (adj.) heating setpoint.

- Unoccupied Mode (night setback): The unit shall maintain
  - A 85°F (adj.) cooling setpoint.
  - A 55°F (adj.) heating setpoint.

Alarms shall be provided as follows:

- High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).

Demand Limiting - Zone Setpoint Optimization:
To lower power consumption, the zone setpoints shall automatically relax when the facility power consumption exceeds definable thresholds. The amount of relaxation shall be individually configurable for each zone. The zone setpoints shall automatically return to their previous settings when the facility power consumption drops below the thresholds.

Zone Setpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize

the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.

Reversing Variable Volume Terminal Unit - Flow Control:
The unit shall maintain zone setpoints by controlling the airflow through one of the following:

Occupied:

- When zone temperature is greater than its cooling setpoint, the zone damper shall modulate between the minimum occupied airflow (adj.) and the maximum cooling airflow (adj.) until the zone is satisfied.
- When the zone temperature is between the cooling setpoint and the heating setpoint, the zone damper shall maintain the minimum required zone ventilation (adj.).
- When zone temperature is less than its heating setpoint, the controller shall enable heating to maintain the zone temperature at its heating setpoint. Additionally, if warm air is available from the AHU, the zone damper shall modulate between the minimum occupied airflow (adj.) and the maximum heating airflow (adj.) until the zone is satisfied.

Unoccupied:

- When the zone is unoccupied the zone damper shall control to its minimum unoccupied airflow (adj.).
- When the zone temperature is greater than its cooling setpoint, the zone damper shall modulate between the minimum unoccupied airflow (adj.) and the maximum cooling airflow (adj.) until the zone is satisfied.
- When zone temperature is less than its unoccupied heating setpoint, the controller shall enable heating to maintain the zone temperature at the setpoint. Additionally, if warm air is available from the AHU, the zone damper shall modulate between the

minimum unoccupied airflow (adj.) and the auxiliary heating airflow (adj.) until the zone is satisfied.

Discharge Air Temperature:
The controller shall monitor the discharge air temperature.

Alarms shall be provided as follows:

- High Discharge Air Temp: If the discharge air temperature is greater than 120°F (adj.).
- Low Discharge Air Temp: If the discharge air temperature is less than 40°F (adj.).

Zone Humidity:
The controller shall monitor the zone humidity.

Alarms shall be provided as follows:

- High Zone Humidity: If the zone humidity is greater than 70% (adj.).
- Low Zone Humidity: If the zone humidity is less than 35% (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Zone Temp	x								x		x
Zone Setpoint Adjust	x										x
Airflow	x								x		x
Discharge Air Temp	x								x		x
Zone Humidity	x								x		x
Zone Damper		x									x
Zone Override			x						x		x
Airflow Setpoint					x				x		x
Heating Mode						x			x		
Schedule								x			
Heating Setpoint									x		x
Cooling Setpoint									x		x
High Zone Temp										x	

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Low Zone Temp										x	
High Discharge Air Temp										x	
Low Discharge Air Temp										x	
High Zone Humidity										x	
Low Zone Humidity										x	
Totals	**5**	**1**	**1**	**0**	**1**	**1**	**0**	**1**	**9**	**6**	**10**

Total Hardware (7) **Total Software (18)**

1.9 Chilled Water Loop Pumps (typical of 0)

Chilled Water Pump System - Run Conditions:
The chilled water pumps shall be enabled whenever:

- A definable number of chilled water coils need cooling.
- AND the outside air temperature is greater than 54°F (adj.).

To prevent short cycling, the chilled water pump system shall run for and be off for minimum adjustable times (both user definable).

The pumps shall run for freeze protection anytime the outside air temperature is less than 38°F (adj.).

Chilled Water Pump Lead/Standby Operation:
The two chilled water pumps shall operate in a lead/standby fashion.

- The lead pump shall run first.
- On failure of the lead pump, the standby pump shall run and the lead pump shall turn off.

The designated lead pump shall rotate upon one of the following conditions (user selectable):

- manually through a software switch
- if pump runtime (adj.) is exceeded
- daily
- weekly
- monthly

Alarms shall be provided as follows:

- Chilled Water Pump 1
    - Failure: Commanded on, but the status is off.

- Running in Hand: Commanded off, but the status is on.
- Runtime Exceeded: Status runtime exceeds a user definable limit.

- Chilled Water Pump 2
  - Failure: Commanded on, but the status is off.
  - Running in Hand: Commanded off, but the status is on.
  - Runtime Exceeded: Status runtime exceeds a user definable limit.

Chilled Water Temperature Monitoring:
The following temperatures shall be monitored:

- Chilled water supply.
- Chilled water return.

Alarms shall be provided as follows:

- High Chilled Water Supply Temp: If the chilled water supply temperature is greater than 55°F (adj.).
- Low Chilled Water Supply Temp: If the chilled water supply temperature is less than 38°F (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Chilled Water Supply Temp	x								x		x
Chilled Water Return Temp	x								x		x
Chilled Water Pump 1 Status			x						x		x
Chilled Water Pump 2 Status			x						x		x
Chilled Water Pump 1 Start/Stop				x					x		x
Chilled Water Pump 2 Start/Stop				x					x		x
Outside Air Temp					x						x
Chilled Water Pump 1 Failure										x	
Chilled Water Pump 2 Failure										x	
Chilled Water Pump 1 Running in Hand										x	

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Chilled Water Pump 2 Running in Hand										x	
Chilled Water Pump 1 Runtime Exceeded										x	
Chilled Water Pump 2 Runtime Exceeded										x	
High Chilled Water Supply Temp										x	
Low Chilled Water Supply Temp										x	
Totals	**2**	**0**	**2**	**2**	**1**	**0**	**0**	**0**	**6**	**8**	**7**

Total Hardware (6) **Total Software (15)**

1.10 Single Boiler System (typical of 0)

Boiler System - Run Conditions:
The boiler system shall be enabled to run whenever outside air temperature is less than 65°F (adj.).

To prevent short cycling, the boiler system shall run for and be off for minimum adjustable times (both user definable), unless shutdown on safeties or outside air conditions.

Each boiler shall run subject to its own internal safeties and controls.

The boiler system shall also run for freeze protection whenever outside air temperature is less than 38°F (adj.)

Boiler Safeties:
The following safeties shall be monitored:

- Boiler alarm.
- Low Water Level.

Alarms shall be provided as follows:

- Boiler alarm.
- Low Water Level alarm.

Hot Water Pump Lead/Lag Operation:
The two hot water pumps shall operate in a lead/lag fashion.

- The lead pump shall run first.
- On failure of the lead pump, the lag pump shall run and the lead pump shall turn off.
- On decreasing hot water differential pressure, the lag pump shall stage on and run in unison with the lead pump to maintain hot water differential pressure setpoint.

The designated lead pump shall rotate upon one of the following conditions (user selectable):

- manually through a software switch
- if pump runtime (adj.) is exceeded
- daily
- weekly
- monthly

Alarms shall be provided as follows:

- Hot Water Pump 1
  - Failure: Commanded on, but the status is off.
  - Running in Hand: Commanded off, but the status is on.
  - Runtime Exceeded: Status runtime exceeds a user definable limit.
  - VFD Fault.

- Hot Water Pump 2
  - Failure: Commanded on, but the status is off.
  - Running in Hand: Commanded off, but the status is on.
  - Runtime Exceeded: Status runtime exceeds a user definable limit.
  - VFD Fault.

Hot Water Differential Pressure Control:
The controller shall measure hot water differential pressure and modulate the hot water pump VFDs in sequence to maintain its hot water differential pressure setpoint.

The following setpoints are recommended values. All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions.

The controller shall modulate hot water pump speeds to maintain a hot water differential pressure of 12lbf/in2 (adj.). The VFDs minimum speed shall not drop below 20% (adj.).

On dropping hot water differential pressure, the VFDs shall stage on and run to maintain setpoint as follows:

- The controller shall modulate the lead VFD to maintain setpoint.
- If the lead VFD speed is greater than a setpoint of 90% (adj.), the lag VFD shall stage on.
- The lag VFD shall ramp up to match the lead VFD speed and then run in unison with the lead VFD to maintain setpoint.

On rising hot water differential pressure, the VFDs shall stage off as follows:

- If the VFDs speeds drops back to 60% (adj.) below setpoint, the lag VFD shall stage off.
- The lead VFD shall continue to run to maintain setpoint.

Alarms shall be provided as follows:

- High Hot Water Differential Pressure: If 25% (adj.) greater than setpoint.
- Low Hot Water Differential Pressure: If 25% (adj.) less than setpoint.

Circulation Pump:
The circulation pump shall run anytime the boiler is called to run and shall have a user definable (adj.) delay on stop.

Alarms shall be provided as follows:

- Circulation Pump Failure: Commanded on, but the status is off.
- Circulation Pump Running in Hand: Commanded off, but the status is on.
- Circulation Pump Runtime Exceeded: Status runtime exceeds a user definable limit.

Boiler Enable:
The boiler shall be enabled when the boiler system is commanded on. The boiler shall be enabled after pump status is proven on and shall run subject to its own internal safeties and controls.

Alarms shall be provided as follows:

- Boiler Failure: Commanded on, but the status is off.
- Boiler Running in Hand: Commanded off, but the status is on.
- Boiler Runtime Exceeded: Status runtime exceeds a user definable limit.

Hot Water Supply Temperature Setpoint Reset:
The hot water supply temperature setpoint shall reset based on outside air temperature.

As outside air temperature rises from 0°F (adj.) to 70°F (adj.) the hot water supply temperature setpoint shall reset downwards by subtracting from 0°F (adj.) up to 20°F (adj.) from the current boiler setpoint.

Primary Hot Water Temperature Monitoring:
The following temperatures shall be monitored:

- Primary hot water supply.
- Primary hot water return.

Alarms shall be provided as follows:

- High Primary Hot Water Supply Temp: If greater than 200°F (adj.).
- Low Primary Hot Water Supply Temp: If less than 100°F (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Hot Water Differential Pressure	x								x		x
Primary Hot Water Return Temp	x								x		x
Primary Hot Water Supply Temp	x								x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Hot Water Pump 1 VFD Speed		x							x		x
Hot Water Pump 2 VFD Speed		x							x		x
Boiler Hot Water Supply Temp Set-point Reset		x							x		x
Boiler Alarm Status			x						x	x	x
Low Water Level			x						x	x	x
Hot Water Pump 1 VFD Fault			x							x	x
Hot Water Pump 2 VFD Fault			x							x	x
Hot Water Pump 1 Status			x						x		x
Hot Water Pump 2 Status			x						x		x
Circulation Pump Status			x						x		x
Boiler Status			x						x		x
Hot Water Pump 1 Start/Stop				x							x
Hot Water Pump 2 Start/Stop				x							x
Circulation Pump Start/Stop				x					x		x
Boiler Enable				x							x
Outside Air Temp					x						x
Hot Water Differential Pressure Set-point					x						x
High Hot Water Differential Pressure										x	
Low Hot Water Differential Pressure										x	
Hot Water Pump 1 Failure										x	
Hot Water Pump 1 Running in Hand										x	
Hot Water Pump 1 Runtime Ex-ceeded										x	
Hot Water Pump 2 Failure										x	
Hot Water Pump 2 Running in Hand										x	
Hot Water Pump 2 Runtime Ex-ceeded										x	
Circulation Pump Failure										x	
Circulation Pump Running in Hand										x	
Circulation Pump Runtime Exceed-ed										x	
Boiler Failure										x	
Boiler Running in Hand										x	
Boiler Runtime Exceeded										x	
High Primary Hot Water Supply Temp										x	

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Low Primary Hot Water Supply Temp										x	
Totals	**3**	**3**	**8**	**4**	**2**	**0**	**0**	**0**	**13**	**20**	**20**

Total Hardware (18) **Total Software (35)**

1.11 Indoor Lighting (typical of 0)

Run Conditions - Scheduled:
The lighting shall be turned on or off based on a user definable schedule.

Occupant Override:
A timed local override control will allow an occupant to override the schedule and turn the lighting on for an adjustable period of time. At the expiration of this time, control of the lighting will automatically return to the schedule

Warning Flash:
The output will cycle off (flash) 5 times (adj) to warn occupants when the lights are about to turn off. This flashing will occur 5 minutes (adj) before the the lights turn off.

Alarm shall be provided as follows:

- Output Runtime Exceeded: Lighting runtime exceeds a user definable limit (adj.).

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
TLO Input			x						x		x
Lighting Output				x					x		x
Schedule								x			
Runtime Alarm										x	
Totals	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**2**	**1**	**2**
Total Hardware (2)					**Total Software (4)**						

1.12 Outdoor Lighting (typical of 0)

Run Conditions:
The lighting output shall turn on and off based upon the local sunrise and sunset times. The transitions shall be configurable as follows:

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Lighting Output				x					x		x
Totals	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**1**

Total Hardware (1) **Total Software (1)**

1.13 Hot Water Loop Pumps (typical of 0)

Hot Water Pump Run Conditions:
The hot water pumps shall be enabled whenever outside air temperature is less than 54°F (adj.).

The pumps shall run for freeze protection anytime outside air temperature is less than 38°F (adj.).

To prevent short cycling, the pumps shall run for and be off for minimum adjustable times (both user definable).

Hot Water Pump Lead/Lag Operation:
The two variable speed hot water pumps shall operate in a lead/lag fashion.

- The lead pump shall run first.
- On failure of the lead pump, the lag pump shall run and the lead pump shall turn off.
- On decreasing hot water differential pressure, the lag pump shall stage on and run in unison with the lead pump to maintain hot water differential pressure setpoint.

The designated lead pump shall rotate upon one of the following conditions (user selectable):

- manually through a software switch
- if pump runtime (adj.) is exceeded
- daily
- weekly
- monthly

Alarms shall be provided as follows:

- Hot Water Pump 1
    - Failure: Commanded on, but the status is off.
    - Running in Hand: Commanded off, but the status is on.

- Runtime Exceeded: Status runtime exceeds a user definable limit.
- VFD Fault.

- Hot Water Pump 2
  - Failure: Commanded on, but the status is off.
  - Running in Hand: Commanded off, but the status is on.
  - Runtime Exceeded: Status runtime exceeds a user definable limit.
  - VFD Fault.

Hot Water Differential Pressure Control:
The controller shall measure hot water differential pressure and modulate the hot water pump VFDs in sequence to maintain its hot water differential pressure setpoint.

The following setpoints are recommended values. All setpoints shall be field adjusted during the commissioning period to meet the requirements of actual field conditions.

The controller shall modulate hot water pump speeds to maintain a hot water differential pressure of 12lbf/in2 (adj.). The VFDs minimum speed shall not drop below 20% (adj.).

On dropping hot water differential pressure, the VFDs shall stage on and run to maintain setpoint as follows:

- The controller shall modulate the lead VFD to maintain setpoint.
- If the lead VFD speed is greater than a setpoint of 90% (adj.), the lag VFD shall stage on.
- The lag VFD shall ramp up to match the lead VFD speed and then run in unison with the lead VFD to maintain setpoint.

On rising hot water differential pressure, the VFDs shall stage off as follows:

- If the VFDs speeds drops back to 60% (adj.) below setpoint, the lag VFD shall stage off.
- The lead VFD shall continue to run to maintain setpoint.

Alarms shall be provided as follows:

- High Hot Water Differential Pressure: If 25% (adj.) greater than setpoint.
- Low Hot Water Differential Pressure: If 25% (adj.) less than setpoint.

Hot Water Temperature Monitoring:
The following temperatures shall be monitored:

- Hot water supply.
- Hot water return.

Alarms shall be provided as follows:

- High Hot Water Supply Temp: If the hot water supply temperature is greater than 200°F (adj.).
- Low Hot Water Supply Temp: If the hot water supply temperature is less than 100°F (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Hot Water Differential Pressure	x								x		x
Hot Water Return Temp	x								x		x
Hot Water Supply Temp	x								x		x
Hot Water Pump 1 VFD Speed		x							x		x
Hot Water Pump 2 VFD Speed		x							x		x
Hot Water Pump 1 Status			x						x		x
Hot Water Pump 2 Status			x						x		x
Hot Water Pump 1 VFD Fault			x							x	x
Hot Water Pump 2 VFD Fault			x							x	x
Hot Water Pump 1 Start/Stop				x					x		x
Hot Water Pump 2 Start/Stop				x					x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temp					x						x
Hot Water Differential Pressure Set-point					x						x
High Hot Water Differential Pressure										x	
Low Hot Water Differential Pressure										x	
Hot Water Pump 1 Failure										x	
Hot Water Pump 2 Failure										x	
Hot Water Pump 1 Running in Hand										x	
Hot Water Pump 2 Running in Hand										x	
Hot Water Pump 1 Runtime Exceeded										x	
Hot Water Pump 2 Runtime Exceeded										x	
High Hot Water Supply Temp										x	
Low Hot Water Supply Temp										x	
Totals	**3**	**2**	**4**	**2**	**2**	**0**	**0**	**0**	**9**	**12**	**13**

Total Hardware (11) **Total Software (23)**

1.14 Electric Meter (typical of 0)

Electric Meter:
The controller shall monitor the electric meter for electric consumption on a continual basis. These values shall be made available to the system at all times.

Alarm shall be generated as follows:

- Meter Failure: Sensor reading indicates a loss of pulse output from the electric meter.

Peak Demand History:
The controller shall monitor and record the peak (high and low) demand readings from the electric meter. Peak readings shall be recorded on a daily, month-to-date, and year-to-date basis.

Usage History:
The controller shall monitor and record electric meter readings so as to provide a power consumption history. Usage readings shall be recorded on a daily, month-to-date, and year-to-date basis.

Demand Levels:
The controller shall set the system demand level (adj.) based on the current power consumption readings from the electric meter. There shall be six daily time periods in which the demand shall be adjusted on three levels. These demand levels shall be available for facility equipment to utilize for demand limiting.

- Demand Level 1: Power consumption has exceeded the first demand level threshold (adj.).
- Demand Level 2: Power consumption has exceeded the second demand level threshold (adj.).
- Demand Level 3: Power consumption has exceeded the third demand level threshold (adj.).

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
kW Pulse	x										x
Current Demand Level					x						x
kW Demand									x		x
kW Peak Today									x		x
kW Peak Month-to-Date									x		x
kW Peak Year-to-Date									x		x
kWh Today									x		x
MWh Month-to-Date									x		x
MWh Year-to-Date									x		x
Meter Failure										x	
Demand Level 1										x	
Demand Level 2										x	
Demand Level 3										x	
Totals	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**7**	**4**	**9**

Total Hardware (1) **Total Software (12)**

1.15 Outside Air Conditions (typical of 0)

Outside Air Conditions:
The controller shall monitor the outside air temperature and humidity and calculate the outside air enthalpy on a continual basis. These values shall be made available to the system at all times.

Alarm shall be generated as follows:

- Sensor Failure: Sensor reading indicates shorted or disconnected sensor. In the event of a sensor failure, an alternate outside air conditions sensor shall be made available to the system without interruption in sensor readings.

If an OA Temp Sensor cannot be read, a default value of 65°F will be used.

If an OA Humidity Sensor cannot be read, a default value of 50 % will be used.

Outside Air Temperature History:
The controller shall monitor and record the high and low temperature readings for the outside air. These readings shall be recorded on a daily, month-to-date, and year-to-date basis.

Cooling Degree Day:
The controller shall provide a Degree Day history index that reflects the energy consumption for the facilities cooling demand. Computations shall use a mean daily temperature of 65°F (adj.). The Degree Day peak value readings shall be recorded on a daily, month-to-date, and year-to-date basis.

Heating Degree Day:
The controller shall provide a Degree Day history index that reflects the energy consumption for the facilities heating demand. Computations shall use a mean daily temperature of 65°F (adj.). The Degree Day peak value readings shall be recorded on a daily, month-to-date, and year-to-date basis.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temp	x								x		x
Outside Air Humidity	x								x		x
Outside Air Temp (Alternate)	x								x		
Outside Air Humidity (Alternate)	x								x		
Outside Air Enthalpy					x				x		x
High Temp Today									x		x
High Temp Month-to-Date									x		x
High Temp Year-to-Date									x		x
Low Temp Today									x		x
Low Temp Month-to-Date									x		x
Low Temp Year-to-Date									x		x
Sensor Failure										x	
Totals	**4**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**11**	**1**	**9**

Total Hardware (4) **Total Software (13)**

1.16 HVAC Split-Systems (typical of 0)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Discharge Air Temp	x								x	x	x
Return Air Temp	x								x	x	x
Electric Heaters			x						x	x	x
Supply Fan Operation								x	x	x	x
Totals	**2**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**4**	**4**	**4**

Total Hardware (3) **Total Software (9)**

1.17 Point Summary

		Hardware Points				Software Points						
Point Name	**Qty**	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Fan Coil Units (Typical of 0)	Each	5	1	3	5	3	0	0	1	17	13	17
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Zone Reheat (Typical of 0)	Each	3	0	1	2	2	0	0	1	9	4	8
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Multizone - AHU (Typical of 0)	Each	4	3	3	1	3	0	0	0	14	12	14
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Single Air Cooled Chiller (Typical of 0)	Each	2	1	3	3	1	0	0	0	6	11	10
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Chiller Interface (Typical of 1)	Each	0	0	0	0	11	3	0	0	13	0	14
	Total (x1)	**0**	**0**	**0**	**0**	**11**	**3**	**0**	**0**	**13**	**0**	**14**
Boiler Interface (Typical of 1)	Each	0	0	0	0	7	2	0	0	7	0	9
	Total (x1)	**0**	**0**	**0**	**0**	**7**	**2**	**0**	**0**	**7**	**0**	**9**
Power Monitoring Inter-face (Typical of 0)	Each	0	0	0	0	15	0	0	0	15	0	15
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Variable Air Volume - Terminal Unit (Typical of 0)	Each	5	1	1	0	1	1	0	1	9	6	10
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Chilled Water Loop Pumps (Typical of 0)	Each	2	0	2	2	1	0	0	0	6	8	7
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Single Boiler System (Typical of 0)	Each	3	3	8	4	2	0	0	0	13	20	20
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Indoor Lighting (Typical of 0)	Each	0	0	1	1	0	0	0	1	2	1	2
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Outdoor Lighting (Typical of 0)	Each	0	0	0	1	0	0	0	0	1	0	1
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hot Water Loop Pumps (Typical of 0)	Each	3	2	4	2	2	0	0	0	9	12	13
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Electric Meter (Typical of 0)	Each	1	0	0	0	1	0	0	0	7	4	9
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Outside Air Conditions (Typical of 0)	Each	4	0	0	0	1	0	0	0	11	1	9
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
HVAC Split-Systems (Typical of 0)	Each	2	0	1	0	0	0	0	1	4	4	4
	Total (x0)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Project Totals		**0**	**0**	**0**	**0**	**18**	**5**	**0**	**0**	**20**	**0**	**23**

Hardware Points	Software Points

Total Hardware (0) **Total Software (43)**

APPENDIX A: Glossary of Terms

Terms used within the Specification Text:

- **Advanced Application Controller (AAC):**

A fully programmable control module. This control module may be capable of some of the advanced features found in Building Controllers (storing trends, initiating read and write requests, etc.) but it does not serve as a master controller. Advanced Application Controllers may reside on either the Ethernet/IP backbone or on a subnet.

- **Application Specific Controller (ASC):**

A pre-programmed control module which is intended for use in a specific application. ASCs may be configurable, in that the user can choose between various pre-programmed options, but it does not support full custom programming. ASCs are often used on terminal equipment such as VAV boxes or fan coil units. In many vendors' architectures ASCs do not store trends or schedules but instead rely upon a Building Controller to provide those functions.

- **BACnet/IP:**

An approved BACnet network type which uses an Ethernet carrier and IP addressing.

- **BACnet MS/TP:**

An approved BACnet network type which uses a Master-Slave Token Passing configuration. MS/TP networks are unique to BACnet and utilize EIA485 twisted pair topology running at 9600 to 76,800 bps.

- **BACnet over ARCNET:**

An approved BACnet network type which uses an ARCNET (attached resource computer network) carrier. ARCNET is an industry standard that can utilize several speeds and wiring standards. The most common configuration used by BACnet controllers is an EIA485 twisted pair topology running at 156,000 bps.

- **Building Controller (BC):**

A fully programmable control module which is capable of storing trends and schedules, serving as a router to devices on a subnet, and initiating read and write requests to other controllers. Typically this controller is located on the Ethernet/IP backbone of the BAS. In many vendors' architectures a Building Controller will serve as a master controller, storing schedules and

trends for controllers on a subnet underneath the Building Controller.

- **Direct Digital Control (DDC):**

A control system in which a digital computer or microprocessor is directly connected to the valves, dampers, and other actuators which control the system, as opposed to indirectly controlling a system by resetting setpoints on an analog pneumatic or electronic controller.

- **PICS - Protocol Implementation Conformance Statement:**

A written document, created by the manufacturer of a device, which identifies the particular options specified by BACnet that are implemented in the device.

- **Smart Actuator (SA):**

An actuator which is controlled by a network connection rather than a binary or analog signal. (0-10v, 4-20mA, relay, etc.)

- **Smart Sensor (SS):**

A sensor which provides information to the BAS via network connection rather than a binary or analog signal. (0-10000 ohm, 4-20mA, dry contact, etc.)

- **Web services:**

Web services are a standard method of exchanging data between computer systems using the XML (extensible markup language) and SOAP (simple object access protocol) standards. Web services can be used at any level within a Building Automation System (BAS), but most commonly they are used to transfer data between BAS using different protocols or between a BAS and a non-BAS system such as a tenant billing system or a utility management system.

Terms used within the Sequences of Operation:

- **adj.**

Adjustable by the end user, through the supplied user interface.

- **AI, AO, etc. (Column Headings on Points List)**

AI = Analog Input. A physical input to the control module.
AO = Analog Output. A physical output from the control module.
AV = Analog Value. An intermediate (software) point that may be editable or read-only. Editable AVs are typically used to allow the user to set a fixed control parameter, such as a setpoint. Read Only AVs are typically used to display the status of a control operation.
BI = Binary Input. A physical input to the control module.
BO = Binary Output. A physical output from the control module.

BV = Binary Value. An intermediate (software) point that may be editable or read-only. Editable BVs are typically used to allow the user to set a fixed control parameter, such as a setpoint. Read Only BVs are typically used to display the status of a control operation.
Loop = A control loop. Most commonly a PID control loop. Typically a control loop will include a setpoint, an input which is compared to the setpoint, and an output which controls some action based upon the difference between the input and the setpoint. A PID control loop will also include gains for the proportional, integral, and derivative response as well as an interval which controls how frequently the control loop updates its output. These gains may be adjustable by the end user for control loop "tuning," but in self-tuning control loops or loops which have been optimized for a specific application the gains may not be adjustable.
Sched = Schedule. The control algorithm for this equipment shall include a user editable schedule.
Trend. The control system shall be configured to collect and display a trend log of this object. The trending interval shall be no less than one sample every 5 minutes. (Change of Value trending, where a sample is taken every time the value changes by more than a user-defined minimum, is an acceptable alternative.)
Alarm. The control system shall be configured to generate an alarm when this object exceeds user definable limits, as described in the Sequence of Controls.

Note: If the specifications require use of the BACnet protocol, all of the above shall be provided as BACnet objects.

- **KW Demand Limiting: ***

An energy management strategy that reduces energy consumption when a system's electric power meter exceeds an operator-defined threshold.

When power consumption exceeds defined levels, the system automatically adjust setpoints, de-energizes low priority equipment, and takes other pre-programmed actions to avoid peak demand charges. As the demand drops, the system restores loads in a predetermined manner.

- **Occupant Override Switch, or Timed Local Override:**

A control option that allows building occupants to override the programmed HVAC schedule for a limited period of time.

When the override time expires, the zone returns to its unoccupied state.

- **Occupant Setpoint Adjustment:**

A control option that allows building occupants to adjust - within limits set by the HVAC control system - the heating and cooling setpoints of selected zones. Typically the user interface for this function is built into the zone sensor.

- **Optimal Start-Up: ***

A control strategy that automatically starts an HVAC system at the latest possible time yet ensures comfort conditions by the time the building becomes occupied.

In a typical implementation, a controller measures the temperature of the zone and the outside air. Then, using design heating or cooling capacity at the design outside air temperature, the system computes how long a unit must run at maximum capacity to bring the zone temperature to its occupied setpoint.

The optimal start algorithm often includes a self-learning feature to adjust for variations from design capacity.

A distributed system must use Run on Request with Optimal Start. (See below.)

- **Requested, or Run on Request: ***

A control strategy that optimizes the runtime of a source piece of equipment that supplies one or more receiving units - such as an air handler unit supplying zone terminal units with heating, cooling, ventilation, or similar service. Source equipment runs only when needed, not on a fixed schedule.

The source equipment runs when one or more receiving units request its services. An operator determines how many requests are required to start the source equipment.

For example, if all the zones in a building are unoccupied and the zone terminal units do not need heating or cooling, the AHU will shut down. However, if a zone becomes occupied or needs cooling, the terminal unit will send a run request to the AHU to initiate the start-up sequence. If this AHU depends on a central chiller, it can send a run request to the chiller.

The run on request algorithm also allows an operator to schedule occupancy for individual zones based on the needs of the occupants without having to adjust the schedules of related AHUs and chillers.

- **Trim and Respond, or Setpoint Optimization: ***

A control strategy that optimizes the setpoint of a source piece of equipment that supplies one or more receiving units - such as an air handler unit supplying zone terminal units with heating, cooling, ventilation, or similar service.

The source unit communicates with receiving units to determine heating, cooling, and other requirements, and then adjusts its setpoint.

For example, if all zones are comfortable and do not request cooling, the AHU will gradually increase (trim) its supply air setpoint. When a zone requests cooling, the AHU responds by

dropping its setpoint. The more zones that request cooling, the more it drops the setpoint. The AHU repeats this process throughout the day to keep zones cool, but with a supply air setpoint that is no cooler than necessary.

Contracting Terms:

- **Furnished or Provided:**

The act of supplying a device or piece of equipment as required meeting the scope of work specified and making that device or equipment operational. All costs required to furnish the specified device or equipment and make it operational are borne by the division specified to be responsible for providing the device or equipment.

- **Install or Installed:**

The physical act of mounting, piping or wiring a device or piece of equipment in accordance with the manufacturer's instructions and the scope of work as specified. All costs required to complete the installation are borne by the division specified to include labor and any ancillary materials.

- **Interface:**

The physical device required to provide integration capabilities from an equipment vendor's product to the control system. The equipment vendor most normally furnishes the interface device. An example of an interface is the chilled water temperature reset interface card provided by the chiller manufacturer in order to allow the control system to integrate the chilled water temperature reset function into the control system.

- **Integrate:**

The physical connections from a control system to all specified equipment through an interface as required to allow the specified control and monitoring functions of the equipment to be performed via the control system.

APPENDIX B: Abbreviations

The following abbreviations may be used in graphics, schematics, point names, and other UI applications where space is at a premium.

AC - Air Conditioning
ACU - Air Conditioning Unit
AHU - Air Handling Unit
AI - Analog Input
AO - Analog Output
AUTO - Automatic
AUX - Auxiliary
BI -Binary Input
BO -Binary Output
C -Common
CHW - Chilled Water
CHWP - Chilled Water Pump
CHWR - Chilled Water Return
CHWS - Chilled Water Supply
COND - Condenser
CW - Condenser Water
CWP - Condenser Water Pump
CWR - Condenser Water Return
CWS - Condenser Water Supply
DA - Discharge Air
EA - Exhaust Air
EF - Exhaust Fan
EVAP - Evaporators
FCU - Fan Coil Unit
HOA - Hand / Off / Auto
HP - Heat Pump
HRU - Heat Recovery Unit
HTEX - Heat Exchanger
HW - Hot Water
HWP - Hot Water Pump
HWR - Hot Water Return
HWS - Hot Water Supply
MAX - Maximum
MIN - Minimum
MISC - Miscellaneous
NC - Normally Closed
NO - Normally Open
OA - Outdoor Air

PIU - Powered Induction Unit
RA - Return Air
RF - Return Fan
RH - Relative Humidity
RTU - Roof-top Unit
SA - Supply Air
SF - Supply Fan
SP - Static Pressure
TEMP - Temperature
UH - Unit Heater
UV - Unit Ventilator
VAV - Variable Air Volume
VVTU - Variable Volume Terminal Unit
W/ - with
W/O - without
WSHP - Water Source Heat Pump

PIU - Powered Induction Unit
RA - Return Air
RF - Return Fan
RH - Relative Humidity
RTU - Roof-top Unit
SA - Supply Air
SF - Supply Fan
SP - Static Pressure
TEMP - Temperature
UH - Unit Heater
UV - Unit Ventilator
VAV - Variable Air Volume
VVTU - Variable Volume Terminal Unit
W/ - with
W/O - without
WSHP - Water Source Heat Pump

EXHIBIT 4

WAYFINDING CONSULTANT DESCRIPTION AND WORK & DELIVERABLES

Wayfinding Consultant Description of Work & Deliverables

DESIGN PHASE:

- The Wayfinding Consultant (WFC) shall utilize the Atlanta Fulton Public Library System Signage Standards and Guidelines to design and lay-out signage at the Phase 2 Library Renovations.
- The WFC shall be under contract to Fulton County and shall report directly to Fulton County's Program Management Team (PMT).
- The WFC shall work closely with the Design/Builder through all phases of design phase and develop the signage specifications and drawings. The Design/Builder shall incorporate these drawings into their design set of drawings and specifications for the project.

BID/PRICING PHASE:

- Provide clarification and assist Contractor with issuance of addenda to bidders (as necessary.
- Assist each Contractor in the analysis of bids.

CONSTRUCTION PHASE:

- Meet with selected Contractor to review scope and details of the project after reward of Construction Contract.
- Review shop drawings, samples and other submittals for compliance with the Contract Documents. This process includes the review of one complete grouped submittal of all shop drawings.
- Prepare communications for design clarifications as needed.
- Assist the Contractor, with the purchase order/subcontract scope of Signage for the Project. Review and coordinate with the Schedule for Construction. Respond to construction Wayfinding RFIs, and attend any coordination meetings set by Contractor concerning Wayfinding.
- Assist in the field verification of locations of signs or reviewing conditions at the onset of installation, (one site visit).
- Review installed signage work; prepare punch list of deficiencies and document correct installations.
- Aid the Design Builder in the resolution of punch list issues.
- The Wayfinding Consultant is charged with final inspection of Wayfinding and shall submit field reports for site visits.

EXHIBIT 5

TECHNOLOGY CONSULTANT DESCRIPTION OF WORK

Technology Consultant Description of Work & Deliverables

DESIGN PHASE:

- The Technology Consultant (TC) shall utilize the Atlanta Fulton Public Library Systems Technology Guidelines and Fulton County's Department of Information Technology's (DoIT) Structured Cabling guidelines to develop Technology Drawings that include, but not necessarily be limited to: Technology Demolition Drawings; Access Control and CCTV drawings; Audio/Video Drawings; Intrusion Detection and Paging Drawings; Structured Cabling Drawings; Technology Details; and Technology Riser Diagrams.
- The TC shall be under contract to Fulton County and shall report directly to Fulton County's Program Management Team (PMT).
- The TC shall work closely with the Design/Builder through all phases of design phase and develop the technology specifications and drawings. The Design/Builder shall incorporate these drawings and specifications into their projects design set of drawings and specifications for the project.
- The TC shall work closely with the Design/Builders hardware consultant to ensure that doors/hardware specifications are coordinated with the access control drawings.

BID/PRICING PHASE:

A. The Technology Consultant shall assist the Design/Build Team with addenda and clarifications in response to questions raised during the bid/pricing phase.

CONSTRUCTION PHASE:

A. Assist the County, as directed with the purchase of Hardware and Software for the program. Assist the County, as directed with coordination of related Consultants and arrangements with vendors providing labor required for complete and total installation of all Hardware and Software included in the program in accordance with the project schedule and specifications. Test, evaluate and certify, in conjunction with DoIT, the performance of network and all related Technology systems in accordance with plans and product specifications. Provide services related to the maintenance of warranties. Assist the County with coordination of County training for all features of all equi[pment included in the project before opening day and troubleshooting for a period after the completion of the project as indicated in product specifications.

B. For Security design, the Technology Consultant will, in coordination with DoIT:

1. Review and coordinate with the Schedule for Construction.

2. Review submittals for compliance with the CDs.

3. Respond to construction Technology RFIs and attend any coordination meetings set by the Design/Build Team.

4. Observe and report periodically (at least monthly, through Grand Opening Day) on the progress of purchases and installation of components of the Security Systems.

5. Manage County training for complete operation of all components of Library Security before opening day.

Construction Phase Deliverables:

- Provide County assistance with submittal review, vendor purchases, and schedule for purchase and installation
- Trouble shooting for operational products/systems
- Assistance with obtaining product submittals, support and warranties
- Technology systems testing evaluations
- Provide County Assistance with training

General Considerations

A. The selected Technology Consultant shall contract directly with the County for these services, but shall report to the County's Program Manager (PMT). The PMT shall have the authority, acting as the County's agent, to transmit instructions, render timely decision, and ensure that the County's interests are protected in all issues related to design, construction and furnishing of the library projects.

B. Construction Administration: The Technology Consultant is charged with final equipment inspection and shall submit field reports for each site visit.

C. The Technology Consultant and County representatives shall at all times be provided with and have access to the work at any time when in preparation or progress.

D. The Technology Consultant shall be required to attend meetings during equipment installation.

EXHIBIT 6

FF&E CONSULTANT DESCRIPTION OF WORK

FF&E Consultant Description of Work & Deliverables

1. The County's FF&E Consultant shall provide FF&E design and construction documentation, including Furniture drawings, FF&E specifications, budgeting, cost estimating, scheduling, and coordination required to assist the Atlanta Fulton Public Library System, the County, and the Design/Build Team with the selection, procurement, delivery, and installation of all FF&E for each library.

2. The Design Build Team shall coordinate fully with the FF&E consultant through-out design process, including but not limited to attendance to design team meetings; sharing of backgrounds/drawings, etc. The Design/Build Team shall incorporate the Furniture drawings/plans and specifications into their set of project documents.

3. The FF&E Consultant will develop FF&E bid packages, including Basis of Design items and alternates, for each library.

4. The FF&E Consultant will work in cooperation with The Design/Build Team, County, Program Management Team (PMT) and Library Administration over the full timeframe of the project schedule.

5. The FF&E Consultant shall assist the Design/Build Team with development of a "Transition Schedule" for each library on all activities involving FF&E beginning with milestone dates for ordering and procuring all FF&E, and for milestones identified from "Substantial Completion" through "Final Completion", and for the "Move" and Final Inspections.

6. The FF&E Consultant will inspect FF&E deliveries for proper fulfillment and placement of all FF&E specified in the Purchase Orders, and assist the Design/Build Team with filing claims for missing or damaged FF&E.

7. The FF&E Consultant will gather all warranties and submittals for FF&E and submit them to the Design/Build Team for incorporation into their final warranty submittals to the County

8. The FF&E Consultant will work in collaboration with the County's selected Design/Build Team and the PMT for the project in matters including constructability, cost control and timely progress of the work.

9. The FF&E Consultant (FFEC) will assist the Design/Build Team with assembling Purchase orders for the FF&E. The FFEC will also assist the Design/Build Team with coordinating the delivery, inspection, and proper placement of these items.

10. The Furniture, Fixtures & Equipment (FF&E) Consultant will:
    a) Assist the Design/Build Team with Purchase Orders for FF&E for the Project. Document progress relative to Procurement Plan at monthly meetings with the Design/Build Team during the Construction Phase. These meetings will continue

on a weekly basis from Substantial Completion to Final Acceptance of the FF&E by the FF&EC.

b) Assist the Design/Build Team with FF&E ordering, delivery and installation in accordance with Construction Schedules.
c) Attend on-site meetings related to FF&E schedules, deliveries and installation. Assist the Design/Build Team with the FF&E deliveries, installations and inspections. Arrange with vendors and provide personnel required for on-site management of a complete delivery, installation, and inspection of FF&E items in accordance with the Project Schedule and Specifications. Assist the Design/Build Team with claims for any damaged or missing products.
d) Provide information to the County and Library related to the Maintenance of Warranties.

11. Construction Phase Deliverables for the FFEC:
    a) Final FF&E Cost Report for all projects in the program
    b) Monthly Procurement Plan progress reports at meetings (weekly following Substantial Completion)
    c) Assist with Purchase Orders for FF&E
    d) Assist with Coordination of FF&E ordering, delivery and installation and coordinate with the Design/Build Tram's Construction Schedules
    e) On-site meetings related to FF&E deliveries, installations
    f) Inspect FF&E set-up, installations and assist Design/Build Team with claims for damaged or missing products
    g) Collect Product Submittals and Warranties; deliver and review with County

EXHIBIT H

PURCHASING FORMS

STATE OF GEORGIA

COUNTY OF FULTON

FORM A: GEORGIA SECURITY AND IMMIGRATION CONTRACTOR AFFIDAVIT AND AGREEMENT

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services[1] under a contract with **[insert name of prime contractor]** BuildSmart/Tebarco, A Joint Venture LLC on behalf of **Fulton County Government** has registered with and is participating in a federal work authorization program*,[2] in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

The undersigned further agrees that, should it employ or contract with any subcontractor(s) in connection with the physical performance of services to this contract with **Fulton County Government**, contractor will secure from such subcontractor(s) similar verification of compliance with O.C.G.A. 13-10-91 on the Subcontractor Affidavit provided in Rule 300-10-01-.08 or a substantially similar form. Contractor further agrees to maintain records of such compliance and provide a copy of each such verification to the **Fulton County Government** at the time the subcontractor(s) is retained to perform such service.

115142
EEV/Basic Pilot Program* User Identification Number

BuildSmart/Tebarco, A Joint Venture
BY: Authorized Officer of Agent
(Insert Contractor Name)

Vice Chairman
Title of Authorized Officer or Agent of Contractor

Darrell P. Stallings
Printed Name of Authorized Officer or Agent

Sworn to and subscribed before me this _____ day of _____, 20___.

Notary Public: _____

County: Fulton

Commission Expires: 12-28-18

TRACY M STALLINGS NOTARY PUBLIC FULTON CO., GEORGIA MY COMMISSION EXPIRES DEC. 28 2018

[1]O.C.G.A.§ 13-10-90(4), as amended by Senate Bill 160, provides that "physical performance of services" means any performance of labor or services for a public employer (e.g., Fulton County) using a bidding process (e.g., ITB, RFQ, RFP, etc.) or contract wherein the labor or services exceed $2,499.99, except for those individuals licensed pursuant to title 26 or Title 43 or by the State Bar of Georgia and is in good standing when such contract is for service to be rendered by such individual.

[2]*[Any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603].

STATE OF GEORGIA

COUNTY OF FULTON

FORM B: GEORGIA SECURITY AND IMMIGRATION SUBCONTRACTOR AFFIDAVIT

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services[3] under a contract with [insert name of prime contractor] BuildSmart Enterprises, LLC behalf of Fulton County Government has registered with and is participating in a federal work authorization program*,[4] in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

224816
EEV/Basic Pilot Program* User Identification Number

J.W. Robinson & Associates, Inc.
BY: Authorized Officer of Agent
(Insert Subcontractor Name)

President
Title of Authorized Officer or Agent of Subcontractor

Jeffrey L. Robinson, AIA, NOMA
Printed Name of Authorized Officer or Agent

Sworn to and subscribed before me this 20th day of April, 20 17.

Notary Public: Patricia Vann Crawford

PATRICIA VANN CRAWFORD NOTARY PUBLIC DEKALB COUNTY, GA EXP. NOV. 16, 2019

County: _____

Commission Expires: _____

[3]O.C.G.A.§ 13-10-90(4), as amended by Senate Bill 160, provides that "physical performance of services" means any performance of labor or services for a public employer (e.g., Fulton County) using a bidding process (e.g., ITB, RFQ, RFP, etc.) or contract wherein the labor or services exceed $2,499.99, except for those individuals licensed pursuant to title 26 or Title 43 or by the State Bar of Georgia and is in good standing when such contract is for service to be rendered by such individual.

[4]*[Any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603].

STATE OF GEORGIA

COUNTY OF FULTON

FORM B: GEORGIA SECURITY AND IMMIGRATION SUBCONTRACTOR AFFIDAVIT

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services[3] under a contract with [insert name of prime contractor] Build Smart Enterprises behalf of Fulton County Government has registered with and is participating in a federal work authorization program*,[4] in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

196133
EEV/Basic Pilot Program* User Identification Number

BY: Authorized Officer of Agent
(Engineered Systems & Services, LLC)

Principal
Title of Authorized Officer or Agent of Subcontractor

Jonathan Rucker
Printed Name of Authorized Officer or Agent

Sworn to and subscribed before me this 5th day of April, 20 17.

Notary Public:

County: Gwinnett

Commission Expires: 4/30/2017

KRISANN L LOGSDON NOTARY PUBLIC GWINNETT CO., GEORGIA MY COMMISSION EXPIRES APR 30 2017

[3]O.C.G.A.§ 13-10-90(4), as amended by Senate Bill 160, provides that "physical performance of services" means any performance of labor or services for a public employer (e.g., Fulton County) using a bidding process (e.g., ITB, RFQ, RFP, etc.) or contract wherein the labor or services exceed $2,499.99, except for those individuals licensed pursuant to title 26 or Title 43 or by the State Bar of Georgia and is in good standing when such contract is for service to be rendered by such individual.

[4]*[Any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603].

STATE OF GEORGIA

COUNTY OF FULTON

FORM B: GEORGIA SECURITY AND IMMIGRATION SUBCONTRACTOR AFFIDAVIT

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services[3] under a contract with **[insert name of prime contractor]** Build Smart behalf of **Fulton County Government** has registered with and is participating in a federal work authorization program*,[4] in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

1136553
EEV/Basic Pilot Program* User Identification Number

Randall A Dragon
BY: Authorized Officer of Agent
(Insert Subcontractor Name)

Partner
Title of Authorized Officer or Agent of Subcontractor

Randall C. Dragon
Printed Name of Authorized Officer or Agent

Sworn to and subscribed before me this 20 day of April, 2017.

Notary Public: Shaunna Wells

County: Dekalb

Commission Expires: 08.13.2018

SHAUNNA A WELLS
NOTARY PUBLIC
Dekalb County
State of Georgia
My Comm. Expires Aug. 13, 2018

[3] O.C.G.A.§ 13-10-90(4), as amended by Senate Bill 160, provides that "physical performance of services" means any performance of labor or services for a public employer (e.g., Fulton County) using a bidding process (e.g., ITB, RFQ, RFP, etc.) or contract wherein the labor or services exceed $2,499.99, except for those individuals licensed pursuant to title 26 or Title 43 or by the State Bar of Georgia and is in good standing when such contract is for service to be rendered by such individual.

[4] *[Any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603].

Form C: OFFEROR'S DISCLOSURE FORM AND QUESTIONNAIRE

1. Please provide the names and business addresses of each of the Offeror's firm's officers and directors.

   For the purposes of this form, the term "Offeror" means an entity that responds to a solicitation for a County contract by either submitting a proposal in response to a Request for Proposal or a Request for Qualification or a Bid in response to an Invitation to Bid. Describe accurately, fully and completely, their respective relationships with said Offeror, including their ownership interests and their anticipated role in the management and operations of said Offeror.

   Terrell Barden serves as Chairman of BuildSmart/Tebarco, A Joint Venture LLC
   Darrell P. Stallings serves as Vice Chairman and Managing Executive for BuildSmart/Tebarco, A Joint Venture LLC
   Address: 1690 Bluegrass Lakes Parkway, Alpharetta, GA 30004

2. Please describe the general development of said Offeror's business during the past five (5) years, or such shorter period of time that said Offeror has been in business.

   BuildSmart/Tebarco, A Joint Venture was formed by Darrell P. Stallings (BuildSmart Enterprises) and Terrell Barden (Tebarco Mechanical). The two companies formed a joint venture to provide competitive construction services to its clients. The combination of the two firms brings the combined expertise of over 30 years of construction experience.

3. Please state whether any employee, agent or representative of said Offeror who is or will be directly involved in the subject project has or had within the last five (5) years: (i) directly or indirectly had a business relationship with Fulton County; (ii) directly or indirectly received revenues from Fulton County; or (iii) directly or indirectly receives revenues from the result of conducting business on Fulton County property or pursuant to any contract with Fulton County. Please describe in detail any such relationship.

   BuildSmart Enterprises, LLC has worked indirectly for Fulton County in the performance of (1) Facility assessment services as a subconsultant to Faithful + Gould, and (2) HVAC Modifications at Aldredge Health Center as a subconsultant to Bramlett Mechanical, serving as construction coordinator.

LITIGATION DISCLOSURE:

Failure to fully and truthfully disclose the information required, may result in the disqualification of your bid or proposal from consideration or termination of the Contract, once awarded.

1. Please state whether any of the following events have occurred in the last five (5) years with respect to said Offeror. If any answer is yes, explain fully the following:

   (a) whether a petition under the federal bankruptcy laws or state insolvency laws was filed by or against said Offeror, or a receiver fiscal agent or similar officer was appointed by a court for the business or property of said Offeror;

   Circle One: YES (NO)

   (b) whether Offeror was subject of any order, judgment, or decree not subsequently reversed, suspended or vacated by any court of competent jurisdiction, permanently enjoining said Offeror from engaging in any type of business practice, or otherwise eliminating any type of business practice; and

   Circle One: YES (NO)

   (c) whether said Offeror's business was the subject of any civil or criminal proceeding in which there was a final adjudication adverse to said or Offeror, which directly arose from activities conducted by the business unit or corporate division of said Offeror which submitted a bid or proposal for the subject project. If so please explain.

   Circle One: YES (NO)

2. Have you or any member of your firm or team to be assigned to this engagement ever been indicted or convicted of a criminal offense within the last five (5) years?

   Circle One: YES (NO)

3. Have you or any member of your firm or team been terminated (for cause or otherwise) from any work being performed for Fulton County or any other Federal, State or Local Government?

   Circle One: YES (NO)

4. Have you or any member of your firm or team been involved in any claim or litigation adverse to Fulton County or any other federal, state or local government, or private entity during the last three (3) years?

Circle One: YES (NO)

5. Has any Offeror, member of Offeror's team, or officer of any of them (with respect to any matter involving the business practices or activities of his or her employer), been notified within the five (5) years preceding the date of this offer that any of them are the target of a criminal investigation, grand jury investigation, or civil enforcement proceeding?

Circle One: YES (NO)

If you have answered "YES" to any of the above questions, please indicate the name(s) of the person(s), the nature, and the status and/or outcome of the information, indictment, conviction, termination, claim or litigation, the name of the court and the file or reference number of the case, as applicable. Any such information should be provided on a separate page, attached to this form and submitted with your proposal.

NOTE: If any response to any question set forth in this questionnaire has been disclosed in any other document, a response may be made by attaching a copy of such disclosure. (For example, said Offeror's most recent filings with the Securities and Exchange Commission ("SEC") may be provided if they are responsive to certain items within the questionnaire.) However, for purposes of clarity, Offeror should correlate its responses with the exhibits by identifying the exhibit and its relevant text.

Disclosures must specifically address, completely respond and comply with all information requested and fully answer all questions requested by Fulton County. Such disclosure must be submitted at the time of the bid or proposal submission and included as a part of the bid/proposal submitted for this project. Disclosure is required for Offerors, joint venture partners and first-tier subcontractors.

Failure to provide required disclosure, submit officially signed and notarized documents or respond to any and all information requested/required by Fulton County can result in the bid/proposal declared as non-responsive. This document must be completed and included as a part of the bid/proposal package along with other required documents.

[SIGNATURES ON NEXT PAGE]

Under penalty or\f perjury, I declare that I have examined this questionnaire and all attachments hereto, if applicable, to the best of my knowledge and belief, and all statements contained hereto are true, correct, and complete.

On this 20TH day of APRIL, 2017

BuildSmart/Tebarco, A Joint Venture LLC
(Legal Name of Proponent) (Date)

Darrell T. Stallings 4/20/17
(Signature of Authorized Representative) (Date)

Vice Chairman
(Title)

Sworn to and subscribed before me,

This 20TH day of APRIL, 2017

Tracy M Stallings
(Notary Public) (Seal)

TRACY M STALLINGS NOTARY PUBLIC FULTON CO., GEORGIA MY COMMISSION EXPIRES DEC. 28 2018

Commission Expires 12-28-18

FORM D1: CONTRACTOR'S GEORGIA UTILITY LICENSE CERTIFICATION

Contractor's Name: BUILDSMART / TEBARCO, A JOINT VENTURE LLC

Utility Contractor's Name: TEBARCO MECHANICAL CORP.

Expiration Date of License: APRIL 30, 217

I certify that the above information is true and correct and that the classification noted is applicable to the Bid for this Project.

Signed: Darrell T. Stallings

Date: APRIL 20, 2017

(ATTACH COPY OF LICENSE)

STATE OF GEORGIA
Brian P. Kemp, Secretary of State
State Construction Industry Licensing Board
Utility Contractor

License No. UC300246 Status: Active

Tebarco Mechanical Corp
1690 Bluegrass Lakes Pkwy
Alpharetta GA 30004

Expires: 4/30/2017
Issued: 1/20/1994

Real-time license verification is available at sos.georgia.gov/PLB

FORM D2: CONTRACTOR'S GEORGIA GENERAL CONTRACTOR'S LICENSE CERTIFICATION

Contractor's Name: BuildSmart/Tebarco, A Joint Venture LLC

General Contractor's License Number: GCQA005446

Expiration Date of License: June 30, 2018

I certify that ~~the~~ above information is true and correct and that the classification noted is applicable to the Bid for this Project.

Signed: Darrell P. Stallings

Date: April 20, 2018

(ATTACH COPY OF LICENSE)

STATE OF GEORGIA
Brian P. Kemp, Secretary of State
Board for Residential and General Contractors
General Contractor Qualifying Agent

License No. GCQA005446 Status: Active

Darrell Patterson Stallings
1690 Bluegrass Lakes Parkway
Alpharetta GA 30004

Company Name: BuildSmart/Tebarco A Joint Venture LLC
Company License: GCCO005448

Issued: 2/23/2017
Expires: 6/30/2018

Real-time license verification is available at sos.georgia.gov/PLB

FORM D3: GEORGIA PROFESSIONAL LICENSE CERTIFICATION

NOTE: Please complete this form for the work your firm will perform on this project.

Contractor's Name: J.W. Robinson & Associates, Inc.

Performing work as: Prime Contractor ___ Sub-Contractor ✓

Professional License Type: Architect

Professional License Number: RA008215

Expiration Date of License: June 30, 2017

I certify that the above information is true and correct and that the classification noted is applicable to the Bid for this Project.

Signed: _____

Date: April 20, 2017

(ATTACH COPY OF LICENSE)

STATE OF GEORGIA
Brian P. Kemp, Secretary of State
Board of Architects and Interior Designers
Registered Architect

License No. RA008215 Status: Active

Jeffrey Leonardo Robinson
2780 Valley Heart Dr NW
Atlanta GA 30318

Expires: 6/30/2017
Issued: 10/1/1993

Real-time license verification is available at sos.georgia.gov/PLB

STATE OF GEORGIA
Brian P. Kemp, Secretary of State
Board of Architects and Interior Designers
Registered Architect
License No. RA008215 - Active

Jeffrey Leonardo Robinson
2780 Valley Heart Dr NW
Atlanta GA 30318

Issued: 10/1/1993
Expires 6/30/2017

Real-time license verification is available at sos.georgia.gov/PLB

STATE OF GEORGIA
Brian P. Kemp, Secretary of State
Board of Architects and Interior Designers
Registered Architect

License No. RA008046 Status: Active

Stanley Leonard Jennings
135 Scarlett Oak Way
Fayetteville GA 30214

Issued: 3/3/1993
Expires: 6/30/2017

Real-time license verification is available at sos.georgia.gov/PLB

STATE OF GEORGIA
Brian P. Kemp, Secretary of State
Board of Architects and Interior Designers
Registered Architect
License No. RA008046 - Active

Stanley Leonard Jennings
135 Scarlett Oak Way
Fayetteville GA 30214

Issued: 3/3/1993
Expires 6/30/2017

Real-time license verification is available at sos.georgia.gov/PLB

FORM D3: GEORGIA PROFESSIONAL LICENSE CERTIFICATION

NOTE: Please complete this form for the work your firm will perform on this project.

Contractor's Name: Engineered Systems & Services, LLC

Performing work as: Prime Contractor ____ Sub-Contractor X

Professional License Type: Engineers & Land Surveyors

Professional License Number: PEF005372

Expiration Date of License: 6/30/2018

I certify that the above information is true and correct and that the classification noted is applicable to the Bid for this Project.

Signed: _____

Date: 4/5/2017

(ATTACH COPY OF LICENSE)

STATE OF GEORGIA
Brian P. Kemp, Secretary of State
State Board of Engineers and Land Surveyors
Engineer Firm

License No. PEF005372 Status: Active

Engineered Systems & Services, LLC
2950 Horizon Park Drive
Suite B
Suwanee GA 30024

Expires: 6/30/2018
Issued: 5/14/2008

Real-time license verification is available at sos.georgia.gov/PLB

STATE OF GEORGIA

COUNTY OF FULTON

FORM E: LOCAL PREFERENCE AFFIDAVIT OF BIDDER/OFFEROR

I hereby certify that pursuant to Fulton County Code Section 102-377, the Bidder/Offeror BuildSmart Enterprises, LLC is eligible to receive local preference points and has a staffed, fixed, physical, place of business located within Fulton County and has had the same for at least one (1) year prior to the date of submission of its proposal or bid and has held a valid business license from Fulton County or a city within Fulton County boundaries for the business at a fixed, physical, place of business, for at least one (1) year prior to the date of submission of its proposal or bid.

Affiant further acknowledges and understands that pursuant to Fulton County Code Section 102-377, in the event this affidavit is determined to be false, the business named herein shall be deemed "non-responsive" and shall not be considered for award of the applicable contract.

BuildSmart Enterprises, LLC (Affix corporate seal here, if a corporation)
(BUSINESS NAME)

1072 W. Peachtree Street NW #7621, Atlanta, GA 30309
(FULTON COUNTY BUSINESS ADDRESS)

Managing Principal & Executive Team Leader
(OFFICIAL TITLE OF AFFIANT)

Darrell P. Stallings
(NAME OF AFFIANT)

(SIGNATURE OF AFFIANT)

Sworn to and subscribed before me this 20th day of April, 2017.

Notary Public:

County: Fulton

Commission Expires: 12-28-18

TRACY M STALLINGS NOTARY PUBLIC FULTON CO., GEORGIA MY COMMISSION EXPIRES DEC. 28 2018

FULTON COUNTY

BUSINESS OCCUPATIONAL TAX CERTIFICATE

(NOT TRANSFERABLE)

Expiration Date	License Number	Date Issued
December 31, 2017	1501035936	March 17, 2017

BUILDSMART ENTERPRISES LLC
1072 WEST PEACHTREE STREET NORTHWEST
#7621
ATLANTA, GA 30309

165 KLONDIKE STREET SOUTHWEST
ATLANTA, GA 30331

VALID ONLY FOR BUSINESS SHOWN ABOVE

ACCOUNT NUMBER	TYPE OF BUSINESS NAICS DESCRIPTION	PRIMARY NAICS NUMBER	FEE CLASS
333116	Administrative Management and General Management Consulting Services	541611	14

FOR OPERATION IN UNINCORPORATED AREAS, SUBJECT TO ZONING RESTRICTIONS AND ALL OTHER RESOLUTIONS OF THE BOARD OF COUNTY COMMISSIONERS, FULTON COUNTY, GEORGIA

ISSUED BY:

Sharon Whitmore

SHARON WHITMORE
ASSISTANT FINANCE DIRECTOR

RDS
Issuing Authority

Questions regarding this certificate should be addressed to RDS at (800) 556-7274

POST THIS CERTIFICATE IN A CONSPICUOUS LOCATION

STATE OF GEORGIA

COUNTY OF FULTON

FORM E: LOCAL PREFERENCE AFFIDAVIT OF BIDDER/OFFEROR

I hereby certify that pursuant to Fulton County Code Section 102-377, the Bidder/Offeror (Subcontractor) J.W. Robinson & Associates, Inc. is eligible to receive local preference points and has a staffed, fixed, physical, place of business located within Fulton County and has had the same for at least one (1) year prior to the date of submission of its proposal or bid and has held a valid business license from Fulton County or a city within Fulton County boundaries for the business at a fixed, physical, place of business, for at least one (1) year prior to the date of submission of its proposal or bid.

Affiant further acknowledges and understands that pursuant to Fulton County Code Section 102-377, in the event this affidavit is determined to be false, the business named herein shall be deemed "non-responsive" and shall not be considered for award of the applicable contract.

J.W. Robinson & Associates, Inc. (Affix corporate seal here, if a corporation)
(BUSINESS NAME)

1020 Ralph David Abernathy Boulevard
Atlanta, Georgia 30312
(FULTON COUNTY BUSINESS ADDRESS)

President
(OFFICIAL TITLE OF AFFIANT)

Jeffrey L. Robinson, AIA, NOMA
(NAME OF AFFIANT)

(SIGNATURE OF AFFIANT)

Sworn to and subscribed before me this 20th day of April, 2017.

Notary Public: Patricia Dawn Crawford

County:

Commission Expires:

NOTARY PUBLIC PATRICIA DAWN CRAWFORD DEKALB COUNTY, GA Exp Nov 16, 2019

CITY OF ATLANTA, GEORGIA - DEPARTMENT OF FINANCE

OCCUPATION TAX REGISTRATION CERTIFICATE

VALID ONLY WHEN REGISTRATION TAX REQUIREMENTS ARE PAID

CERTIFICATE NO. : 177779 LGB

BUSINESS NAME : J.W. ROBINSON & ASSOCIATES INC

LOCATION : 1020 RALPH D ABERNATHY BV SW ATLANTA, GA 30310

DATE ISSUED : 04/18/2017 EXPIRES ON : 12/31/2017

BUSINESS NAME AND ADDRESS:

J.W. ROBINSON & ASSOCIATES INC
1020 RALPH D ABERNATHY BV SW
ATLANTA, GA 30310

2017

J. Anthony "Jim" Beard, CTP
Chief Financial Officer

DISPLAY THIS CERTIFICATE IN A CONSPICUOUS PLACE AT BUSINESS LOCATION
NOT VALID IF BUSINESS LOCATION DOES NOT COMPLY TO CITY ZONING REQUIREMENTS
NOT VALID UNLESS ACCOMPANIED BY STATE OF GEORGIA LICENSE(S) IF REQUIRED

CERTIFICATE NOT TRANSFERABLE

IF BUSINESS TERMINATES OR CHANGES OWNERSHIP DURING CERTIFICATE PERIOD,
CALL THE BUSINESS LICENSE OFFICE AT 404-330-6270
THIS CERTIFICATE IS SUBJECT TO ALL APPLICABLE ORDINANCES AND LAWS

STATE OF GEORGIA

COUNTY OF FULTON

FORM E: **LOCAL PREFERENCE AFFIDAVIT OF BIDDER/OFFEROR**

I hereby certify that pursuant to Fulton County Code Section 102-377, the Bidder/Offeror (Subcontractor) The Dragon Group is eligible to receive local preference points and has a staffed, fixed, physical, place of business located within Fulton County and has had the same for at least one (1) year prior to the date of submission of its proposal or bid and has held a valid business license from Fulton County or a city within Fulton County boundaries for the business at a fixed, physical, place of business, for at least one (1) year prior to the date of submission of its proposal or bid.

Affiant further acknowledges and understands that pursuant to Fulton County Code Section 102-377, in the event this affidavit is determined to be false, the business named herein shall be deemed "non-responsive" and shall not be considered for award of the applicable contract.

The Dragon Group (Affix corporate seal here, if a corporation)
(BUSINESS NAME)

3924 Northpoint Blvd. Building #100, Suite #60, Atlanta, GA 30313
(FULTON COUNTY BUSINESS ADDRESS)

Partner
(OFFICIAL TITLE OF AFFIANT)

Randall C. Dragon
(NAME OF AFFIANT)

Randall C. Dragon
(SIGNATURE OF AFFIANT)

Sworn to and subscribed before me this 20 day of April, 2017.

Notary Public: Shaunna Wells

County: Dekalb

Commission Expires: 08·13·2018

SHAUNNA A WELLS
NOTARY PUBLIC
Dekalb County
State of Georgia
My Comm. Expires Aug. 13, 2018

STATE OF GEORGIA

COUNTY OF FULTON

FORM F: SERVICE DISABLED VETERAN PREFERENCE AFFIDAVIT OF BIDDER/OFFEROR

I hereby certify that pursuant to Fulton County Code Section 102-378, the Bidder/Offeror N/A is eligible to receive Service Disabled Veteran Business Enterprise preference points and is independent and continuing operation for profit, performing a commercially useful function, and is 51 percent owned and controlled by one or more individuals who are disabled as a result of military service who has been honorably discharged, designated as such by the United States Department of Veterans Affairs.

Affiant further acknowledges and understands that pursuant to Fulton County Code Section 102-378, in the event this affidavit is determined to be false, the business named herein shall be deemed "non-responsive" and shall not be considered for award of the applicable contract.

N/A (Affix corporate seal here, if a corporation)
(BUSINESS NAME)

(FULTON COUNTY BUSINESS ADDRESS)

(OFFICIAL TITLE OF AFFIANT)

(NAME OF AFFIANT)

(SIGNATURE OF AFFIANT)

Sworn to and subscribed before me this _____ day of _____, 20____.

Notary Public: _____

County: _____

Commission Expires: _____

GEORGIA CORPORATIONS DIVISION

GEORGIA SECRETARY OF STATE
BRIAN P. KEMP

HOME (/)

BUSINESS SEARCH

BUSINESS INFORMATION

Business Name:	BuildSmart/Tebarco, a Joint Venture, LLC	Control Number:	16069642
Business Type:	Domestic Limited Liability Company	Business Status:	Active/Compliance
NAICS Code:	Any legal purpose	NAICS Sub Code:	
Principal Office Address:	1690 Bluegrass Lakes Pkwy, Alpharetta, GA, 30004, USA	Date of Formation / Registration Date:	7/20/2016
State of Formation:	Georgia	Last Annual Registration Year:	2017

REGISTERED AGENT INFORMATION

Registered Agent Name:	TERRELL BARDEN, AGT
Physical Address:	1690 Bluegrass Lakes Pkwy, Fulton, ALPHARETTA, GA, 30004, USA

Back

Filing History Name History

Return to Business Search

Report a Problem?

EXHIBIT I

OFFICE OF CONTRACT COMPLIANCE FORMS

EXHIBIT A – PROMISE OF NON-DISCRIMINATION

"Know all persons by these presents, that I/We (Darrell P. Stallings),
Name

Vice Chairman
Title

BuildSmart/Tebarco, A Joint Venture LLC
Firm Name

Hereinafter "Company", in consideration of the privilege to bid on or obtain contracts funded, in whole or in part, by Fulton County, hereby consent, covenant and agree as follows:

1) No person shall be excluded from participation in, denied the benefit of, or otherwise discriminated against on the basis of race, color, national origin or gender in connection with any bid submitted to Fulton County for the performance of any resulting there from,

2) That it is and shall be the policy of this Company to provide equal opportunity to all businesses seeking to contract or otherwise interested in contracting with this Company without regard to the race, color, gender or national origin of the ownership of this business,

3) That the promises of non-discrimination as made and set forth herein shall be continuing in nature and shall remain in full force and effect without interruption,

4) That the promise of non-discrimination as made and set forth herein shall be made a part of, and incorporated by reference into, any contract or portion thereof which this Company may hereafter obtain,

5) That the failure of this Company to satisfactorily discharge any of the promises of non-discrimination as made and set forth herein shall constitute a material breach of contract entitling the Board to declare the contract in default and to exercise any and all applicable rights and remedies, including but not limited to cancellation of the contract, termination of the contract, suspension and debarment from future contracting opportunities, and withholding and/or forfeiture of compensation due and owning on a contract; and

6) That the bidder shall provide such information as may be required by the Director of Purchasing & Contract Compliance pursuant to Section 102.436 of the Fulton County Non-Discrimination in Purchasing and Contracting Policy.

NAME: Darrell P. Stallings **TITLE:** Vice Chairman

SIGNATURE: Darrell P. Stallings

ADDRESS: 1690 Bluegrass Lakes Parkway, Alpharetta, GA 30004

PHONE NUMBER: (678) 409-6523
(770) 475-5552 **EMAIL:** dstallings@buildsmartenterprises.com

EXHIBIT C - SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION

If the bidder/proposer intends to subcontract any portion of this scope of work/service(s), this form **must be** completed and **submitted with the bid/proposal.** All prime bidders/proposers **must** submit Letter(s) of Intent (Exhibit D) for all subcontractors who will be utilized under the scope of work/services prior to contract execution.

Prime Bidder/Proposer Company Name BuildSmart/Tebarco, A Joint Venture LLC

ITB/RFP Name & Number: 17RFP020717K-EC

1. My firm, as Prime Bidder/Proposer on this scope of work/service(s) is☒, is not ☐a minority or female owned and controlled business enterprise. (Please indicate below the portion of work, including, percentage of bid/proposal amount that your firm will carry out directly):
   $140,407.00 or 5.25 %

2. This highlighted information below must be completed and submitted with the bid/proposal if a **joint venture (JV)** approach is to be undertaken. Please provide JV breakdown information below and attach a copy of the executed Joint Venture Agreement.

   JV Partner(s) information:

Business Name	**Business Name**	**Business Name**
BuildSmart Enterprises, LLC	Tebarco Mechanical Corporation	
% of JV 45%	**% of JV** 55%	**% of JV**
Ethnicity AA	**Ethnicity** WHITE	**Ethnicity**
Gender MALE	**Gender** MALE	**Gender**
Phone# (678) 409-6523	**Phone#** (770) 475-5552	**Phone#**

3. Sub-Contractors (including suppliers) to be utilized in the performance of this scope of work/service(s), if awarded, are:

SUBCONTRACTOR NAME: J.W. ROBINSON & ASSOCIATES
ADDRESS: 1020 RALPH DAVID ABERNATHY BOULEVARD, ATLANTA GA 30312
PHONE (404) 753-4129
CONTACT PERSON: JEFF ROBINSON
ETHNIC GROUP*: AA COUNTY CERTIFIED** FULTON, CITY OF ATLANTA
WORK TO BE PERFORMED: ARCHITECTUAL DESIGN
DOLLAR VALUE OF WORK: $ 185,300 PERCENTAGE VALUE: 6.9 %

***Ethnic Groups: African American (AABE); Asian American (ABE); Hispanic American (HBE); Native American (NABE); White Female American (WFBE); **If yes, please attach copy of recent certification.**

SUBCONTRACTOR NAME: ENGINEERED SYSTEMS & SERVICES
ADDRESS: 2950 HORIZON PARK DR., SUITE B, SUWANEE, GA 30024

PHONE: (770) 810-5700
CONTACT PERSON: JONATHAN RUCKER
ETHNIC GROUP*: AA COUNTY CERTIFIED**
WORK TO BE PERFORMED: MECHANICAL & ELECTRICAL ENGINEERING

DOLLAR VALUE OF WORK: $ (INCLUDED IN J.W. ROBINSON AMOUNT) PERCENTAGE VALUE: %

SUBCONTRACTOR NAME: THE DRAGON GROUP
ADDRESS: 384 NORTHYARDS BLVD., BLDG. 100, SUITE 60
ATLANTA, GA 30313
PHONE:
CONTACT PERSON: RANDALL DRAGON
ETHNIC GROUP*: AA COUNTY CERTIFIED**
WORK TO BE PERFORMED: LEED CONSULTING

DOLLAR VALUE OF WORK: $ 93,900 PERCENTAGE VALUE: 3.5 %

SUBCONTRACTOR NAME: OTHER SUBCONTRACTORS TO BE DETERMINED
ADDRESS: AFTER DESIGN

PHONE:
CONTACT PERSON:
ETHNIC GROUP*: COUNTY CERTIFIED**
WORK TO BE PERFORMED:

DOLLAR VALUE OF WORK: $ PERCENTAGE VALUE: %

SUBCONTRACTOR NAME:
ADDRESS:

PHONE:
CONTACT PERSON:
ETHNIC GROUP*: COUNTY CERTIFIED**
WORK TO BE PERFORMED:

DOLLAR VALUE OF WORK: $ PERCENTAGE VALUE: %

***Ethnic Groups: African American (AABE); Asian American (ABE); Hispanic American (HBE); Native American (NABE); White Female American (WFBE); **If yes, please attach copy of recent certification.**

Total Dollar Value of Subcontractor Agreements: ($)	TBD

Total Percentage of Subcontractor Value: (%)	TBD

CERTIFICATION: The undersigned certifies that he/she has read, understands and agrees to be bound by the Bid/Proposer provisions, including the accompanying Exhibits and other terms and conditions regarding sub-contractor utilization. The undersigned further certifies that he/she is legally authorized by the Bidder/Proposer to make the statement and representation in this Exhibit and that said statements and representations are true and correct to the best of his/her knowledge and belief. The undersigned understands and agrees that if any of the statements and representations are made by the Bidder/Proposer knowing them to be false, or if there is a failure of the intentions, objectives and commitments set forth herein without prior approval of the County, then in any such event the Contractor's acts or failure to act, as the case may be, shall constitute a material breach of the contract, entitling the County to terminate the Contract for default. The right to so terminate shall be in addition to, and in lieu of, any other rights and remedies the County may have for other defaults under the contract.

Signature: _____ **Title:** Vice Chairman

Business or Corporate Name: BuildSmart/Tebarco, A Joint Venture LLC

Address: 1690 Bluegrass Lakes Parkway, Alpharetta, GA 30004

Telephone: (678) 409-6523 or (770) 475-5552

Fax Number: (678) 892-8320

Email Address: dstallings@buildsmartenterprises.com

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% of JV 45%	**% of JV** 55%	**% of JV**
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Gender MALE	**Gender** MALE	**Gender**
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CONTACT PERSON: JEFF ROBINSON
ETHNIC GROUP*: AA COUNTY CERTIFIED** FULTON, CITY OF ATLANTA
WORK TO BE PERFORMED: ARCHITECTURAL DESIGN
DOLLAR VALUE OF WORK: $ 185,300 PERCENTAGE VALUE: 6.9 %

***Ethnic Groups: African American (AABE); Asian American (ABE); Hispanic American (HBE); Native American (NABE); White Female American (WFBE); **If yes, please attach copy of recent certification.**

EXHIBIT A – PROMISE OF NON-DISCRIMINATION

"Know all persons by these presents, that I/We (Darrell P. Stallings),
Name

Vice Chairman
Title

BuildSmart/Tebarco, A Joint Venture LLC
Firm Name

Hereinafter "Company", in consideration of the privilege to bid on or obtain contracts funded, in whole or in part, by Fulton County, hereby consent, covenant and agree as follows:

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PHONE NUMBER: (678) 409-6523
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ADDRESS: 2950 HORIZON PARK DR., SUITE B, SUWANEE, GA 30024

PHONE: (770) 810-5200
CONTACT PERSON: JONATHAN RUCKER
ETHNIC GROUP*: AA COUNTY CERTIFIED**
WORK TO BE PERFORMED: MECHANICAL & ELECTRICAL ENGINEERING

DOLLAR VALUE OF WORK: $ (INCLUDED IN J.W. ROBINSON AMOUNT) PERCENTAGE VALUE: %

SUBCONTRACTOR NAME: THE DRAGON GROUP
ADDRESS: 384 NORTHYARDS BLVD., BLDG. 100, SUITE 60
ATLANTA, GA 30313
PHONE:
CONTACT PERSON: RANDALL DRAGON
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WORK TO BE PERFORMED: LEED CONSULTING

DOLLAR VALUE OF WORK: $ 93,900 PERCENTAGE VALUE: 3.5 %

SUBCONTRACTOR NAME: OTHER SUBCONTRACTORS TO BE DETERMINED
ADDRESS: AFTER DESIGN

PHONE:
CONTACT PERSON:
ETHNIC GROUP*: COUNTY CERTIFIED**
WORK TO BE PERFORMED:

DOLLAR VALUE OF WORK: $ PERCENTAGE VALUE: %

SUBCONTRACTOR NAME:
ADDRESS:

PHONE:
CONTACT PERSON:
ETHNIC GROUP*: COUNTY CERTIFIED**
WORK TO BE PERFORMED:

DOLLAR VALUE OF WORK: $ PERCENTAGE VALUE: %

***Ethnic Groups: African American (AABE); Asian American (ABE); Hispanic American (HBE); Native American (NABE); White Female American (WFBE); **If yes, please attach copy of recent certification.**

Total Dollar Value of Subcontractor Agreements: ($)	TBD

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Business or Corporate Name: BuildSmart/Tebarco, A Joint Venture LLC

Address: 1690 Bluegrass Lakes Parkway, Alpharetta, GA 30004

Telephone: (678) 409-6523 or (770) 475-5552

Fax Number: (678) 892-8320

Email Address: dstallings@buildsmartenterprises.com

EXHIBIT J

RISK MANAGEMENT INSURANCE PROVISIONS FORM

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 7/7/2017

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Yates Insurance Agency 2800 Century Parkway NE Suite 300 Atlanta GA 30345-	**CONTACT NAME:** **PHONE (A/C, No, Ext):** 404-633-4321 **FAX (A/C, No):** 404-633-1312 **E-MAIL ADDRESS:** certs@yatesins.com
INSURED BUILAJO-01 BuildSmart/TEBARCO, A Joint Venture, LLC 1690 Bluegrass Lakes Parkway Alpharetta GA 30005-	**INSURER(S) AFFORDING COVERAGE** / **NAIC #** INSURER A : Westfield Insurance Company 24112 INSURER B : Hartford Underwriters Insuranc 30104 INSURER C : Gemini Insurance Company 10833 INSURER D : Great American Insurance Compa 22136 INSURER E : INSURER F :

COVERAGES **CERTIFICATE NUMBER:** 250253824 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY X PRO-JECT LOC OTHER:	Y	Y	CWP5264337	3/3/2017	3/3/2018	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG $	$1,000,000 $500,000 $2,500 $1,000,000 $2,000,000 $2,000,000
A	AUTOMOBILE LIABILITY ANY AUTO OWNED AUTOS ONLY X HIRED AUTOS ONLY SCHEDULED AUTOS X NON-OWNED AUTOS ONLY			CWP5264337	3/3/2017	3/3/2018	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) $	$1,000,000 $ $ $
A	X UMBRELLA LIAB X OCCUR EXCESS LIAB CLAIMS-MADE DED X RETENTION $-0-	Y	Y	CWP5264337	3/3/2017	3/3/2018	EACH OCCURRENCE AGGREGATE $	$5,000,000 $5,000,000
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N: Y / N/A		6S60UB 7H957145	3/4/2017	3/4/2018	X PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $1,000,000 $1,000,000 $1,000,000
C D	Professional Liability Builders Risk			HPM-DP00355-00 IMPE237270-00	7/1/2017 7/3/2017	7/1/2018 7/3/2018	2,000,000 per Claim Ded $2,500/Special	2,000,000 2,675,368

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Subject to policy terms, conditions, forms, and exclusions, the insurance coverages afforded by the policies above include the following when required by written contract for the certificate holder and/or entities listed below: Blanket Additional Insured in regards to General Liability for ongoing and completed operations, Lessors of Leased Equipment, Umbrella Liability; Blanket Primary and Non-Contributory in regards to General Liability and Umbrella; Blanket Waiver of Subrogation in regards to General Liability and Umbrella Liability. Per Project Aggregate applies to the General Liability.

See Attached...

CERTIFICATE HOLDER

Fulton County Government
130 Peachtree Street
Suite 1168
Atlanta GA 30303

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Brian K. Hughes

AGENCY CUSTOMER ID: BUILAJO-01

LOC #:

ADDITIONAL REMARKS SCHEDULE

AGENCY	NAMED INSURED
Yates Insurance Agency	BuildSmart/TEBARCO, A Joint Venture, LLC 1690 Bluegrass Lakes Parkway Alpharetta GA 30005-
POLICY NUMBER	
CARRIER / NAIC CODE	EFFECTIVE DATE:

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: 25 FORM TITLE: CERTIFICATE OF LIABILITY INSURANCE

FORMS:
CG2010 (04/13) - Additional Insured – Owners, Lessees or Contractors
CG2037 (04/13) - Additional Insured – Owners, Lessees or Contractors – Completed Operations
CG7137 (11/12) - Signature Series – Commercial General Liability Contractors Endorsement
CG2503 (05/09) - Designated Construction Project General Aggregate Limit
CU2403 (09/00) - Waiver of Transfer of Rights of Recovery Against Others to Us
CU7034 (09/11) - Primary and Noncontributory Coverage Endorsement - Automatic Status When Required By Contract

Re: #17RFP020717K-EC, Design/Build Services for Library CIP Renovations – Group 4
Entity Fulton County Government.