

PROJECT MANUAL
FOR
Renovations & Additions to the
Georgetown County Headquarters
Library

Bid No. 22-035



**GEORGETOWN COUNTY,
SOUTH CAROLINA**

VOLUME I - BIDDING AND CONTRACT DOCUMENTS
VOLUME II - GENERAL REQUIREMENTS & TECHNICAL SPECIFICATIONS

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ARCHITECTS, LLP

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SECTION 00010
INVITATION FOR BIDS

Time Line: Invitation for Bid #22-035

Item	Date	Time	Location*
Advertised Date of Issue:	Friday, June 17, 2022	n/a	n/a
(Mandatory) Pre-Bid Conference & Site Inspection	Wednesday, June 29, 2022	9:00AM ET	Georgetown Library†
Material Substitution Cut-Off Time:	Friday, July 15, 2022	3:00PM ET	n/a
Inquiry Cut-Off Time:	Friday, July 15, 2022	3:00PM ET	n/a
Bids Must be Received on/or Before:	Wednesday, July 27, 2022	3:00PM ET	Electronic
Public Bid Opening & Tabulation:	Wednesday, July 27, 2022	3:00PM ET	Hybrid
County Council Consideration for Award	Tuesday, August 23, 2022	5:30PM ET	Chambers

† **Georgetown County Headquarters Library, 405 Cleland St., Georgetown, SC 29440.**

*At the time of this posting, bid openings may be performed virtually, in-person, or by a hybrid method, see above location for method specified. A virtual meeting link will be posted under the bid number before the bid opening time so that members of the public may attend the meeting virtually. Vendors may also now attend the meeting in person at the Georgetown County Historic Courthouse, Purchasing Conference Room, 129 Screven St., Suite 239, 29440.

Renovations & Additions to the Georgetown County Headquarters Library
GEORGETOWN COUNTY, SOUTH CAROLINA
Bid #22-035

All bids must be submitted electronically through the Purchasing Department’s Vendor Registry webpage. Please click on the following link <http://www.georgetowncountysc.org/172/Purchasing> for instructions on how to submit bids electronically through this system. As always, emailed/faxed bids will not be accepted. Your bid must be submitted electronically through Georgetown County's Purchasing Vendor Registry page to ensure it remains sealed until the scheduled bid opening date and time.

Any scheduled bid openings will still be opened at the designated date and time as listed in the bid document or related addendum. However, at the time of this bid issuance, these bid openings may be conducted virtually, in-person, or by a hybrid method (both virtually and in person). See the timeline above for location and method specified. As always, bid openings will be accompanied by at least one witness and bid tabulation results will be posted online for the public’s viewing after the bid opening.

Purchasing Contacts: Nancy Silver
Phone: 843-545-3076
Fax: 843-545-3500
E-mail: nsilver@gtcounty.org

This solicitation does not commit Georgetown County to award a contract, to pay any cost incurred in the preparation of the bid, or to procure or contract for goods or services. It is the responsibility of each bidder to see that they submit their bids on or before, the date and time specified for the bid opening. No bid will be accepted thereafter. Georgetown County reserves the right to reject any or all bids and to waive any informalities and technicalities in the bid process.

1) Scope of Work/Project Description:

Base Bid:

The scope of work shall consist of an approximately 4,000 sf new wing and the interior renovation of the existing Georgetown Library headquarters which is approximately 18,000 sf. The project includes relocation of parking lot and associated drainage. The site is located at 405 Cleland St., Georgetown, SC, 29440.

This project will include alternates, allowances and unit prices as defined in Section 01200 Price and Payment Procedures and summarized below.

Alternate #1: To pressure wash the existing masonry façade and associated sidewalks, clean the window glazing, remove existing sealant at all aluminum storefront windows and replace with appropriate backer rod and sealant in accordance with 07900 Joint Sealers.

Alternate #2: Along the rear of the existing building, point up the mortar joints at existing cracks and install new bricks where wood plywood board is on the exterior.

Allowances: Allowances for this project total \$379,500.00. See allowances schedule under Volume II, Division 1, Section 01200 Price and Payment Procedures for full details.

2) General Conditions and Requirements:

The work performed under this Contract shall include, but may not be limited to: the furnishing of all labor, materials, equipment and services, whether specifically mentioned or not, that is required to complete the Construction of the Work of the project. Contractor shall follow any and all local, state of South Carolina, and federal laws that are applicable to this project, whether specifically mentioned or not.

3) This project is receiving partial funding from the American Rescue Plan Act (ARPA). Therefore, the County's usual Local Vendor Preference shall be waived for this solicitation. See Section 01100 D for more information regarding grant requirements.

4) A **MANDATORY Pre-Bid Conference** will be held in the Georgetown County Headquarters Library located at 405 Cleland, Georgetown, SC 29440 on **Wednesday, June 29, 2022 at 9:00 AM** Eastern Time. Only those companies with a representative registered in attendance will be qualified to submit a Bid.

5) Site Inspection:

- a) The bidder is expected to have become familiar with and take into consideration, site conditions which may affect the work and to check all dimensions at the site.
- b) Each bidder shall acquaint themselves thoroughly as to the character and nature of the work to be done. Each bidder furthermore shall make a careful examination of the site of the work and inform themselves fully as to the difficulties to be encountered in performance of the work, the facilities for

delivering, storing and placing materials and equipment and other conditions relating to construction and labor.

- c) The bidder shall examine the premises and the site and compare them with any applicable drawings and specifications. He/she shall familiarize themselves with the existing conditions such as obstructive area levels and any problems related to erecting the required systems.
- d) No plea of ignorance of conditions that exist or may hereafter exist on the site of the work, or difficulties that may be encountered in the execution of the work, as a result of failure to make necessary investigations and examinations, will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill in every detail all the requirements of the contract documents and to complete the work for the consideration set forth therein, or as a basis for any claim whatsoever.
- e) Insofar as possible, the Contractor, in carrying out his/her work, must employ such methods or means as will not cause interruption of or interference with the work of any other Contractor, or County personnel at the site.
- f) When boring data is provided by the Owner, the Bidder shall assume responsibility for any conclusions he/she may draw from such data. (S)he may employ his/her own consultants to analyze available information and shall be responsible for any conclusions drawn from that information. The cost of such employment shall be borne solely by the Bidder.

6) **Bid Security/Bid Bonding:**

- a) Each bid must be accompanied by a Bid Bond, for an amount equal to five per-cent (5%) of the total base bid as a guarantee that if the bid is accepted, the required Contract will be executed within fifteen (15) days after receipt of written notice of formal award of Contract. Bids not including such a bid bond will not be considered.
- b) The successful proposer must provide a Performance Bond from a surety company qualified to do business under the laws of the State of South Carolina in the amount of 100 percent (100%) of the contract amount, within fifteen (15) days after receipt of written notice of formal award of the Contract.
- c) The successful offeror must provide a Payment and Material Bond from a surety company qualified to do business under the laws of the State of South Carolina in the amount of 100 percent (100%) of the contract amount, within fifteen (15) days after receipt of written notice of formal award of Contract.
- d) Should any Surety on the Construction Contract be determined unsatisfactory at any time by the Owner, notice will be given the Contractor who shall immediately provide a new Surety, satisfactory to the Owner and at no additional cost to the Owner. The Contract shall not be operative nor will any payments be due or paid until approval of the bonds has been made by the Owner.

- e) The Bidder shall require the Attorney-in-Fact who executes the required bonds, on behalf of the Surety, to affix thereto a certified and current copy of his Power of Attorney, indicating the monetary limit of such power.
 - f) The cost of the bonds shall be included in the construction portion of the base bid.
- 7) The Construction Contract will be awarded to the firm or team of firms submitting the lowest and most responsive and responsible proposal as determined by the County. Georgetown County reserves the right to reject any and all proposals for any reason at any time prior to execution of the Contract. It further reserves the right to waive any and all technicalities and formalities in the proposal process as well as accept in whole or in part such proposal or proposals where it deems it advisable in protection of the best interests of the County and to hold all proposals for examination for a period not to exceed ninety (90) calendar days. The selected Contractor is encouraged to utilize, to the extent possible, local firms and trades from within Georgetown County.

Throughout this Project Manual all references to the “Owner” shall mean the County of Georgetown, SC or its Designated Representative.

END OF SECTION 00010

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SECTION 00100

Instructions for Bidders

Bid #22-035, Renovations & Additions to the Georgetown County Headquarters Library

These are general instructions and conditions that accompany each bid package. If more specific instructions are given in the individual bid package, those instructions should prevail.

1. Submission of Questions

Questions must be submitted in writing via electronic mail, facsimile or postal mail to the Issuing Officer no later than the "Deadline for Questions" cutoff identified in the Bid Timeline on page eight (8) in order to generate an official answer. All written questions will receive an official written response from the Georgetown County Purchasing Office (GCPO) and will become addenda to the solicitation.

GCPO reserves the right to reject or deny any requests made by the provider.

Impromptu, unwritten questions are permitted and verbal answers may be provided, but are only intended as general direction and will not represent the official GCPO position. The only official position of GCPO is that which is stated in writing and issued in the solicitation as addenda thereto.

No other means of communication, whether oral or written, shall be construed as a formal or official response/statement and may not be relied upon. SEND QUESTIONS TO:

Nancy Silver, Purchasing Officer
Post Office Box 421270, Georgetown, SC 29442-4200
Fax: (843) 545-3500
Email: nsilver@gtcounty.org

2. Sealed bids to provide CFUND Road Construction-Proverbs Lane shall be received electronically through the County's Vendor Registry webpage until the cut-off time shown in the bid timeline of this document. Bids will then be promptly opened at the designated time by the Buyer. Bids that are not received prior to the stated opening date and time will be considered NON RESPONSIVE. An official authorized to bind the offer must sign all bids submitted.
3. Inclement Weather/Closure of County Courthouse
Due to the current COVID-19 situation, County offices at the time of this bid posting remain open but are limited to the public. Bid openings at the time of this issuance are being conducted virtually and may occur from an alternate secure and/or remote location as needed.
4. This solicitation does not commit Georgetown County to award a contract, to pay any cost incurred in the preparation of the bid, or to procure or contract for goods or services. It is the responsibility of each bidder to see that the Georgetown County Purchasing Office receives bids on, or before, the date and time specified for the bid opening. No bid will be accepted thereafter. The County assumes no responsibility for delivery of bids that are mailed.

Georgetown County reserves the right to reject any or all bids and to waive any informalities and technicalities in the bid process.

5. **NON EXCLUSIVITY**

Nothing herein is intended nor shall be construed as creating any exclusive arrangement with Contractor. Any resulting contract shall not restrict the County from acquiring similar, equal or like goods and/or services from other entities or sources, when Staff determines internally that this resulting action is in the best interest of Georgetown County.

6. No Bidder may submit more than one bid. Multiple bids for different manufacturers but represented by the same firm will not be accepted. Bids offered directly from manufacturers shall indicate if a local dealer/representative will be involved.

7. Definitions:

- a) The terms “Proposer”, “Offeror”, “Vendor” or “Bidder” refer to those parties who are submitting sealed responses for the work set forth in this document to the OWNER, as distinct from a sub-bidder who provides a bid to the Bidder. The term “Contractor” refers to the successful Bidder.
- b) The term “Renovation”, “Construction” or “Work” refers to the complete set of services as specified in this document, in every aspect.
- c) The terms “Owner” and “County” refer to the County of Georgetown, South Carolina.
- d) Where the words “shall” or “must” are used, it signifies an absolute minimum function or capacity that, if not satisfied, may result in disqualification.
- e) Where the words “should”, “may”, or “is desirable” are used, it signifies desirable, but not mandatory functions or capacities. Bidders who are able to provide these functions or capacities may be evaluated more favorably than those who cannot.

8. Correction or Withdrawal of Bids; Cancellation of Awards

An offeror must submit in writing a request to either correct or withdraw a bid to the Procurement Officer. Each written request must document the fact that the offeror’s mistake is clearly an error that will cause him substantial loss.

- a) Correction of awards : An offeror shall not be permitted to correct a bid mistake after bid opening that would cause such offeror to have the low bid unless the mistake in the judgment of the Procurement Officer is clearly evident from examining the bid document; for example, extension of unit prices or errors in addition.
- b) Cancellation of awards prior to performance: When it is determined after an award has been issued but before performance has begun that Georgetown County’s requirements for the goods or services have changed or have not been met, the award or contract may be canceled and either re-awarded or a new solicitation issued.

9. Faxed or E-mailed bids will not be accepted by Georgetown County.

10. If you need any reasonable accommodation for any type of disability in order to participate in this procurement, please contact the purchasing office as soon as possible.

11. Title VI of the Civil Rights Act of 1964: Georgetown County hereby gives public notice that it is the policy of the agency to assure full compliance with Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987, Executive Order 12898 on Environmental Justice, and related statutes and regulations in all programs and activities. Title VI requires that no person in the United States of America shall, on the grounds of race, color, or national origin, be excluded from the participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which Georgetown County receives federal financial assistance. Any person who believes they have been aggrieved by an unlawful discriminatory practice under Title VI has a right to file a formal complaint with Georgetown County. Any such complaint must be in writing and filed with Georgetown County's Title VI Coordinator within one hundred and eighty (180) days following the date of the alleged discriminatory occurrence. For more information, or to obtain a Title VI Discriminatory Complaint Form, please see our website at <http://www.gtcounty.org/about/faqs.html>.
12. Any deviations from the specifications or modification of this bid and any extra or incidental work or reductions in work shall be set forth in writing and signed by both parties prior to making such change. Any increase or decrease in the bid price resulting from such change shall be included in writing.
13. Exceptions: The bidder shall list on a separate sheet of paper any variations from, or exceptions to, the conditions and specifications of this bid. This sheet shall be labeled "Exception(s) to Bid Conditions and Specifications," and shall be attached to the bid. When Proposers find instances where they must take exception with certain requirements or specifications of the bid, all exceptions shall be clearly identified. Written explanations shall include the scope of the exceptions, the ramifications of the exceptions for the County of Georgetown, and a description of the advantage to be gained or disadvantages to be incurred by the County as a result of these exceptions. If none, write "NONE".
14. Georgetown County reserves the right to reject any or all bids, and to waive as an informality any irregularities contained in any bid as may be deemed in the best interest of the County. Georgetown County further reserves the right to reject any bid submitted, at its sole option, that the vendor may not be able to meet the service requirements of the bid.
15. Publicity releases: contractor agrees not to refer to award of any resulting contract in commercial advertising in such a manner as to state or imply that the products or services provided are endorsed or preferred by the user.
16. Material Safety Data Sheets: The County of Georgetown will not receive any materials, products, or chemicals which may be hazardous to an employee's health unless accompanied by a Material Data Sheet when received.
17. Ownership of Copyright: All right, title and interest in all copyrightable materials which vendor shall create in the performance of its obligations hereunder shall be the property of the procurer. Vendor agrees to assign and hereby does assign any and all interest it has in and to such material to procurer. Vendor agrees, upon the request of procurer to execute all papers and perform all other such acts necessary to assist procurer to obtain and register copyrights on such materials. Where applicable, works of authorship created by the vendor in the performance of its obligations hereunder, shall be considered "works for hire" as defined in

the U.S. Copyright Act.

18. **Ownership of Documents:** Any reports, studies, photographs, negatives or other documents prepared by vendor in the performance of its obligations shall be the exclusive property of the procurer and all such material shall be remitted to the procurer by the vendor upon completion, termination or cancellation of this order. Vendor shall not use, willingly allow or cause to have such material used for any purpose other than performance of its obligations under this order without the prior written consent of the procurer.
19. **Affirmative Action:** The contractor will take affirmative action in complying with all Federal and State requirements concerning fair employment and employment of the handicapped, and concerning the treatment of all employees, without regard or discrimination by reason of age, race, color, religion, sex, national origin or physical handicap. The following are incorporated herein by reference: 41 C.F.R. 60-1.4, 60-250.4 and 60-741.4.
20. Inclusion and participation of disadvantaged, small, and local business entities is strongly encouraged, but minimum participation standards are not in effect for this project.
21. **Federally Funded Construction Contracts Over \$2,000:**
 - a) **Davis-Bacon Requirements.** These contracts need to include a provision for compliance with the Davis-Bacon Act (40 USC 276a to a—7) and the Department of Labor implementing regulations (29 CFR Part 5). Under this Act, Contractors are required to include the contract provisions in Section 5.5 (a) of 29 CFR Part 5, and to pay wages to laborers and mechanics at a rate not less than the minimum wages specified in the wage determination made by the Secretary of Labor. In addition, Contractors shall be required to pay wages not less than the minimum wages specified in the wage determination made by the Secretary of Labor. In addition, Contractors shall be required to pay wages not less often than once a week. Current Wage Determination for Georgetown County in South Carolina is available on-line at:
https://beta.sam.gov/search?index=wd&keywords=Georgetown&sort=-relevance&wdType=dbra&page=1&date_filter_index=0&inactive_filter_values=false.
 - b) **Contract Work Hours and Safety Standard Act Requirements.** The contracts must include a provision for compliance with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 USC 327-330) as supplemented by the Department of Labor regulations (29 CFR Part 5). Under Section 103 of the Act, each Contractor shall be required to compute the wages of every mechanic and laborer on the basis of a standard workweek of 40 hours. Work in excess of the standard workweek is permissible provided that the worker is compensated at a rate not less than one times the basic rate of pay for all hours worked in excess of 40 hours in the workweek. Section 107 of the Act is applicable to construction work and provides that no laborer of mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to health and safety as determined under construction, safety and health standards promulgated by the Secretary of Labor. These requirements do not apply to the purchases of supplies, materials, or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.
 - c) **Copeland “Anti-Kickback” Act Requirements.** All construction contracts over

\$2,000.00 must include a provision for compliance with the Copeland “Anti-Kickback” Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR Part 3). This act provides that each Contractor shall be prohibited from inducing, by any means, persons employed in the construction, completion, or repaid of public work to give up any part of their compensation.

22. Bidders must clearly mark as "confidential" each part of their bid which they consider to be proprietary information that could be exempt from disclosure under section 30-4-40, Code of Laws of South Carolina 1976, as amended (Freedom of Information Act). If any part is designated as confidential, there must be attached to that part an explanation of how this information fits within one or more categories listed in section 30-4-40. The County reserves the right to determine whether this information should be exempt from disclosure and no legal action may be brought against the County or its agents for its determination in this regard.

23. CERTIFICATION REGARDING DRUG-FREE WORKPLACE:

The contractor certifies that the vendor(s) will provide a “drug-free workplace” as that term is defined in Section 44-107-30 of the Code of Laws of South Carolina, 1976, as amended, by the complying with the requirements set forth in title 44, Chapter 107.

24. Certification of Non-Segregated Facilities

The federally-assisted construction contractor certifies that he does not maintain or provide, for his employees, any segregated facilities at any of his establishments and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally-assisted construction contractor certifies that he will not maintain or provide, for his employees, segregated facilities at any of his establishments and that he will not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The federally-assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this Contract.

As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms, and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated on the basis of race, color, religion, or national origin because of habit, local custom, or any other reason. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause and that he will retain such certifications in his files.

25. Nothing herein is intended to exclude any responsible vendor, his product or service or in any way restrain or restrict competition. On the contrary, all responsible vendors are encouraged to bid and their bids are solicited.

26. Acknowledgement of Addenda

Each contractor is responsible to verify the number of total addenda issued prior to bid. Failure to acknowledge all addenda may disqualify the bidder. All addenda are posted by the County at the website located at www.georgetowncountysc.org, select “Bid Opportunities” from the Quick Links box, then “View Current Bid Solicitations”. It is each proposer’s

responsibility to verify that all addenda have been received and acknowledged.

27. Form and Style of Bids

- a) Bids in the form of sealed proposals for the Construction of the Project will be received until the time and the date stated in Section 00010, Notice to Bidders.
- b) The Bid shall be submitted on the Bid Form provided; no other form is acceptable.
- c) The successful Bidder will be required to provide verified breakdown of costs of all services and work in a manner acceptable to the Owner.
- d) All blanks on the Bid Form shall be filled in, either typed or printed in ink. The person signing the bid shall initial all corrections or erasures.
- e) Where so indicated on the Bid Form, the Bid Sum shall be expressed in both words and figures; in case of a discrepancy between the two, the Sums expressed in words shall govern.
- f) Bid unit price on quantity specified -- extend and show total. In case of errors in extension, unit prices shall govern.
- g) Bidder shall quote all Alternates in the Bidding Documents. If Bidder fails to bid on all Alternates, then his/her Bid may be considered irregular, non-responsive and may be disqualified.
- h) Bids containing qualifications will be considered irregular, non-responsive and may be disqualified.
- i) A Bid Form submitted by a partnership shall list the names of all partners and shall be signed in the partnership name by one of the members of the partnership who is authorized to sign for the partnership.
- j) A Bid Form submitted by a corporation shall be executed in the legal name of the corporation, followed by the state of incorporation and signed by the President or Vice President or other authorized officer. The name of each person signing the Bid Form shall be typed or printed below the signature.
- k) When the person signing for a corporation is other than the President or Vice President and when requested by the Owner, a resolution or other satisfactory evidence of the authority of the officer signing in behalf of the corporation shall be furnished for the Owner's records. The name of each person signing the Bid Form shall be typed or printed below the signature.

28. Insurance

The successful bidder shall procure, maintain, and provide proof of, insurance coverage for injuries to persons and/or property damage as may arise from or in conjunction with, the work performed on behalf of the County by the bidder, his agents, representatives, employees or subcontractors. Proof of coverage as contained herein shall be submitted fifteen (15) days prior to the commencement of work and such coverage shall be maintained by the bidder for

the duration of the contract period; for occurrence policies.

a. General Liability

Coverage shall be as broad as: Comprehensive General Liability endorsed to include Broad Form, Commercial General Liability form including Products/Completed Operations.

1. Minimum Limits

General Liability:

\$1,000,000 General Aggregate Limit
\$1,000,000 Products & Completed Operations
\$1,000,000 Personal and Advertising Injury
\$1,000,000 Each Occurrence Limit
\$50,000 Fire Damage Limit
\$5,000 Medical Expense Limit

b. Automobile Liability

Coverage sufficient to cover all vehicles owned, used, or hired by the bidder, his agents, representatives, employees or subcontractors.

1. Minimum Limits

Automobile Liability:

\$1,000,000 Combined Single Limit
\$1,000,000 Each Occurrence Limit
\$5,000 Medical Expense Limit

c. Workers' Compensation

Limits as required by the Workers' Compensation Act of SC. Employers Liability, \$1,000,000.

d. Owners' & Contractors' Protective Liability

Policy will be in name of County. Minimum limits required are \$1,000,000.

e. Professional Liability (a/k/a Errors and Omissions)

Minimum limits are \$1,000,000 per occurrence.

f. Coverage Provisions

1. All deductibles or self-insured retention shall appear on the certificate(s).
2. The County of Georgetown, its officers/ officials, employees, agents and volunteers shall be added as "additional insured" as their interests may appear. This provision does not apply to Professional Liability or Workers' Compensation/Employers' Liability.
3. The offeror's insurance shall be primary over any applicable insurance or self-insurance maintained by the County.
4. Shall provide 30 days written notice to the County before any cancellation, suspension, or void of coverage in whole or part, where such provision is reasonable.
5. All coverage for subcontractors of the bidder shall be subject to all of the requirements stated herein.
6. All deductibles or self-insured retention shall appear on the certificate(s) and shall be subject to approval by the County. At the option of the County,

either; the insurer shall reduce or eliminate such deductible or self-insured retention; or the bidder shall be required to procure a bond guaranteeing payment of losses and related claims expenses.

7. Failure to comply with any reporting provisions of the policy(s) shall not affect coverage provided the County, its officers/officials, agents, employees and volunteers.
8. The insurer shall agree to waive all rights of subrogation against the County, its' officers/officials, agents, employees or volunteers for any act, omission or condition of premises which the parties may be held liable by reason of negligence.
9. The bidder shall furnish the County certificates of insurance including endorsements affecting coverage. The certificates are to be signed by a person authorized by the insurance company(s) to bind coverage on its' behalf, if executed by a broker, notarized copy of authorization to bind, or certify coverage must be attached.
10. All insurance shall be placed with insurers maintaining an A.M. Best rating of no less than an A:VII. If A.M. Best rating is less than A:VII, approval must be received from County's Risk Officer.

29. Workman's Compensation Coverage

Georgetown County, SC will require each contractor and service provider to maintain on file with the purchasing officer, a current Certificate of Insurance showing limits as required by the Workers' Compensation Act of SC: Employers Liability, \$1,000,000.

The law also recognizes "statutory employees." These are employees who work for a subcontractor who may be working for a business or another contractor. Employers should inquire whether or not a subcontractor working for them has workers' compensation insurance, regardless of the number of employees employed by the subcontractor. If the subcontractor does not, the subcontractor's injured employees would be covered under the employer's workers' compensation insurance. If the subcontractor does not carry workers' compensation insurance, then the owner or the principal contractor would be liable just as if the subcontractor's employee was one of their employees.

For answers to additional questions, visit the SC Worker's Compensation Commission website, at:

<http://www.wcc.sc.gov/Pages/FrequentlyAskedQuestions.aspx#emp1>

30. Builders' Risk Insurance. Contractor shall provide and maintain, during the progress of the work and until execution of the Certificate of Contract Completion, a Builder's Risk Insurance policy to cover all work in the course of construction including false work, temporary buildings, scaffolding, and materials used in the construction process (including materials designated for the project but stored off site or in transit). The coverage shall equal the total completed value of the work and shall provide recovery at replacement cost.

- a) Such insurance shall be on a special cause of loss form, providing coverage on an open perils basis insuring against the direct physical loss of or damage to covered property, including but not limited to theft, vandalism, malicious mischief, earthquake,

tornado, lightning, explosion, breakage of glass, collapse, water damage, and testing/startup.

- b) Coverage shall include coverage for "soft costs" (costs other than replacement of building materials) including, but not limited to, the reasonable extra costs of the architect/engineer and reasonable Contractor extension or acceleration costs. This coverage shall also include the reasonable extra costs of expediting temporary and permanent repairs to, or permanent replacement of, damaged property. This shall include overtime wages and the extra cost of express or other means for rapidly transporting materials and supplies necessary to the repair or replacement.
- c) The policy shall specifically permit and allow for partial occupancy by the owner prior to execution of the final Certification of Contract Completion, and coverage shall remain in effect until all punch list items are completed.
- d) The Builder's Risk deductible may not exceed \$5,000. The Contractor or subcontractor experiencing any loss claimed under the Builder's Risk policy shall be responsible for that loss up to the amount of the deductible.
- e) If Contractor is involved solely in the installation of material and equipment and not in new building construction, the Contractor shall provide an Installation Floater policy in lieu of a Builder's Risk policy. The policy must comply with the provisions of this paragraph.

31. Hold Harmless Clause

The Contractor shall, during the term of the contract and including any warranty period, indemnify, defend, and hold harmless the County, its officials, employees, agents, architect and his consultants, and representatives thereof from all suits, actions, or claims of any kind, including attorney's fees, brought on account of any personal injuries, damages, or violations of rights, sustained by any person or property in consequence of any neglect in safeguarding contract work or on account of any act or omission by the contractor or his employees, or from any claims or amounts arising from violation of any law, bylaw, ordinance, regulation or decree. The vendor agrees that this clause shall include claims involving infringement of patent or copyright.

32. Condition of Items

All items shall be new, in first class condition, including containers suitable for shipment and storage, unless otherwise indicated herein. Verbal agreements to the contrary will not be recognized.

33. Workmanship and Inspection

All work under this contract shall be performed in a skillful and workmanlike manner. The County may, in writing, require the Contractor to remove any employee from work that the County deems incompetent or careless.

Further, the County may, from time to time, make inspections of the work performed under this contract. Any inspection by the County does not relieve the Contractor from any responsibility regarding defects or other failures to meet the contract requirements.

34. Invoicing and Payment

The Contractor shall submit invoices or progress payments on a frequency to be determined, as agreed upon by the County, for each payment requested. Such invoice or progress payment shall also include a detailed breakdown of all charges. All such invoices or progress payments will be paid within thirty (30) days unless any items thereon are questioned, in which event payment will be withheld pending verification of the amount claimed and the validity of the claim. The firm shall provide complete cooperation during any such investigation. All invoices shall be forwarded to the following address:

County of Georgetown
Accounts Payable, Finance Dept.
P.O. Box 421270
Georgetown, SC 29442-4200

An IRS W-9 form must be on file with the Purchasing Office before any payment will be issued.

35. South Carolina Sales Tax

The County of Georgetown, SC is not exempt and pays the appropriate SC sales tax on all applicable purchases.

36. Assignment of Contract

This contract may not be assigned in whole or part without the written consent of the Purchasing Officer.

37. Termination

Subject to the provisions below, the contract may be terminated by the County upon sixty (60) days advance written notice to the other party; but if any work or service hereunder is in progress, but not completed as of the date of termination, then this contract may be extended upon written approval of the County until said work or services are completed and accepted.

a. Termination for Convenience

In the event that this contract is terminated or canceled upon request and for the convenience of the County, without the required sixty (60) days advance written notice, then the County shall negotiate reasonable termination costs, if applicable.

b. Termination for Cause

Termination by the County for cause, default or negligence on the part of the contractor shall be excluded from the foregoing provision; termination costs, if any, shall not apply. The sixty (60) days advance notice requirement is waived in the event of Termination for Cause.

c. Non-Appropriation:

It is understood and agreed by the parties that in the event funds are not appropriated in the current fiscal year or any subsequent fiscal years, this contract will become null and void and the County will only be required to pay for services completed to the satisfaction of the County.

38. Default

In case of default by the contractor, for any reason whatsoever, the County may procure the goods or services from another source and hold the contractor responsible for any resulting excess cost and may seek other remedies under law

39. Severability

In the event that any provision shall be adjudged or decreed to be invalid, such ruling shall not invalidate the entire Agreement but shall pertain only to the provision in question and the remaining provisions shall continue to be valid, binding and in full force and effect.

40. Applicable Laws

This Agreement shall be governed by and construed in accordance with the laws of the State of South Carolina, U.S.A.

41. Claims and Disputes:

All claims, disputes and other matters in question between parties arising out of, or relating to, this Agreement, or the breach thereof, shall be decided in the Circuit Court of the Fifteenth Judicial circuit in Georgetown County, South Carolina. By executing this Agreement, all parties specifically consent to venue and jurisdiction in Georgetown County, South Carolina and waive any right to contest jurisdiction and venue in said Court.

42. Rights of County

The County reserves the right to reject all or any part of any bid, waive informalities and award the contract to the lowest responsive and responsible bidder to best serve the interest of the County.

43. Award of Bid

In determining the lowest responsive and responsible bidder, in addition to price, there shall be considered the following:

- (a) The ability, capacity and skill of the bidder to perform the contract.
- (b) Whether the bidder can perform the contract within the time specified, without delay of interference.
- (c) The character, integrity, reputation, judgment, experience and efficiency of the bidder.
- (d) The quality of performance on previous contracts.
- (e) The previous and existing compliance by the bidder with laws and ordinances relating to the contract.

44. Notice of Award

A *Notice of Intent to Award* will be mailed to all respondents.

45. Protest

Bidders may refer to Sections 2-67, 2-73, and 2-74 of Ordinance #20-32, also known as the Georgetown County, South Carolina Purchasing Policy to determine their remedies concerning this competitive process. The failure to be awarded a bid shall not be valid grounds for protest.

46. Debarment

By submitting a bid, the offeror certifies to the best of its knowledge and belief, that it and its principals, sub-contractors and assigns are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal, State or local department or agency. A copy of the County's debarment procedure in accordance with Section 2-68 of Ordinance #20-32, also known as the Georgetown County, South Carolina Purchasing Policy is available upon request.

47. Firm Pricing for County Acceptance

Bid price must be firm for County acceptance for 90 days from bid opening date. "Discount

from list,” bids are not acceptable unless specifically requested.

48. Use of Brand Names (If Appropriate)

Unless otherwise stated in an Invitation for Bid, the name of a certain brand, make or manufacturer does not restrict bidders to the specific brand, make or manufacturer named; it conveys the general style, type, character, and quality of the article desired, and any article which the County in its sole discretion determines to be the equal of that specified, considering quality, workmanship, economy of operation, and suitability for the purpose intended, shall be accepted. Any catalog, brand name or manufacturer's reference used in bid invitation is descriptive - NOT restrictive - it is to indicate type and quality desired. Bids on brands of like nature and quality will be considered. If bidding on other than reference or specifications, bid must show manufacturer, brand or trade name, catalog number, etc. of article offered. If other than brand(s) specified is offered, illustrations and complete description must be submitted with bid. Samples may be required. If bidder makes no other bid and takes no exception to specifications or reference data, he will be required to furnish brand names, numbers, etc., as specified. Bidders must certify that item(s) bid upon meet and/or exceed specifications.

49. Permits

The successful Offeror must be responsible for obtaining all necessary city, county, and state permits/licenses and must comply with all local codes and ordinances. Copies of such permits/licenses shall be made available to the County upon request. Building contractors working within Georgetown County must also secure a Contractor's License from the Building Department. Work within the Georgetown City Limits may require a City Business License. For additional information, please review the "Forms and Fees" section of the Building and Planning web page at the link below:

<http://www.georgetowncountysc.org/building/default.html>

50. Environmental Management:

Vendor/Supplier/Contractor will be responsible for complying with all federal, state and local environmental regulations relating to transportation, handling, storage, spillage and any other aspect of providing the services specified herein, as applicable.

51. Bid Tabulation Results

Vendors wishing to view the bid tabulation results may visit the Georgetown County, SC website at: <http://www.georgetowncountysc.org>. Select "Bid Opportunities" from the Quick Links box, then "View Current Bid Solicitations", click on the "Expired" tab and double click the link under the individual bid listing.

52. The Bidder hereby certifies that he or she has carefully examined all of the Documents for the project, has carefully and thoroughly reviewed this Request for Bid/Quotation, has inspected the location of the project (if applicable), and understands the nature and scope of the work to be done; and that this Bid is based upon the terms, specifications, requirements, and conditions of the Request for Bid/ Documents. The Bidder further agrees that the performance time specified is a reasonable time, having carefully considered the nature and scope of the project as aforesaid.

53. Any attempt by the vendor to influence the opinion of County Staff or County Council by discussion, promotion, advertising, misrepresentation of the submittal or purchasing process or any procedure to promote their offer will constitute a violation of the vendor submittal conditions and will cause the vendor's submittal to be declared null and void.

54. Apparent omission of a detailed description concerning any point, shall be regarded as meaning the best commercial practice is to prevail and that only material and workmanship of the finest quality are to be used.

55. Response Clarification

Georgetown County reserves the right to request additional written or oral information from Bidders in order to obtain clarification of their Responses.

56. Due to the nature of funding for this project, the County's normal Local Vendor Preference Option is waived for this solicitation.

57. Bidding Documents

- a) Each Bidder shall carefully examine the Bidding and Contract Documents, General Requirements, Drawings and Technical Specifications and all addenda or other revisions and thoroughly familiarize themselves with the detailed requirements prior to submitting a Bid. Bidders shall promptly notify the Owner in writing of any ambiguity, inconsistency, error or omission, which they may discover upon examination of the Bidding and Contract Documents, Project Site and / or local conditions. The Owner shall make such interpretations, corrections or changes to the Bidding Documents and will reply to all questions submitted by the Bidders. The Owner will log all responses and issue an addendum as may be appropriate. The Owner will not be responsible for any oral instructions and / or responses. Interpretations, corrections or changes made in any other manner will not be binding. All addenda sent to Bidders will become a part of the Bidding and Contract Documents. All inquiries shall be directed in writing or transmitted by facsimile to the office of the Owner. No allowance will be made after Bids are received due to oversight and / or error by bidder.
- b) Each Bidder shall carefully review the Table of Contents and the List of Drawings in the Project Manual to determine if any instrument is missing from the Bidding Documents. Bidders shall promptly notify the Owner, in writing, of any discrepancy.
- c) Owner does not assume any responsibility for errors, omissions or misinterpretations resulting from the Bidder's use of incomplete Bidding Documents.

58. Substitutions and Product Options

Written requests for changes in products, materials, equipment and methods of construction required by the Contract Documents shall be submitted to the Owner prior to bidding in accordance with the timeline provided and using the Material Substitution Request form.

64. Liquidated Damages

Refer to *The Project Manual, Division 1, Section 01100, Summary, Section 1.8 Liquidated Damages.*

66. Allowances

Refer to *The Project Manual, Division 1, Section 01200, Price and Payment Procedures, Section 1.2 F.*

END OF SECTION 00100



Intent to Respond

REF: Bid #22-035, Renovations & Additions to the Georgetown County Headquarters Library

If your company intends to respond to this solicitation, please complete and promptly return this form. We also encourage you to visit <https://vrapp.vendorregistry.com/Bids/View/BidsList?BuyerId=80b55190-4fef-4799-912d-3459328cf6f3> and register as a new vendor. If you are an existing vendor, please make sure your profile is up-to-date with a valid contact name and email address on file.

It is not necessary to return any other portion of the bid documents if you are not bidding.

Failure to return the Intent to Respond shall not be sufficient cause to rule a submittal as non-responsive; nor does the return of the form obligate an interested party to submit a response. Georgetown County's efforts to directly provide interested parties with addenda or additional information are provided as a courtesy only, and do not alleviate the respondent from their obligation to verify they have received and considered all addenda. All addenda are published and available on the county website at www.gtcounty.org select "Bid Opportunities" under Quick Links.

Our firm **does** intend on responding to this solicitation.

Our firm **does not** intend on responding to this solicitation.

Company Name: _____

Address: _____

Contact Person: _____

Telephone: _____

FAX: _____

E-Mail: _____

How did you hear about this opportunity? _____

Reason if **not** responding: _____

Please return this completed form to Nancy Silver, Purchasing Officer

- by e-mail to nsilver@gtcounty.org
- or by FAX to (843)545-3500.



MATERIAL/PRODUCT SUBSTITUTION REQUEST

Bid #22-035, Renovations & Additions to the Georgetown County Headquarters Library

Date: _____

We hereby submit for your review the following PRODUCT SUBSTITUTION of the specified material for the above listed project.

Section: _____

Paragraph: _____

Specified Material: _____

Attached is complete technical data of the PRODUCT SUBSTITUTION, highlighted or underlined for easy reading, including laboratory test, as necessary, in duplicate. Included is complete information on changes to the Project Manual Documents required by the proposed PRODUCT SUBSTITUTION for its proper installation.

A) The Trade Contractor, under whose transmittal this information is sent, has reviewed the PRODUCT SUBSTITUTION and agrees it is applicable to this project in the location described and agrees to warrant/guarantee the use of the PRODUCT SUBSTITUTION in the same manner he would the Specified Product.

Yes No

If not, explain: _____

B) Does the PRODUCT SUBSTITUTION affect the dimensions shown on the Drawings in ANY WAY?

Yes No

If so, how? _____

C) Does the undersigned have the approval of the Manufacturer/Supplier to pay for any changes to the building design, including engineering and detailing costs, caused by the requested PRODUCT SUBSTITUTION?

Yes No

If so, to what extent? _____

D) What effect does the PRODUCT SUBSTITUTION acceptance have on other trades?

None Don't Know As follows:

E) Difference between proposed PRODUCT SUBSTITUTION and the Specified Product? BE SPECIFIC IN DESCRIPTION. (ASTM No., Size, Gauge, Material, Color Availability, Construction)

(Attach additional pages as required)

F) Manufacturer's guarantees and warranties of the PRODUCT SUBSTITUTION and the Specified Product?

Same Different (Explain)

G) What is the cost differential of the PRODUCT SUBSTITUTION in comparison to the Specified Product?

Same Less Expensive by \$ _____ More Expensive by \$ _____

I) The PRODUCT SUBSTITUTION has been verified by the undersigned with the Manufacturer/Supplier as meeting or exceeding the specifications of the Specified item.

Yes No Waiting for answer.

THE UNDERSIGNED Trade Contractor states that the function, appearance, and quality of the PRODUCT SUBSTITUTION are equivalent or superior to the specified item. In addition, I, as the Trade Contractor will assume all responsibility for any impact or delay the review and evaluation of the alternate product may cause. Your approval of the Substitute Product in no way will relieve me as the Trade Contractor of my responsibilities to conform with all requirements of the Contract Documents.

Submitted By: _____
Signature Printed

FOR USE BY ARCHITECT/ENGINEER:

RECEIVED TOO LATE NOT ACCEPTED APPROVED AS NOTED

FOR BIDDING ONLY, FINAL APPROVAL SUBJECT TO SUBMITTAL DATA IN ACCORDANCE WITH REQUIREMENTS OF CONTRACT DOCUMENTS.

DATE: _____

PRINTED NAME: _____

SIGNATURE: _____



SECTION 00300
EXHIBIT A - BID FORM
MANDATORY BID SUBMITTAL FORM

For: **Bid #22-035, Renovations & Additions to the Georgetown County Headquarters Library**

Name of Company Submitting Bid: _____

The undersigned, having visited the site of the Work and having familiarized themselves with local conditions affecting the design and cost of the work and with all requirements of the proposed Contract Documents, and duly issued Addenda to said documents, as acknowledged herein, propose to furnish and perform all labor, materials, necessary tools, expendable equipment, and all utility and transportation services necessary to perform and complete in a workmanlike manner all work required by said documents and Addenda.

- 1) **BASE BID:** Bidder / Proposer agrees to perform all of the work described in the specifications, including allowances, and shown on the drawings, for the sum of:

_____ \$ _____
(words shall govern)

- 2) **ALTERNATE #1:**

ADD _____ \$ _____
(words shall govern)

- 3) **ALTERNATE #2:**

ADD _____ \$ _____
(words shall govern)

- 4) For additional work authorized after signing the Contract, the amount of overhead and the amount of profit to be added to base costs of labor and materials shall be (10%) total for overhead and profit on work performed by the Contractor's own forces and (15%) total on work by Subcontractors.
- 5) **COMPLETION DATE:** Refer to *The Project Manual, Division 1, Section 01100, Summary, Section 1.10 Construction Timeline*
- 6) **LIQUIDATED DAMAGES:** Liquidated damages for this project shall be \$250.00 per calendar day for Contractor's failure to complete any key milestone by its intermediate completion date or the Substantial Completion date. Refer to *Division 1, Section 01100, 1.9, Liquidated Damages.*
- 7) The undersigned affirms that in making such Bid, neither he /she nor any company that they may represent, nor anyone in behalf of him / her or their company, directly or indirectly, has entered into any combination, collusion, undertaking or agreement with any other Bidder or Bidders to maintain the prices of said work, or any compact to prevent any other Bidder or Bidders from Bidding on said Contract or work and further affirms that such bid is made without regard or reference to any other Bidder or Proposer and without any agreement or understanding or combination either directly or indirectly with any other person or persons with reference to such Bidding in any way or manner whatsoever.
- 8) The undersigned, when notified of the acceptance of this Bid bid, does hereby agree to enter into a Contract with the Owner within five (5) calendar days from the date of the Notice of Award, for the execution of the work described within the period of time allocated, and he / she shall give a Performance Bond and Payment Bond, with good and sufficient surety.

- 9) The undersigned further agrees that if awarded the Contract he /she will commence the work within ten (10) calendar days after the date of the Notice of Award and that he / she will complete the work in accordance with the Summary Schedule and Key Milestones and Substantial Completion date set forth in the Bidding and Contract Documents or such amended date as may be granted. If the undersigned fails to complete the work as provided in the aforementioned schedule, then and in that event, he / she further expressly agrees that, for each day that any phase of work under this Contract remains uncompleted thereafter the Owner may deduct from the Contract price herein specified the stipulated sum of liquidated damages as provided for herein and retain that sum for failure of the undersigned to complete this Contract on or before the expiration of the period shown in the completion schedule.
- 10) The undersigned agrees that the Owner's damages caused by delay are not capable of being established and would be difficult to measure accurately and that the sums herein specified as liquidated damages are not a penalty, but represent the parties' estimate of the actual damages which the Owner would suffer per day if the work is not completed as scheduled.
- 11) In submitting this Bid, it is understood that the right is reserved by the Owner to waive any informality or irregularity in any Bid or Bid guaranty, to reject any and all Bids, to re-Bid, to award or refrain from awarding a contract for the work and to negotiate with the apparent qualified low responsive Bidder to such extent as may be beneficial to the Owner.
- 12) The undersigned attaches hereto a cashier's check, certified check or Bid Bond in the sum five percent (5%) of the total base bid payable to Georgetown County, as required in the Request for Bids, and the undersigned agrees that in case he / she fails within five (5) calendar days after Notice of Award of the Contract to him /her to enter into the Contract in writing and furnish the required Payment and Performance Bonds, with surety or sureties to be approved by Owner, and insurance policies or endorsements, the Owner may, as its option, determine that the undersigned has abandoned his / her rights and interest in such Bid and that the cashier's check, certified check, or Bid Bond accompanying his or her bid has been forfeited. Otherwise, the cashier's check, certified check, or Bid Bond shall be returned to the undersigned upon the execution of the Contract and acceptance of the bonds and insurance, or upon rejection of his / her Bid.
- 13) A Bid shall be considered unresponsive and shall be rejected if it fails to include fully executed statements or if the Bidder fails to furnish required data. When a determination has been made to award the Contract to a specific Contractor, such Contractor shall, prior to award, furnish such other pertinent information regarding his / her own employment policies and practices as well as those of his / her proposed prime contractor, subcontractors and consultants as the Owner may require.
- 14) The Bidder shall furnish similar statements executed by each of his / her prime contractor, first-tier and second-tier subcontractors and consultants whose contracts equal Ten Thousand Dollars (\$10,000.00) or more and shall obtain similar compliance by such prime contractor, subcontractors and consultants before awarding such contracts. No prime contractor or subcontract shall be awarded to any non-complying prime contractor and/or subcontractor.
- 15) It is understood and agreed that all workmanship and materials under all items of work are guaranteed for one (1) year from the date of Final Acceptance, unless otherwise specified.
- 16) The undersigned affirms that he / she has completed all of the blank spaces in the Bid Form, with an amount in words and numbers and agrees that where a discrepancy occurs between the prices quoted in words and/or in numbers the lowest figure quoted in words shall take precedence and govern when determining final costs or award of the Contract.
- 17) The undersigned affirms that wages not less than the minimum rates or wages, as predetermined for this project by the State of South Carolina were used in the preparation of this "Bid Form".
- 18) **REQUIRED FORMS:** There are specific forms required to be completed and submitted as part of the response to this Invitation for Bids (IFB). The omission, whether inadvertent or not, of any one or more of these forms may cause the Bidder's response to be disqualified. The following forms identified as Exhibits to this IFB, shall be included in the response:

- Exhibit A Bid Form
- Exhibit B Acknowledgement of Addenda
- Exhibit C Non-Collusion Affidavit
- Exhibit D List of Prime & Subcontractors
- Exhibit E Statement of Experience
- Exhibit F Unit Price Schedule
- Exhibit G Exceptions Page Form
- Bid Bond – 5% of total base bid

19) Project Mgr/NTP Contact Address: _____

20) Project Mgr/NTP Contact Person: _____

21) Telephone Number: _____ Fax Number : _____

22) E-Mail address _____

23) Remittance Address: _____

24) A/P Accounting Contact: _____

25) Telephone Number _____ Fax Number: _____

26) E-Mail address _____

27) Suspension and Debarment

Federal guidelines require grant recipients to obtain sufficient assurance that vendors are not suspended or debarred from participating in federal programs when contracts exceed \$25,000. By signing below you verify that no party to this agreement is excluded from receiving Federal contracts, certain subcontracts, and certain Federal financial and nonfinancial assistance and benefits, pursuant to the provisions of 31 U.S.C. 6101, note, E.O. 12549, E.O. 12689, 48 CFR 9.404, and each agency's codification of the Common Rule for Non-procurement suspension and debarment. [See <https://www.epls.gov/> for additional information.]

28) If the bid is accepted, the required Contract must be executed within fifteen (15) days after receipt of written notice of formal award of Contract.

29) Will you honor the submitted prices and terms for purchase by other departments within Georgetown County and/or by other government entities who participate in cooperative purchasing with Georgetown County, South Carolina?

Yes No

30) Acceptance of Invitation for Bid Content: The contents of the successful IFB/RFP are included as if fully reproduced herein. Therefore, the selected contractor must be prepared to be bound by his/her proposal as submitted.

31) RENEWAL OF CONTRACT

The continuation of the terms, conditions, and provisions of any resulting contract beyond the fiscal year is subject to approval and ratification by Georgetown County and appropriation of the necessary money to fund said contract for each succeeding year.

32) CERTIFICATION REGARDING DRUG-FREE WORKPLACE:

The undersigned certifies that the vendor listed below will provide a “drug-free workplace” as that term is defined in Section 44-107-30 of the Code of Laws of South Carolina, 1976, as amended, by the complying with the requirements set forth in title 44, Chapter 107.

Yes **No**

33) Any attempt by the vendor to influence the opinion of County Staff or County Council by discussion, promotion, advertising, misrepresentation of the submittal or purchasing process or any procedure to promote their offer will constitute a violation of the vendor submittal conditions and will cause the vendor’s submittal to be declared null and void.

34) The lowest or any proposal will not necessarily be accepted and the County reserves the right to award any portion thereof. I/We, the undersigned, hereby confirm that all the above noted documents for Bid/Request for Proposal No. 22-035 were received.

35) MINORITY PARTICIPATION [INFORMATION ONLY]

(a) Is the bidder a South Carolina Certified Minority Business?

Yes **No**

(b) Is the bidder a Minority Business certified by another governmental entity?

Yes **No**

If so, please list the certifying governmental entity: _____

(c) Will any of the work under this contract be performed by a SC certified Minority Business as a subcontractor?

Yes **No**

If so, what percentage of the total value of the contract will be performed by a SC certified Minority Business as a subcontractor? _____%

(d) Will any of the work under this contract be performed by a minority business certified by another governmental entity as a subcontractor?

Yes **No**

If so, what percentage of the total value of the contract will be performed by a minority business certified by another governmental entity as a subcontractor?
_____%

(e) If a certified Minority Business is participating in this contract, please indicate all categories for which the Business is certified:

Traditional minority

- Traditional minority, but female
- Women (Caucasian females)
- Hispanic minorities
- DOT referral (Traditional minority)
- DOT referral (Caucasian female)
- Temporary certification
- SBA 8 (a) certification referral
- Other minorities (Native American, Asian, etc.) _____

(If more than one minority contractor will be utilized in the performance of this contract, please provide the information above for each minority business.)

36) **ILLEGAL IMMIGRATION: Non-Construction (NOV. 2008):** (An overview is available at www.procurement.sc.gov) By signing your offer, you certify that you will comply with the applicable requirements of Title 8, Chapter 14 of the South Carolina Code of Laws and agree to provide to the State upon request any documentation required to establish either: (a) that Title 8, Chapter 14 is inapplicable to you and your subcontractors or sub-subcontractors; or (b) that you and your subcontractors or sub-subcontractors are in compliance with Title 8, Chapter 14. Pursuant to Section 8-14-60, "A person who knowingly makes or files any false, fictitious, or fraudulent document, statement, or report pursuant to this chapter is guilty of a felony, and, upon conviction, must be fined within the discretion of the court or imprisoned for not more than five years, or both." You agree to include in any contracts with your subcontractors language requiring your subcontractors to (a) comply with the applicable requirements of Title 8, Chapter 14, and (b) include in their contracts with the sub-subcontractors language requiring the sub-subcontractors to comply with the applicable requirements of Title 8, Chapter 14. [07-7B097-1]

37)

INFORMATION ONLY:

Our company accepts VISA government procurement cards.
If yes, list any upcharge for P-Card Payment? _____

Our company does not accept VISA government procurement cards.

38) Printed Name of person binding bid _____

39) Signature (X) _____

40) Date _____

NOTE: THE ENTIRE IFB PACKET NEED NOT BE RETURNED. Please be sure to provide all mandatory bid submittal forms as requested. Thank you.

[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK.]

EXHIBIT B

Bid #22-035

Renovations & Additions to the Georgetown County Headquarters Library



ADDENDUM ACKNOWLEDGEMENT

Mandatory Submittal Form

COMPANY NAME: _____

Addendum #1 Received Date: _____ Initialed By: _____

Addendum #2 Received Date: _____ Initialed By: _____

Addendum #3 Received Date: _____ Initialed By: _____

Addendum #4 Received Date: _____ Initialed By: _____

Addendum #5 Received Date: _____ Initialed By: _____

Addendum #6 Received Date: _____ Initialed By: _____

[THE REMAINDER OF THIS PAGE IS BLANK]



EXHIBIT C

**NON-COLLUSION AFFIDAVIT OF PRIME PROPOSER / BIDDER
Bid #22-035, Renovations & Additions to the Georgetown County Headquarters Library
(Mandatory Bid Submittal Form)**

COUNTY OF: _____)

STATE OF: _____)

_____ being first duly sworn, has made oath that they are the
(Print/Type Name of Person Authorized to Bind Company)

_____ of _____
(Print/Type Title-i.e. Owner, President, etc.) (Print/Type Company Name)

the party making the foregoing proposal that such proposal is genuine and not collusive or sham; that said Offeror has not colluded, conspired, connived, or agreed directly or indirectly, with any Offeror or person, to put in a sham Proposal, or that such other person shall refrain from submitting a proposal and has not in any manner, directly or indirectly sought by agreement or collusion, or communication or conference, with any person, to fix the proposal price of affiant or any other Offeror, or to fix any overhead, profit or cost element of said proposal price, or of that of any other Offeror or to secure any advantage against Owner or any person interested in the proposed Contract; and that all statements in said Proposal are true; and further, that such Offeror has not, directly or indirectly submitted this proposal, or the contents thereof, or divulged information or date relative to any association or to any member or agent thereof.

Signature of Offeror: _____

Sworn to and subscribed before me this _____ day of _____, 2022.

Official Signature of Notary: _____

Notary's Printed or Typed Name: _____

My Commission Expires: _____

Affix Notary Seal Below:



EXHIBIT D

LIST OF PRIME AND SUBCONTRACTORS

**Bid #22-035, Renovations & Additions to the Georgetown County Headquarters Library
(Mandatory Bid Submittal Form)**

The undersigned states that the following is a full and complete list of proposed prime contractor and subcontractors on this Project and the class of work to be performed by each, and that such list will not be added to nor altered without the written consent of the Owner.

**Prime Contractor, Subcontractor
Consultants and Address**

**Class of Work
to be Performed**

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Date: _____

Firm Name: _____

Signed: _____

Title: _____



EXHIBIT E

STATEMENT OF EXPERIENCE

**Bid #22-035, Renovations & Additions to the Georgetown County
Headquarters Library
(Mandatory Bid Submittal Form)**

The Bidder is requested to state below what work of similar scope and complexity he/she has successfully completed, and to provide references that will enable the Owner to judge his/her experience, skill and business standing and his/her ability to conduct the Work in conformance with the requirements of the Construction Contract Documents. The County requests a minimum of three (3) references from the Primary Contractor. The Bidder may print additional pages to provide additional references if they so choose.

Project and Location

Reference

1)		
2)		
3)		

Dated: _____

Firm Name: _____

Signed: _____

Title: _____

[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK.]



EXHIBIT F

UNIT PRICE SCHEDULE

Bid #22-035, Renovations & Additions to the Georgetown County Headquarters Library

(Mandatory Bid Submittal Form)

When changes in the work are ordered by the Owner, and such changes involve the following items, the following unit prices will be used to calculate adjustments to the Contract Sum. These unit prices shall be for the Work as specified, including all labor, materials, equipment, accessories, shipping, preparation, insurance, testing, overhead, profit, applicable taxes, permits, fees, warranties and all other associated costs for the finished and completed Work.

This list may not include all components necessary to provide a completed product, therefore any applicable items necessary to provide a completed product should be considered in your unit price response.

UNIT PRICE SCHEDULE

Unit Price Item	Unit	ADD	DEDUCT
Div. 2 Earthwork Fill Material: Mucking and removal of earthwork as per Section 01200, 1.10 – H	CY		
Div. 2 Earthwork Fill Material: Import and compacting of fill as per Section 01200, 1.10 – H	CY		

Date: _____

Firm Name: _____

Signed: _____

Title: _____



EXHIBIT F

EXCEPTIONS PAGE

**Bid #22-035, Renovations & Additions to the Georgetown County Headquarters Library
MANDATORY BID SUBMISSION FORM**

List any areas where you cannot or will not comply with the specifications or terms contained herein. If none, write "NONE".

END OF SECTION 00300



SECTION 00400

BID BOND

Submit one (1) original, Power of Attorney, and Agent’s Current South Carolina license.

STATE OF _____)

COUNTY OF _____)

KNOW ALL MEN BY THESE PRESENTS that we,

as Principal, and _____ as Surety, are held and firmly bound unto Georgetown County, hereinafter called the Owner, in the sum of _____ Dollars

(\$ _____) for the payment of which sum well and

to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally firmly by these presents.

WHEREAS, the Principal, on the _____ day of _____, 2022 entered into a certain Contract with the Owner, hereto attached, for Contract entitled **Bid #22-035,**

Renovations & Additions to the Georgetown County Headquarters Library

NOW THEREFORE, If the Principal shall not withdraw said Bid within One Hundred Twenty (120) calendar days after date of opening of the same, and shall within five (5) calendar days after the prescribed forms are presented to him/her for signature, enter into a written Contract with the Owner in accordance with the Bid as accepted, and give a Performance Bond and a Payment Bond with good and sufficient surety or sureties, as required by the Contract Documents, for the faithful performance and proper fulfillment of such Contract and for the proper payment of all persons furnishing labor or materials in connection therewith, or in the event or withdrawal of said Bid within the period specified, or in the event of failure to enter into such Contract and give such Bonds within the time specified, if the Principal shall pay the Owner the difference between the amount specified in said Bid and the amount of which the Owner may procure the required work and/or supplies, provided the latter amount be in excess of the former then the above obligations shall be void and of no effect; otherwise, to remain in full force and effect.

IN WITNESS WHEREOF, the Principal and Surety have hereunto caused this Bond to be duly executed and acknowledged by their appropriate officials as set forth below this _____ day of _____, 2022.

PRINCIPAL (If Sole Proprietor or Partnership)

(Firm Name)

ATTEST

By: _____
(SEAL)

Title (Sole Proprietor or Partner)

PRINCIPAL (If Corporation)

(Corporate Name)

By: _____
(President)

Attest: _____
(Secretary)

(Impress Corporate Seal)

COUNTERSIGNED BY
RESIDENT SOUTH CAROLINA
AGENT OF SURETY:

SURETY:

(Copy of Agent's current license

as issued by State of South Carolina
Insurance Commissioner

By: _____
Attorney-In-Fact

(Power of Attorney Must Be Attached)

(Impress Corporate Seal)

END OF SECTION 00400



SECTION 00600
PERFORMANCE BOND

BOND NO. _____

KNOW ALL MEN BY THESE PRESENTS that we, _____ as Principal, and _____ as Surety, are held and firmly bound unto Georgetown County, South Carolina hereinafter called the Obligee, in the Penal sum of _____ Dollars (\$ _____) for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally firmly by these presents.

WHEREAS, the Principal, on the _____ day of _____, 2022 entered into a certain Contract with the Owner, included herein, for the Contract entitled **Bid #22-035, Renovations & Additions to the Georgetown County Headquarters Library.**

NOW THEREFORE, the condition of this obligation is such that if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said Contract, and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then this obligation shall be void; otherwise, to remain in full force and effect.

Whenever the Principal shall be and is declared by the Owner to be in default under the Contract, or wherever the contract has been terminated by default of the Contractor, the Owner having performed the Owner's obligations hereunder, the Surety shall:

1. Complete the Contract in accordance with its terms and conditions, or at the Owner's sole option.
2. Obtain a Bid or Bids for submission to the Owner for completing the Contract in accordance with its terms and conditions, and upon determination by the Owner and Surety of the lowest responsible Bidder, arrange for a Contract between such Bidder and the Owner, and made available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost 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 amount set forth in the first paragraph hereof. 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 properly paid by the Owner to the Contractor.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Owner named herein or the successors or assignees thereof.

In the case of termination of the Contract, as provided in the Contract Documents, there shall be assessed against the Principal and Surety herein, all expenses, including design/engineering, geo-technical, surveying, and legal services incidental to collecting losses to the Owner under this Bond.

This Bond shall remain in full force and effect for such period or periods of time after the date of acceptance of the project by the Owner as are provided for in the Contract Documents, and the Principal hereby guarantees

to repair or replace for the said periods all work performed and materials and equipment furnished, which were not performed or furnished according to the terms of the Contract Documents. If no specific periods of warranty are stated in the Contract Documents for any particular item of work, material, or equipment, the Principal hereby guarantees the same for a minimum period of one (1) year from the date of final acceptance by the Owner.

The Surety shall permit arbitration and be ultimately responsible for the payment of any award.

IN WITNESS WHEREOF, the above bounden parties have caused this Bond to be signed and sealed by their appropriate officials as of the _____ day of _____, 2022.

PRINCIPAL

(Firm Name)

By: _____
(Title)

WITNESS

SURETY

(Firm Name)

By: _____
(Title)

WITNESS

END OF SECTION 00600



SECTION 00601

LABOR AND MATERIAL PAYMENT BOND

BOND NO. _____

KNOW ALL MEN BY THESE PRESENTS that we, _____ as Principal, and _____ as Surety, are held and firmly bound unto Georgetown County, South Carolina hereinafter called the Obligee, in the Penal sum of _____ Dollars (\$ _____) for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally firmly by these presents.

WHEREAS, the Principal, on the ____ day of _____, 2022 entered into a certain Contract with the Owner, included herein, for Contract entitled **Bid #22-035, Renovations & Additions to the Georgetown County Headquarters Library.**

NOW THEREFORE, the condition of this obligation is such that if the Principal shall promptly make payments to all persons supplying labor, materials and supplies used directly or indirectly by said Principal or his Subcontractors in the prosecution of the work provided for in said Contract, then this obligations shall be void; otherwise to remain in full force and effect, subject, however, to the following conditions:

1. This bond is executed for the purpose of complying with the applicable State of South Carolina Statutes and all acts amendatory thereof, and this Bond shall inure to the benefit of any and all persons supplying labor, material and supplies used directly or indirectly by the Principal or his Subcontractors in the prosecution of the work provided for in said Contract so as to give such persons a right of action to recover upon this Bond in a separate suit brought on this Bond. No right of action shall accrue hereunder to or for the use of any person except as such right of action may be given and limited by the applicable State of South Carolina Statutes.
2. In each and every suit brought against the Principal and Surety upon this Bond in which the plaintiff shall be successful, there shall be assessed therein against the Principal and Surety herein, in favor of the Plaintiff therein, reasonable counsel fees, which the Principal and Surety hereby expressly agree to pay as a part of the cost and expense of said suit.
3. A claimant, except a laborer, who is not in privity with the Principal and who has not received payment for his labor, materials, or supplies, shall, within forty-five (45) calendar days after beginning to furnish labor, materials, or supplies for the prosecution of the work, furnish the Principal with a notice that he intends to look to the bond for protection.
4. A claimant who is not in privity with the Principal and who has not received payment for his labor, materials or supplies shall, within ninety (90) calendar days after performance of the labor or after complete delivery of the materials or supplies, deliver to the Principal and to the Surety written notice of the performance of the labor or delivery of the materials or supplies and of the non-payment.
5. No action for the labor, materials, or supplies may be instituted against the Principal or the Surety unless both notices have been given. No action shall be instituted against the Principal or the Surety on the bond after one (1) year from the performance of the labor or completion of delivery of the materials or supplies.

The Surety shall permit arbitration and be ultimately responsible for the payment of any award.

IN WITNESS WHEREOF, the above bounden parties have caused this Bond to be signed and sealed by their appropriate officials as of the _____ day of _____, 2022.

PRINCIPAL

(Firm Name)

(Witness)

By: _____

(Title)

SURETY

(Firm Name)

(Witness)

By: _____

(Title)

END SECTION 00601

END OF VOLUME I

VOLUME II
SECTION 01100
SUMMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Contract description.
- B. Work by Owner.
- C. Owner supplied products.
- D. Contractor's use of site and premises.
- E. Future work.
- F. Work sequence.
- G. Owner occupancy.
- H. Specification Conventions.
- I. Liquidated Damages
- J. Construction Timeline
- K. Construction Rain Delays

1.2 CONTRACT DESCRIPTION

- A. Work of the Project includes construction of an approximately 4,000sf new wing and the interior renovation of the existing approximately 18,000sf library. Both the new wing and addition are one-story structures located on Cleland Street in Georgetown, SC. The project will include relocation of parking lot and associated drainage.
- B. Perform Work of Contract under a stipulated sum contract with Owner in accordance with Conditions of Contract.
- C. Work of each separate Contract is identified in the following and on Drawings.

1. Parking Lot Lights: Leased by Owner from Utility Company. Installed by Utility Company.
2. Existing overhead power line will be relocated by the City of Georgetown. General Contractor and Architect shall coordinate with the City for this relocation scheduling

D. **FUNDING:** There is partial funding from ARPA (American Rescue Plan Act) for the removal and replacement of the HVAC system and associated in the existing building. Once a successful bidder is established, this portion of the project will be broken out separately in the schedule of values. The monies allocated for this portion of work will be reviewed and finalized prior to awarding of contract to the successful low bidder.

1. **THE BREAKDOWN WITHIN THE SEPARATE SCHEDULE OF VALUES WILL INCLUDE:**
 - a. Removal of acoustical ceiling tile / lights and associated wiring and controls, ductwork and existing HVAC units and associated wiring
 - b. Installation of new HVAC units, associated wiring and controls, ductwork, new LED lights, new acoustic ceiling tiles and grid.
 - c. Associated supervision, overhead and profit and general conditions, building permit for this portion of work

A separate schedule of values for the ARPA work will be required.

1.3 WORK BY OWNER

- A. **The Owner will be responsible for the removal and relocation of all books.**
- B. Work under this contract includes:

1. Refer *The Project Manual, Division 1, Section 01200, Price and Payment Procedures, 1.2 Allowances* for construction related fees.
- C. Items noted NIC (Not in Contract), movable cabinets, furnishings, minor equipment, will be furnished and installed by Owner before the project is occupied.

1.4 OWNER SUPPLIED PRODUCTS

- A. Owner's Responsibilities:
1. Arrange for and deliver Owner-reviewed Shop Drawings, Product Data, and Samples, to Contractor.
 2. Arrange and pay for delivery to site.
 3. On delivery, inspect products jointly with Contractor.
 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:
1. Review Owner-reviewed Shop Drawings, Product Data, and Samples.
 2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
 3. Handle, store, install and finish products.
 4. Repair or replace items damaged after receipt.
 5. The Contractor will be responsible for final connections to all workstation that are indicated on the Electrical floor plans.
- C. Products furnished to site and installed by Owner:
1. Not Applicable
- D. Items furnished by Owner for installation by Contractor:
1. Not Applicable

1.5 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Limit use of site and premises to allow:
1. Owner occupancy.
 2. Work by Others and Work by Owner.
 3. Use of site and premises by the public is to be limited and controlled.

1.6 WORK SEQUENCE

- A. Construct Work in accordance with scheduling requirements as defined in *The Project Manual, Division 1, Section 01323, Network Analysis Schedule*.
- B. It is understood that the General Contractor will be fully responsible for coordination of all technology and FFE installation and any other item identified in *The Project Manual, Division 1, Section 01200, Price and Payment Procedures*.
- C. The project will be constructed in two phases.
 - 1. Phase 1 – construction of the new addition and associated parking lot. During this phase, the existing library facility and associated parking lot will remain open and accessible to the public.
 - 2. Phase 2 – the Owner will occupy the new addition, and the renovation to the existing facility will take place.
- D. The Contractor shall notify the Architect/Owner 48 hours prior to any interruption in power and/or access to the building.

1.7 SPECIFICATION CONVENTIONS

- A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

1.8 LIQUIDATED DAMAGES

- A. As defined in AIA Document A101-2007, Article 3.3 the liquidated damages relating to failure to achieve Substantial Completion on time as referenced in Section 1.10 Construction Timeline will be allocated at **two hundred and fifty dollars (\$250.00)** per day. The aforementioned liquidated damages are not a penalty, but rather a pre-agreed liquidation of losses incurred by the Owner due to failure of the Contractor to complete work as per agreed upon schedule.

1.9 CONSTRUCTION TIMELINE

- A. Substantial Completion: **310** calendar days after the issuance of the Notice to Proceed
- B. Final Completion: 30 calendar days after issuance of Substantial Completion

1.10 CONSTRUCTION RAIN DELAYS

- A. For the purpose of this contract, a total of five calendar days per month (non cumulative) shall be anticipated as adverse weather at the job site, and such time shall not be considered justification for an extension time. If in any month adverse weather develops beyond five days, the contractor shall be allowed to claim additional days to compensate for the excess weather delays, only to the extent of the impact on the approved construction schedule. The remedy for this condition is for an extension of time only, not money.
- B. Adverse weather due to rain accumulation shall be based on actual rain measured at the Georgetown County Airport, or at the job site. In order to qualify as an adverse weather, rain day in excess of the anticipated five calendar days, the rain gauge must register at least one-tenth an inch of precipitation on the date in question.

END OF SECTION

SECTION 01200
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cash allowances.
- B. Contingency allowances.
- C. Testing and inspection allowances.
- D. Schedule of values.
- E. Applications for payment.
- F. Change procedures.
- G. Defect assessment.
- H. Unit prices.
- I. Alternates.

1.2 CASH ALLOWANCES

- A. Costs Included in Cash Allowances: Cost of product to Contractor or Subcontractor, less applicable trade discounts.
- B. Costs Not Included in Cash Allowances But Included in Contract Sum/Price: Handling at site, including unloading, uncrating, and storage; protection of products from elements and from damage.
- C. Architect/Engineer Responsibilities:
 - 1. Consult with Contractor for consideration and selection of products, suppliers, and installers.
 - 2. Select products in consultation with Owner and transmit decision to Contractor.
 - 3. Prepare Change Order.
 - 4. Assist to obtain proposals from suppliers and installers and offer recommendations. All proposals will be delivered and/or copied to the office of the Architect prior to final decisions.
- D. Contractor Responsibilities:
 - 1. Assist Architect/Engineer in selection of products, suppliers and installers.

2. Upon notification of selection by Architect/Engineer, execute purchase agreement with designated supplier and installer. The Contractor shall not execute any agreements with an allowance supplier or subcontractor without written approval from the Architect.
 3. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
 4. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
- E. Differences in costs that are approved by Architect will be adjusted by Change Order. Any amounts remaining at close out will be refunded to the Owner.
- F. Allowances Schedule: The Architect reserves the right to assign a contract or purchase order to the General Contractor/Subcontractor. The General Contractor shall not issue a contract on the allowance without the prior approval of the Architect. The Owner will have no financial responsibility to the General Contractor if the above referenced procedures are not followed.

ALLOWANCE SCHEDULE

Division 1

Building Permit City of Georgetown

The stipulated sum for the City of Georgetown building permit to include building permit fee and plan review fee. \$21,000.00

All other fees and business licenses are to be included as part of the General Contractor's base bid.

2. Division 7

Roof Monitoring Services

The stipulated sum for the roof monitoring services for periodic inspections \$5,500.00

3. Section 08710

Doors, Frames & Door Hardware

Include the stipulated sum/price for the Standard Steel Doors/Frames, Wood Doors and Door Hardware as specified in Sections 08111, 08212 and 08710. Installation of all doors, frames and hardware is to be included as part of the General Contractor's base bid. \$42,000.00

4. Section 10440

Signage

Include the stipulated sum for interior signage \$5,000.00

5. Electronic Equipment

To include but not limited to:

\$25,000.00

To provide labor, materials and installation of electronic equipment to include computers, projectors, A/V equipment, security system, camera system

6. Furnishings, Fixtures and Equipment

Include the stipulated sum/price for furnishings, fixtures and equipment (all electrical connections of equipment and coordination should be included as part of the base bid.

\$250,000.00

7. Owner Contingency

A stipulated sum/price for use by the Owner to address unforeseen conditions. Written approval from the Architect must be obtained prior to any authorized allocation of funds.

\$25,000.00

8. Special Inspections/Testing

Testing will include the following:

\$6,000.00

Geotechnical Elements:

- Hand auger to verify allowable soil bearing pressure
- Monitor removal of top soil
- Soil compaction
- Monitor proof roll of building pad
- Verify compatibility of fill material
- Compaction testing

Structural Elements:

- Concrete Testing
- Foundation Slab Reinforcement Inspection
- Framing Inspection
- Fastener/Attachment of Plywood Sheathing Inspection

ALLOWANCE TOTAL \$379,500.00

1.3 ROOF MONITORING ALLOWANCES

- A. Costs Included in Roof Monitoring Allowances: Cost of engaging testing and inspecting agency; execution of tests and inspecting; and reporting results.

- B. Costs Not Included in Testing and Inspecting Allowance But Included in Contract Sum/Price:
 - 1. Costs of incidental labor and facilities required to assist testing or inspecting agency.
 - 2. Costs of testing services used by Contractor separate from Contract Document requirements.
 - 3. Costs of retesting upon failure of previous tests as determined by Architect/Engineer.

- C. Payment Procedures:
 - 1. Submit one copy of inspecting or testing firm's invoice with next application for payment.
 - 2. Pay invoice on approval by Architect/Engineer.

1.4 OWNER CONTINGENCY ALLOWANCES

- A. Include in the Contract, a stipulated sum/price for use upon Owner's instruction (as indicated on item #7 Owner Contingency above).

- B. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will not be included in Change Orders authorizing expenditure of funds from this Contingency Allowance. This shall be in base bid.

- C. Funds will be drawn from Contingency Allowance only by Change Order.

- D. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.5 TESTING AND INSPECTION -

- A. Costs Included in Testing and Inspecting: Cost of engaging testing and inspecting agency; execution of tests and inspecting; and reporting results.

- B. Costs Not Included in Testing and Inspecting But Included in Contract Sum/Price:
 - 1. Costs of incidental labor and facilities required to assist testing or inspecting agency.
 - 2. Costs of testing services used by Contractor separate from Contract Document requirements.
 - 3. Costs of retesting upon failure of previous tests as determined by Architect/Engineer.

- C. Payment Procedures:
 - 1. Submit one copy of inspecting or testing firm's invoice with next application for payment.

2. Pay invoice on approval by Architect/Engineer.

1.6 SCHEDULE OF VALUES

- A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702. Contractor's standard form or electronic media printout will be considered.
- B. Submit Schedule of Values in duplicate within fifteen days after date established in Notice to Proceed.
- C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify site mobilization, bonds and insurance as separate line items. Architect will require a breakdown of major items, i.e. rough-in electric below slabs, above slabs, fixtures, trim etc.
- D. Include in each line item, amount of Allowances specified in this section.
- E. Contractor overhead and profit shall be displayed as a separate line item and not incorporated within each line item.
- F. Revise schedule to list approved Change Orders, with each Application For Payment.

1.7 APPLICATIONS FOR PAYMENT

- A. Submit three copies of each application on **AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702**. Contractor's electronic media driven form can be approved upon review of compliance.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Submit updated construction schedule with each Application for Payment.
- D. Payment Period: Submit at intervals stipulated in the Agreement.
- E. Submit with transmittal letter as specified for Submittals in Section 01330 - Submittal Procedures.
- F. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
 1. Partial release of liens from major subcontractors and vendors.
 2. Affidavits attesting to off-site stored products.
 3. Construction progress schedules, revised and current as specified in Section 01323 Network Analysis Schedules.

1.8 CHANGE PROCEDURES

- A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

- B. The Architect/Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on AIA Form G710.
- C. The Architect/Engineer may issue a Proposal Request or Notice of Change including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change. Contractor will prepare and submit estimate within ten days.
- D. Contractor may propose changes by submitting a request for change to Architect/Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change, and effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors. Document requested substitutions in accordance with Section 01600 - Product Requirements.
- E. Stipulated Sum/Price Change Order: Based on Proposal Request or Notice of Change and Contractor's fixed] price quotation or Contractor's request for Change Order as approved by Architect/Engineer.
- F. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.
- G. Construction Change Directive: Architect/Engineer may issue directive, on AIA Form G713 Construction Change Directive signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.
- H. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Architect/Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.
- I. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
- J. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.
- K. Change Order Forms: AIA G701 Change Order.
- L. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.
- M. Correlation Of Contractor Submittals:
 - 1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
 - 2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

3. Promptly enter changes in Project Record Documents.

1.9 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct appropriate remedy or adjust payment.
- C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Architect/Engineer.
- D. Defective Work will be partially repaired to instructions of Architect/Engineer, and unit sum/price will be adjusted to new sum/price at discretion of Architect/Engineer.
- E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.
- F. Authority of Architect/Engineer to assess defects and identify payment adjustments is final.
- G. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from transporting vehicle.
 - 4. Products placed beyond lines and levels of required Work.
 - 5. Products remaining on hand after completion of the Work.
 - 6. Loading, hauling, and disposing of rejected products.

1.10 UNIT PRICES (For Work beyond the Scope of Work defined in the Contract Documents)

- A. Authority: Measurement methods are delineated in individual specification sections.
- B. Measurement methods delineated in individual specification sections complement criteria of this section. In event of conflict, requirements of individual specification section govern.
- C. Take measurements and compute quantities. Architect/Engineer will verify measurements and quantities.
- D. Unit Quantities: Quantities and measurements indicated in Bid Form are for contract purposes only. Quantities and measurements supplied or placed in the Work shall determine payment. Actual quantities provided shall determine payment.
 - 1. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at unit sum/prices contracted.
 - 2. When actual Work requires 25 percent or greater change in quantity than those quantities indicated, Owner or Contractor may claim for Contract Price adjustment.

- E. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application or installation of item of the Work; overhead and profit.
- F. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Architect/Engineer multiplied by unit sum/price for Work incorporated in or made necessary by the Work.
- G. Measurement Of Quantities:
 - 1. Weigh Scales: Inspected, tested and certified by applicable South Carolina Weights and Measures department within past year.
 - 2. Platform Scales: Of sufficient size and capacity to accommodate conveying vehicle.
 - 3. Metering Devices: Inspected, tested and certified by applicable South Carolina department within past year.
 - 4. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
 - 5. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
 - 6. Measurement by Area: Measured by square dimension using mean length and width or radius.
 - 7. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
 - 8. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.
- H. Unit Price Schedule: Reference Supplemental Bid Schedule Appendix C – List of Unit Prices
 - 1. **Division 2 Earthwork: Fill Material** - Mucking and removal of earthwork as required per written statement from the Geotechnical Engineer and as approved by the Architect beyond that specified in the Contract Documents. The amount shall be based on an aggregate minimum of 50 cubic yards for the project.
 - 2. **Division 2 Earthwork: Fill Material** - Importing and compacting fill as required per written statement from the Geotechnical Engineer and as approved by the Architect beyond that specified in the Contract Documents. The amount shall be based on an aggregate minimum of 50 cubic yards for the project.

1.11 ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement. **The Owner shall have the right to accept Alternates in any order or combination, and to determine the low bidder on the basis of the sum of the Base Bid and alternates accepted.**
- B. Coordinate related work and modify surrounding work.
- C. Schedule of Alternates:

Alternate #1 – To pressure wash the existing masonry façade and associated sidewalks, clean the window glazing, remove existing sealant at all aluminum storefront windows and replace with appropriate backer rod and sealant in accordance with 07900 Joint Sealers.

Alternate #2 – Along the rear of the existing building, point up the mortar joints at existing cracks and install new bricks where wood plywood board is on the exterior.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

ATTACHMENTS:

G702 – APPLICATION AND CERTIFICATE FOR PAYMENT

G701 – CHANGE ORDER

END OF SECTION

SECTION 01300
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Field engineering.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Pre-installation meetings.
- G. Cutting and patching.
- H. Special procedures.
- I. Composite above ceiling drawing submittal.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs. Have all pertinent subcontractors review and sign off on all related shop drawings.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.

- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 FIELD ENGINEERING

- A. Employ Land Surveyor registered in State of South Carolina and acceptable to Architect/Engineer.
- B. Locate and protect survey control and reference points. Promptly notify Architect/Engineer of discrepancies discovered.
- C. Control datum for survey is that shown on Drawings.
- D. Verify set-backs and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit copy of site drawing and certificate signed by Land Surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.
- G. Maintain complete and accurate log of control and survey work as Work progresses.
- H. On completion of foundation walls and major site improvements, prepare certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.
- I. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- J. Promptly report to Architect/Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- K. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect/Engineer.

1.4 PRECONSTRUCTION MEETING

- A. Owner will schedule meeting after Notice of Award.
- B. Attendance Required: Owner, Architect/Engineer, and Contractor.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
 - 5. Designation of personnel representing parties in Contract, and Architect/Engineer.

6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 7. Scheduling.
 8. Scheduling activities of Geotechnical Engineer.
- D. The Contractor shall record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Engineer, and those affected by decisions made.

1.5 SITE MOBILIZATION MEETING

- A. Architect/Engineer will schedule meeting at Project site prior to Contractor occupancy.
- B. Attendance Required: Architect/Engineer, Special Consultants, and Contractor, Contractor's Superintendent, and major Subcontractors.
- C. Agenda:
1. Use of premises by Owner and Contractor.
 2. Owner's requirements and partial occupancy.
 3. Construction facilities and controls provided by Owner.
 4. Temporary utilities provided by Owner.
 5. Survey and building layout.
 6. Security and housekeeping procedures.
 7. Schedules.
 8. Application for payment procedures.
 9. Procedures for testing.
 10. Procedures for maintaining record documents.
 11. Requirements for start-up of equipment.
 12. Inspection and acceptance of equipment put into service during construction period.
- D. The Contractor shall record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Engineer, Owner, and those affected by decisions made.

1.6 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major subcontractors and suppliers, Architect/Engineer, as appropriate to agenda topics for each meeting.
- D. Agenda:
1. Review minutes of previous meetings.
 2. Review of Work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems impeding planned progress.
 5. Review of submittals schedule and status of submittals.

- 6. Review of off-site fabrication and delivery schedules.
- 7. Maintenance of progress schedule.
- 8. Corrective measures to regain projected schedules.
- 9. Planned progress during succeeding work period.

- 10. Coordination of projected progress.
- 11. Maintenance of quality and work standards.
- 12. Effect of proposed changes on progress schedule and coordination.
- 13. Other business relating to Work.

- E. The Contractor shall record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Engineer, and those affected by decisions made.

1.7 PRE-INSTALLATION MEETINGS

- A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.
- B. Require attendance of parties directly affecting, or affected by, Work of specific section.
- C. Notify Architect/Engineer seven days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of installation, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. The Contractor shall record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Engineer, Owner and those affected by decisions made.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements affecting:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.

2. Uncover Work to install or correct ill-timed Work.
 3. Remove and replace defective and non-conforming Work.
 4. Remove samples of installed Work for testing.
 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.
 - E. Cut masonry and concrete materials using masonry saw or core drill.
 - F. Restore Work with new products in accordance with requirements of Contract Documents.
 - G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
 - H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
 - I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07840, to full thickness of penetrated element.
 - J. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.
 - K. Identify hazardous substances or conditions exposed during the Work to Architect/Engineer for decision or remedy.

3.2 SPECIAL PROCEDURES

- A. Materials: As specified in product sections; match existing with new products and salvaged products for patching and extending work.
- B. Employ skilled and experienced installer to perform alteration work.
- C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- E. Remove debris and abandoned items from area and from concealed spaces.
- F. Prepare surface and remove surface finishes to permit installation of new work and finishes.
- G. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- H. Finish surfaces as specified in individual product sections.

3.3 COMPOSITE ABOVE CEILING DRAWING SUBMITTAL

- A. Submit and obtain approval prior to any field work commencement.
- B. Submit as defined in Section 15010-3.3b coordination with other trades.
- C. The submittal shall clearly note elevation points of installed item from finish floor.
- D. The submittal must be signed off by all major subcontractors that will have work that is above the ceiling.

END OF SECTION

SECTION 01323
NETWORK ANALYSIS SCHEDULES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. References.
- B. Quality assurance.
- C. Format.
- D. Schedules.
- E. Submittals.
- F. Review and evaluation.
- G. Updating schedules.
- H. Distribution.

1.2 REFERENCES

- A. The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry, Washington, D.C., The Associated General Contractors of America (AGC).

1.3 QUALITY ASSURANCE

- A. Scheduler: Contractor's personnel specializing in CPM scheduling with two years minimum experience in scheduling construction work of complexity comparable to this Project, and having use of computer facilities capable of delivering detailed graphic printout within 48 hours of request.
- B. Contractor's Administrative Personnel: Five years minimum experience in using and monitoring CPM schedules on comparable projects.

1.4 FORMAT

- A. Listings: Reading from left to right, in ascending order for each activity. Identify each activity with applicable specification section number.
- B. Diagram Sheet Size: 24 inches high x 36 inches wide.
- C. Scale and Spacing: To allow for notations and revisions.

1.5 SCHEDULES

- A. Prepare network analysis diagrams and supporting mathematical analyses using Critical Path Method, under concepts and methods outlined in AGC's "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".
- B. Illustrate order and interdependence of activities and sequence of work; how start of given activity depends on completion of preceding activities, and how completion of activity may restrain start of subsequent activities.
- C. Illustrate complete sequence of construction by activity, identifying work of separate floors. Indicate dates for submittals including dates for Owner furnished items and return of submittals; dates for procurement and delivery of critical products; and dates for installation and provision for testing. Include legend for symbols and abbreviations used.
- D. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
 - 1. Preceding and following event numbers.
 - 2. Activity description.
 - 3. Estimated duration of activity, in maximum fifteen day intervals.
 - 4. Earliest start date.
 - 5. Earliest finish date.
 - 6. Actual start date.
 - 7. Actual finish date.
 - 8. Latest start date.
 - 9. Latest finish date.
 - 10. Total and free float; accrue float time to Owner and to Owner's benefit.
 - 11. Monetary value of activity, keyed to Schedule of Values.
 - 12. Percentage of activity completed.
 - 13. Responsibility.
- E. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, of accepting revised completion dates, and recomputation of scheduled dates and float.
- F. Required Sorts: List activities in sorts or groups:
 - 1. By preceding work item or event number from lowest to highest.
 - 2. By longest float, then in order of early start.
 - 3. By responsibility in order of earliest possible start date.
 - 4. In order of latest allowable start dates.
 - 5. In order of latest allowable finish dates.
 - 6. Contractor's periodic payment request sorted by Schedule of Values listings specifications sections.
 - 7. Listing of basic input data generating report.
 - 8. Listing of activities on critical path.
- G. Prepare sub-schedules for each stage of Work identified in Section 01100 - Summary.
- H. Coordinate contents with schedule of values in Section 01330 - Submittal Procedures.

1.6 SUBMITTALS

- A. Within ten days after date established in Notice to Proceed, submit proposed preliminary network diagram defining planned operations for first sixty days of Work, with general outline for remainder of Work.
- B. Participate in review of preliminary and complete network diagrams jointly with Architect/Engineer.
- C. Within twenty days after joint review of proposed preliminary network diagram, submit draft of proposed complete network diagram for review. Include written certification that major Subcontractors have reviewed and accepted proposed schedule.
- D. Within ten days after joint review, submit complete network analysis consisting of network diagrams and mathematical analysis.
- E. Submit updated network schedules with each Application for Payment every thirty days.
- F. Submit number of opaque reproductions Contractor requires, plus two copies Architect/Engineer will retain.
- G. Submit under transmittal letter form specified in Section 01330 – Submittal Procedures.

1.7 REVIEW AND EVALUATION

- A. Participate in joint review and evaluation of network diagrams and analysis with Architect/Engineer at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise network diagrams and analysis incorporating results of review, and resubmit within ten days.

1.8 UPDATING SCHEDULES

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity. Update diagrams to graphically depict current status of Work.
- C. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- D. Indicate changes required to maintain Date of Substantial Completion.
- E. Submit sorts required to support recommended changes.
- F. Prepare narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken or proposed and its effect.

1.9 DISTRIBUTION

- A. Following joint review, distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Architect/Engineer, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01330
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Contractor's Use of Architect's CADD Files.
- C. Construction progress schedules.
- D. Proposed products list.
- E. Product data.
- F. Shop drawings.
- G. Samples.
- H. Design data.
- I. Test reports.
- J. Certificates.
- K. Manufacturer's instructions.
- L. Manufacturer's field reports.
- M. Erection drawings.
- N. Construction photographs.

1.2 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Architect/Engineer accepted form attached.
- B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- C. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.
- D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.

- E. Schedule submittals to expedite Project, and deliver to Architect/Engineer at business address. Coordinate submission of related items.
- F. For each submittal for review, allow thirty working days excluding delivery time to and from Contractor.
- G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.
- H. Allow space on submittals for Contractor and Architect/Engineer review stamps.
- I. When revised for resubmission, identify changes made since previous submission.
- J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- K. Submittals not requested will not be recognized or processed.
- L. The Architect will take the following actions upon receipt of submittal:
 1. Check each submittal for Contractor's signature. If a submittal does not bear the Contractor's signature, return submittal without review for resubmittal by the Contractor.
 2. Log in the submittal and distribute to appropriate consultant, if applicable.
 3. Check the submittal to make sure it is in the proper form, and that all information required to be filled in by the Contractor has been completed.
 4. Review the submittal for conformance with the requirements of the Contract Documents.
 5. Architect shall keep on file one copy, and will return one copy electronically to the Contractor.
 6. Stamp each item in the submittal, and indicate Architect's Action (+/-). Make sure consultant has indicated recommended action (+/-) as well, if applicable.
 7. If a resubmittal appears to be the result of a misunderstanding of a requirement of the Contract Documents, add notes of guidance to expedite a correct resubmittal wherever practicable.
 8. Fill in date of review.
 9. Sign full name of reviewer. If consultant reviewed the submittal, make sure his signature appears as well.
 10. Note the distribution of the reviewed submittal.
 11. Log the submittal out.
 12. Return the submittal by mail (or, if requested by Contractor, hold for pick-up.)

1.3 CONTRACTOR'S USE OF ARCHITECT'S CADD FILES

- A. CADD Drawings: CADD files on electronic media are available to the Contractor from the Architect at fees stipulated and in accordance with the "CADD File Letter of Agreement" attached at the end of this Section. Only architectural plan files will be available; detail sheet files will not be available. Consultant drawings are not made available on electronic media, including but not limited to Structural, Plumbing/Fire Protection, Mechanical and Electrical.

- B. CADD files are provided as available information only and are not to be considered Contract Documents as defined by the Contract for Construction.
- C. Contractor shall submit written request for CADD files, accompanied by signed copy of the attached CADD File Letter of Agreement prior to release of these documents.

1.4 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial schedules within twenty days after date established in Notice to Proceed. After review, resubmit required revised data within ten days.
- B. Submit revised Progress Schedules with each Application for Payment.
- C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.
- D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
- E. Submit computer generated network analysis diagram as specified in Section 01323 - Network Analysis Schedules.
- F. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.
- G. Indicate estimated percentage of completion for each item of Work at each submission.
- H. Submit separate schedule of submittal dates for shop drawings, product data, and samples, including Owner furnished products and products identified under Allowances, and dates reviewed submittals will be required from Architect/Engineer. Indicate decision dates for selection of finishes.
- I. Indicate delivery dates for Owner furnished products and products identified under Allowances.
- J. Revisions To Schedules:
 - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
 - 2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
 - 3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect including effect of changes on schedules of separate contractors.

1.5 PROPOSED PRODUCTS LIST

- A. Within fifteen days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.6 PRODUCT DATA

- A. Product Data: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit number of copies Contractor requires, plus two copies Architect/Engineer will retain.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01700 - Execution Requirements.

1.7 SHOP DRAWINGS

- A. Shop Drawings: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual specification sections, provide shop drawings signed and sealed by professional engineer responsible for designing components shown on shop drawings.
 - 1. Include signed and sealed calculations to support design from an engineer registered in the State of South Carolina.
 - 2. Submit drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
 - 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01700 - Execution Requirements.

1.8 SAMPLES

- A. Samples: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Samples For Selection as Specified in Product Sections:
 - 1. Submit to Architect/Engineer for aesthetic, color, or finish selection.
 - 2. Submit samples of finishes from full range of manufacturers' standard colors, in custom colors selected, textures, and patterns for Architect/Engineer selection.

- C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- D. Include identification on each sample, with full Project information.
- E. Submit number of samples specified in individual specification sections; Architect/Engineer will retain one sample.
- F. Reviewed samples which may be used in the Work are indicated in individual specification sections.
- G. Samples will not be used for testing purposes unless specifically stated in specification section.
- H. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01700 - Execution Requirements.

1.9 DESIGN DATA

- A. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.
- B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.10 TEST REPORTS

- A. Submit for Architect/Engineer's knowledge as contract administrator and to the Owner.
- B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.11 CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Architect/Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

1.12 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Architect/Engineer for delivery to Owner in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.13 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for Architect/Engineer's benefit as contract administrator or for Owner.
- B. Submit report in duplicate within five days of observation to Architect/Engineer for information.
- C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.14 ERECTION DRAWINGS

- A. Submit drawings for Architect/Engineer's benefit as contract administrator and to the Owner.
- B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by Architect/Engineer or Owner.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

ATTACHMENTS:

SA Form
CADD File Letter of Agreement

The following is a list of submittals required within the Project Manual; refer to each section for specific requirements. The list is for information only and does not override the specification section requirements of each.

DIVISION 2 - SITE CONSTRUCTION

02204 Earthwork
02210 Soil Erosion Control
02362 Termite Control

DIVISION 3 - CONCRETE

03200 Concrete Reinforcement
03300 Cast-In-Place Concrete
03305 Site Concrete

DIVISION 4 - MASONRY

04810 Unit Masonry

DIVISION 5 - METALS

05400 Cold-Formed Structural Framing

DIVISION 6 - WOOD AND PLASTICS

06100 Rough Carpentry
06114 Wood Blocking and Curbing
06193 Plate Connected Wood Trusses
06200 Finish Carpentry
06410 Architectural Wood Casework

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07310 Asphalt Shingles
07460 Fiber Cement Siding
07613 Manufactured Sheet Metal Roofing
07620 Sheet Metal Flashing and Trim
07720 Aluminum Ladder
07840 Firestopping
07900 Joint Sealers

DIVISION 8 - DOORS AND WINDOWS

08111 Standard Steel Doors and Frames
08212 Wood Doors
08410 Metal-Framed Storefronts
08525 Extruded Aluminum Clad Wood Windows
08710 Door Hardware
08800 Glazing
08830 Mirror Glass

DIVISION 9 - FINISHES

09260 Gypsum Board Systems
09510 Acoustical Ceilings
09651 Resilient Tile Flooring

09900 Paints and Coatings

DIVISION 10 - SPECIALTIES

10440 Signage
10523 Fire Extinguishers and Cabinets
10800 Toilet and Bath Accessories

DIVISION 15 - MECHANICAL

15180 Testing, Adjusting, and Balancing
15250 Insulation
15410 Basic Materials and Methods (Plumbing)
15420 Domestic Water Supply Piping
15440 Soil, Waste, Vent and Drain Piping
15450 Plumbing Fixtures and Equipment
15500 Fire Protection
15620 Piping

- 15665 Split System Heat Pump
- 15762 Electronic Wall Insert Heaters
- 15810 Air Distribution
- 15862 Split System Heat Pump (ductless)
- 15900 Automatic Temperature Controls

DIVISION 16 - ELECTRICAL

- 16120 Conductors
- 16122 Metal-Clad Cable Systems
- 16130 Grounding and Bonding
- 16140 Boxes
- 16150 Wiring Devices
- 16160 Raceway and Outlet Systems
- 16190 Miscellaneous Materials
- 16420 Panelboards
- 16500 Lighting Fixtures and Accessories
- 16511 Low Voltage Switching Systems
- 16702 Fire Alarm System, Addressable
- 16620 Engine-Generator System

END OF SECTION

SUBMITTAL ACTION

CONTRACTOR'S SUBMITTAL

for use by contractor

DATE OF SUBMITTAL _____

SUBMITTAL NUMBER _____
provide separate form for each Section

SPECIFICATION SECTION NUMBER _____

FROM:

FORM OF SUBMITTAL
P Prints **Cx** Calculations
S Sepia or other **L** Letter
transparency
CC Catalog cuts **C** Certificate
Sa Sample **M** Maint. mat.
extra stock
T Test of Inspect.
____ Other _____

SUBMITTED BY:
____ MAIL ____ HAND ____ EXPRESS

ITEM (a, b, c, etc.)	NO. OF COPIES	FORM	SECTION PARAGRAPH NO. OR DWG. & DET. REF. NO.	DESCRIPTION OF SUBMITTAL	SOURCE (NAME OF MNF., FABRICATOR, OF GEN. CONTR.

THIS SUBMITTAL DEVIATES FROM THE REQUIREMENTS OF THE CONTRACT DOCUMENTS IN THE FOLLOWING WAYS: _____

ATTACH ANOTHER SHEET IF REQUIRED

I/WE HAVE CHECKED, COORDINATED, AND APPROVED THIS SUBMITTAL. THIS SUBMITTAL, EXCEPT FOR THE DEVIATIONS NOTED ABOVE, IS IN CONFORMANCE WITH THE CONSTRUCTION DOCUMENTS

CONTRACTOR APPROVAL BY:

FULL SIGNATURE, NOT INITIALS

ARCHITECT'S REVIEW

SA

FROM: **TYCH & WALKER ARCHITECTS, LLP**
P.O. Box 509
38 Blackgum Road, Unit B
Pawleys Island, SC 29585
(843) 651-7151

PROJECT: **Renovations & Additions to the Georgetown Headquarters Library**
Georgetown County, SC

PROJECT NO. **TWA-2020-06**

NOTE: UPPER PORTION OF BOX DENOTES CONSULTANT'S ACTION; LOWER PORTION DENOTES ARCHITECT'S ACTION.

ACTION REQ'D. OF CONTRACTOR		ARCHITECT'S ACTION/CONSULTANT'S ACTION			
+	--	--	+	+	--
DO NOT RESUBMIT	REVISE AND RESUBMIT	MAKE NEW CONFORM. SUBMITTAL	CONFORMS	CONFORMS NOTE COMMENTS	REJECTED
(OK)	(RR)	(NS)	(C)	(CC)	(R)

ARCHITECTS REVIEW IS ONLY FOR CONFORMANCE WITH DESIGN CONCEPT AND INFORMATION IN THE CONTRACT DOCUMENTS

Contractor shall inform Architect of deviations in writing. Request substitutions only by the specified procedures, not by the submittal process. Marks and comments shall not relieve the Contractor from responsibility for deviations there from, nor from any responsibility for errors and omissions in his submittal. Approval of a specific item does not include approval of the assembly of which the item is a component. Contractor is responsible for details and accuracy, for confirming quantities, dimensions and fit, for fabrication process, for the means, methods, sequences and techniques of assembly and construction, for safe performance of the work, and for the coordination of the work of all trades. Contractor shall not fabricate or install unless positive action is granted by the Architect.

TYCH & WALKER ARCHITECTS, LLP

reviewed by:

Date:

Consultant reviewed by:

Date:

TERMS AND CONDITIONS

1. The Architect makes no representation as to the compatibility of the CADD files with any hardware or software. The General Contractor shall notify the Architect within 7 days of any problems associated the compatibility of the data contained on the media provided.
2. Since the information set forth on the CADD files can be modified unintentionally or otherwise, the Architect will remove all indications of ownership and/or involvement from each electronic display.
3. All information on the CADD files is considered instruments of service of the Architect and shall not be used for other projects, for additions to this project, or completion of this project by others. CADD files shall remain the property of the Architect, and in no case shall the transfer of these files be considered a sale.
4. The Architect makes no representation regarding the accuracy, completeness or permanence of CADD files. Addenda information or revisions made after the date indicated on the CADD files may not have been incorporated. In the event of a conflict between the Architect’s sealed contract drawings and CADD files, the sealed contract drawings shall govern. It is the General Contractor’s responsibility to determine if any conflicts exist. The CADD files shall not be considered to be Contract Documents as defined by the General Conditions of the Contract for Construction.
5. The use of CADD files prepared by the Architect shall not in any way relieve the Contractor’s responsibility for the proper checking and coordination of dimensions, details and quantities of materials as required to facilitate complete and accurate construction of the Project.
6. The General Contractor shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the Architect, and its subconsultants from any and all claims, damages, losses, expenses, penalties and liabilities of any kind, including attorney’s fees, arising out of or resulting from the use of the CADD files by the General Contractor, or by third party General Contractors of the CADD files from the General Contractor.
7. The General Contractor shall take all reasonable steps necessary to maintain in effect with each of the General Contractor’s employees, agents, and subcontractors, a policy of protection of Architect’s rights to the information covered by this Agreement.
8. The Architect believes that no licensing or copyright fees are due to others on account of the transfer of the CADD files, but to the extent any are, the General Contractor will pay the appropriate fees and hold the Architect harmless from such claims.
9. Any purchase order number provided by the General Contractor is for General Contractor’s accounting purposes only. Purchase order items and conditions are void and are not part of this agreement.
10. Payment of the service fee is due prior to receipt of the CADD Files.
11. This agreement shall be governed by the laws of the principal place of business of the Architect.

AUTHORIZED ACCEPTANCE

by Architect:

by General Contractor:

Signature

Signature

Printed Name and Title

Printed Name and Title

Date

Date

SECTION 01400
QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality control and control of installation.
- B. Tolerances.
- C. References.
- D. Labeling.
- E. Mock-up requirements.
- F. Testing and inspection services.
- G. Manufacturers' field services.
- H. Examination.
- I. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

- B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.5 LABELING

- A. Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.
- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.
 - 1. Model number.
 - 2. Serial number.
 - 3. Performance characteristics.

1.6 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this section and identified in respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be comparison standard for remaining Work.
- D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Architect/Engineer.

1.7 TESTING AND INSPECTION SERVICES

- A. The General Contractor **will include the allowance amount for the testing services** to perform testing and inspection, complete, as described in this section and elsewhere in the contract documents. The General Contractor shall coordinate this work and pay for it, as defined within Section 01200. The Owner has the right to appoint and select the testing firm.
- B. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and section in Division 1 of these specifications.
- C. Requirements for testing may be described in various sections of these specifications.
- D. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Engineer specialist and responsible officer.
- E. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by Architect/Engineer.
 - 1. Laboratory: Authorized to operate at Project location in State of South Carolina.
 - 2. Laboratory Staff: Maintain full time registered Engineer on staff to review services.
 - 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- F. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Architect/Engineer or Owner.
- G. Reports will be submitted by independent firm to Architect/Engineer, Contractor, and authority having jurisdiction, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
 - 1. Submit final report indicating correction of Work previously reported as non-compliant.
- H. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Architect/Engineer and independent firm 24 hours prior to expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- I. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
 - 1. Laboratory is not authorized to release, revoke, alter or enlarge on requirements of contract documents, approve or accept any portion of the work, perform any duties of contractor.
- J. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Architect/Engineer. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
- K. Agency Responsibilities:

1. Test samples of mixes submitted by Contractor.
 2. Provide qualified personnel at site. Cooperate with Architect/Engineer and Contractor in performance of services.
 3. Perform specified sampling and testing of products in accordance with specified standards.
 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 5. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or products.
 6. Perform additional tests required by Architect/Engineer.
 7. Attend preconstruction meetings and progress meetings.
- L. Agency Reports: After each test, promptly submit two copies of report to Architect/Engineer, Contractor, and authority having jurisdiction. When requested by Architect/Engineer, provide interpretation of test results. Include the following:
1. Date issued.
 2. Project title and number.
 3. Name of inspector.
 4. Date and time of sampling or inspection.
 5. Identification of product and specifications section.
 6. Location in Project.
 7. Type of inspection or test.
 8. Date of test.
 9. Results of tests.
 10. Conformance with Contract Documents.
- M. Limits On Testing Authority:
1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency or laboratory may not approve or accept any portion of the Work.
 3. Agency or laboratory may not assume duties of Contractor.
 4. Agency or laboratory has no authority to stop the Work.

1.8 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01330 - Submittal Procedures, MANUFACTURERS' FIELD REPORTS article.

1.9 WAIVER OF INSPECTION AND/OR TESTS

- A. Specified inspections and/or tests may be waived only by the specific approval of the Architect/Engineer and such waivers will be expected to result in credit to the Owner, equal to normal cost of such inspection and/or test.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION

SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary Utilities:
1. Temporary electricity.
 2. Temporary lighting for construction purposes.
 3. Temporary heating.
 4. Temporary cooling.
 5. Temporary ventilation.
 6. Telephone service.
 7. Temporary water service.

- B. Construction Facilities:
1. Field offices and sheds.
 2. Vehicular access.
 3. Parking.
 4. Progress cleaning and waste removal.
 5. Project identification.
 6. Traffic regulation.
 7. Fire prevention facilities.

- C. Temporary Controls:
1. Barriers.
 2. Enclosures and fencing.
 3. Security.
 4. Water control.
 5. Dust control.
 6. Erosion and sediment control.
 7. Noise control.
 8. Pest control.
 9. Pollution control.
 10. Rodent control.

- D. Removal of utilities, facilities, and controls.

1.2 TEMPORARY ELECTRICITY

- A. Provide and pay for power service required from utility source as needed for construction operation.
- B. Provide temporary electric feeder from electrical service at location as directed by Architect/Engineer. Do not disrupt Owner's use of service.

- C. Complement existing power service capacity and characteristics as required for construction operations.
- D. Provide power outlets, with branch wiring and distribution boxes located as required for construction operations. Provide flexible power cords as required for portable construction tools and equipment.
- E. Provide main service disconnect and over-current protection at convenient location.
- F. Permanent convenience receptacles may be utilized during construction.

1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain incandescent lighting for construction operations to achieve minimum lighting level of 2 watt/sq ft.
- B. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas entire site after dark for security purposes.
- C. Provide and maintain 0.25 watt/sq ft HID lighting to interior work areas after dark for security purposes.
- D. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps for specified lighting levels.
- E. Maintain lighting and provide routine repairs.
- F. Permanent building lighting may not be utilized during construction.

1.4 TEMPORARY HEATING

- A. Provide and pay for heating devices and heat as needed to maintain specified conditions for construction operations.
- B. Prior to operation of permanent equipment for temporary heating purposes, verify installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
- C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in product sections.

1.5 TEMPORARY COOLING

- A. Provide and pay for cooling devices and cooling as needed to maintain specified conditions for construction operations. Provide separate metering and reimburse Owner for cost of energy used.

- B. Prior to operation of permanent equipment for temporary cooling purposes, verify installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
- C. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.6 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.7 TELEPHONE SERVICE

- A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.

1.8 TEMPORARY WATER SERVICE

- A. Provide and pay for suitable quality water service as needed to maintain specified conditions for construction operations. Connect to existing water source.
- B. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.9 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide facilities at time of project mobilization.

1.10 VEHICULAR ACCESS

- A. Construct temporary access roads from public thoroughfares to serve construction area, of width and load bearing capacity to accommodate unimpeded traffic for construction purposes as indicated on Civil Drawings.
- B. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
- C. Extend and relocate vehicular access as Work progress requires, provide detours as necessary for unimpeded traffic flow.
- D. Location approved by Architect/Engineer.
- E. Provide unimpeded access for emergency vehicles. Maintain 20 feet wide driveways with turning space between and around combustible materials.
- F. Provide and maintain access to fire hydrants and control valves free of obstructions.
- G. Provide means of removing mud from vehicle wheels before entering streets.
- H. Use designated existing on-site roads for construction traffic.

1.11 PARKING

- A. Construct temporary gravel surface parking areas to accommodate construction personnel. Refer to Civil Drawings for parking area for personnel. Final location to be determined at pre-construction meeting.
- B. Locate as approved by Architect/Engineer.
- C. When site space is not adequate, provide additional off-site parking.
- D. Use of designated existing on-site streets and driveways used for construction traffic is permitted. Tracked vehicles not allowed on paved areas.
- E. Use of existing parking facilities used by construction personnel is not permitted.
- F. Do not allow heavy vehicles or construction equipment in parking areas.
- G. Do not allow vehicle parking on existing pavement.
- H. Permanent Pavements And Parking Facilities:
 - 1. Prior to Substantial Completion, bases for permanent roads and parking areas may be used for construction traffic.
 - 2. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.
 - 3. Use of permanent parking structures is not permitted.
- I. Maintenance:
 - 1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
 - 2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.
- J. Removal, Repair:
 - 1. Remove temporary materials and construction before Substantial Completion.
 - 2. Remove underground work and compacted materials to depth of 2 feet; fill and grade site as specified.
 - 3. Repair existing facilities damaged by use, to original condition.
- K. Mud From Site Vehicles: Provide means of removing mud from vehicle wheels before entering streets.
- L. Establish temporary parking surface for Department of Special Needs Building "A" at corner of Dozier and Church streets with an ADA accessible path to their building entry.

1.12 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing spaces.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect waste materials, debris, and rubbish. The material shall be sorted in separate dumpster bins as provided by Georgetown County. Georgetown County will remove dumpsters and replace dumpsters weekly. The Contractor shall coordinate with Georgetown County concerning quantity and timing. It is the intent that the Contractor recycle as much construction waste as possible. There will be no landfill fee.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.13 PROJECT IDENTIFICATION

- A. Project Identification Sign:
 - 1. One painted sign, 32 sq ft area, bottom 6 feet above ground.
 - 2. Content:
 - a. Project title, logo and name of Owner as indicated on Contract Documents.
 - b. Names and titles of authorities.
 - c. Names and titles of Architect/Engineer and Consultants.
 - d. Name of Prime Contractor and major Subcontractors.
 - 3. Graphic Design, Colors, Style of Lettering: Designated by Architect/Engineer.
- B. Project Informational Signs:
 - 1. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering for legibility at 100 feet distance.
 - 2. Provide sign at each field office, storage shed, and directional signs to direct traffic into and within site. Relocate as Work progress requires.
 - 3. No other signs are allowed except those required by law.
- C. Design sign and structure to withstand 60 miles/hr wind velocity.
- D. Sign Painter: Experienced as professional sign painter for minimum three years.
- E. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.
- F. Show content, layout, lettering, color, foundation, structure, sizes, and grades of members.
- G. Sign Materials:
 - 1. Structure and Framing: New, wood, structurally adequate.
 - 2. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inches thick, standard large sizes to minimize joints.
 - 3. Rough Hardware: Galvanized.
 - 4. Paint and Primers: Exterior quality, two coats; sign background of color as selected.
 - 5. Lettering: Exterior quality paint, contrasting colors as selected.

- H. Installation:
 - 1. Install project identification sign within 15 days after date fixed by Notice to Proceed.
 - 2. Erect at designated location.
 - 3. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
 - 4. Install sign surface plumb and level, with butt joints. Anchor securely.
 - 5. Paint exposed surfaces of sign, supports, and framing.
- I. Maintenance: Maintain signs and supports clean, repair deterioration and damage.
- J. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore area.

1.14 TRAFFIC REGULATION

- A. Haul Routes:
 - 1. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
 - 2. Confine construction traffic to designated haul routes.
 - 3. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.
- B. Removal:
 - 1. Remove equipment and devices when no longer required or at Substantial Completion.
 - 2. Repair damage caused by installation.
 - 3. Remove post settings to depth of 2 feet.

1.15 FIRE PREVENTION FACILITIES

- A. Prohibit smoking with buildings under construction and demolition. Designate area on site where smoking is permitted. Provide approved ashtrays in designated smoking areas.
- B. Establish fire watch for cutting and welding and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.
- C. Standpipes: Install minimum one standpipe for use during construction before building reaches 40 feet in height.
- D. Portable Fire Extinguishers: NFPA 10; 10 pound capacity, 4A-60B: C UL rating.
 - 1. Provide one fire extinguisher at each stair on each floor of buildings under construction and demolition.
 - 2. Provide minimum one fire extinguisher in every construction trailer and storage shed.
 - 3. Provide minimum one fire extinguisher on roof during roofing operations using heat producing equipment.

1.16 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

- B. Provide barricades and covered walkways required by authorities having jurisdiction for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.17 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.18 DUST CONTROL

- A. Execute Work by methods to minimize raising dust from construction operations and in conformance with City of Georgetown ordinance or SC DHEC regulations.
- B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.19 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.20 NOISE CONTROL

- A. Provide methods, means, and facilities to minimize noise from and noise produced by construction operations.

1.21 PEST CONTROL

- A. Provide methods, means, and facilities to prevent pests and insects from damaging the Work and entering facility.

1.22 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
- B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

1.23 RODENT CONTROL

- A. Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.24 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, and materials prior to Substantial Completion inspection.
- B. Remove underground installations to minimum depth of 2 feet. Grade site as indicated on Drawings.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01600
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.
- F. Equipment electrical characteristics and components.

1.2 PRODUCTS

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- C. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.

- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
- J. Material Moisture and Mold Control: Comply with recommendations contained in Associated General Contractors (AGC) document "Managing the Risk of Mold in the Construction of Buildings." Prepare and submit plan for protecting materials from water damage, including the following:
 - 1. Indicate delivery, checking and storage operations affected by water damage control efforts.
 - 2. Indicate procedures for protecting porous materials from water damage, and how damaged materials will be handled.
 - 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet work has dried sufficiently to permit installation of related finish materials.
 - 4. Describe protocol for dealing with large and unexpected water intrusion into completed portions of building. Indicate procedures for investigation of cause and effects, and methods for dealing with both.

1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.6 PRODUCT SUBSTITUTION PROCEDURES

- A. Instructions to Bidders Section 00100 specify time restrictions for submitting requests for Substitutions during bidding period to requirements specified in this section.
 - 1. **No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for**

which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

- 2. If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner. If substitution is not addressed in an Addendum, it shall be considered not approved.**
 - 3. No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.**
- B. Substitutions may be considered by the Architect when a product becomes unavailable through no fault of Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that Contractor:
1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
 2. Will provide same warranty for Substitution as for specified product.
 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities having jurisdiction or additional time expended by Architect/Engineer to review information.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.
- F. Substitution Submittal Procedure:
1. Submit one copy of request for Substitution for consideration. Limit each request to one proposed Substitution.
 2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
 3. Architect/Engineer will notify Contractor in writing of decision to accept or reject request. The architect decision will be final.
 4. Architect/Engineer will notify the Contractor if redesign services or additional review services will be charged to the Contractor.

PART 2 PRODUCTS

2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.
- B. Cord and Plug: Furnish minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01700
EXECUTION REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Starting of systems.
- D. Demonstration and instructions.
- E. Testing, adjusting and balancing.
- F. Protecting installed construction.
- G. Project record documents.
- H. Operation and maintenance data.
- I. Manual for materials and finishes.
- J. Manual for equipment and systems.
- K. Spare parts and maintenance products.
- L. Product warranties and product bonds.
- M. Maintenance service.
- N. Moisture and Mold Control

1.2 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's review.
- B. Provide submittals to Architect/Engineer required by authorities having jurisdiction.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.

- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
- D. Replace filters of operating equipment. Filters shall be MERV rated.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer seven days prior to start-up of each item.
- C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative or Contractors' personnel in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report in accordance with Section 01330 - Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of final inspection. The demonstration will be documented by the Contractor with a full sign-in sheet of all in attendance.
- B. Demonstrate Project equipment and instruct in classroom environment located at project site and instructed by qualified manufacturer's representative who is knowledgeable about the Project.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at designated location.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- G. Required instruction time for each item of equipment and system is specified in individual sections.

1.6 TESTING, ADJUSTING AND BALANCING

- A. General Contractor will employ services of independent firm to perform testing, adjusting, and balancing. Contractor shall pay for services. Refer to plumbing & mechanical specifications. Refer to Section 15180 – Testing, Adjusting and Balancing.
- B. Reports will be submitted by independent firm to Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.7 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.
- G. Protect elevator cabs. They will not be allowed for use during construction.

1.8 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.

4. Change Orders and other modifications to the Contract.
 5. Reviewed Shop Drawings, Product Data, and Samples.
 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
 - C. Store record documents separate from documents used for construction.
 - D. Record information concurrent with construction progress, not less than weekly.
 - E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
 - F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 1. Measured depths of foundations in relation to finish first main floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 4. Field changes of dimension and detail.
 5. Details not on original Contract drawings.
 - G. Submit documents to Architect/Engineer with claim for final Application for Payment.

1.9 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, three D side ring binders with durable plastic covers. These may also be submitted electronically.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
 2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.

- b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
- a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Originals of warranties and bonds.

1.10 MANUAL FOR MATERIALS AND FINISHES

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes fifteen days prior to final inspection. Draft copy be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.
- D. Submit two sets of revised final volumes in final form within ten days after final inspection.
- E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations.
- F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- G. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.
- H. Additional Requirements: As specified in individual product specification sections.
- I. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.11 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

- C. Submit one copy of completed volumes fifteen days prior to final inspection. Draft copy be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.
- D. Submit two sets of revised final volumes in final form within ten days after final inspection.
- E. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
- F. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- G. Include color coded wiring diagrams as installed.
- H. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and special operating instructions.
- I. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- J. Include servicing and lubrication schedule, and list of lubricants required.
- K. Include manufacturer's printed operation and maintenance instructions.
- L. Include sequence of operation by controls manufacturer.
- M. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- N. Include control diagrams by controls manufacturer as installed.
- O. Include Contractor's coordination drawings, with color coded piping diagrams as installed.
- P. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- Q. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- R. Include test and balancing reports as specified in Section 01400 - Quality Requirements.
- S. Additional Requirements: As specified in individual product specification sections.
- T. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.13 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.
- F. Submit prior to final Application for Payment.
- G. Time Of Submittals:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
 - 2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.14 MAINTENANCE SERVICE

- A. Furnish service and maintenance of components indicated in specification sections for one year from date of Substantial Completion during warranty period.
- B. Examine system components at frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.
- D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of Owner.

1.15 MOISTURE AND MOLD CONTROL

- A. General: Coordinate requirements in Contractor's approved Material and Mold Control Plan as describe in Section 01600 "Product Requirements". Avoid trapping water in finished work. Document visible signs of mold that may appear during construction. Comply with recommendations contained in Associated General Contractors (AGC) document "Managing the Risk of Mold in the Construction of Buildings," including the following:
1. Exposed Phase of Construction
 - a. Protect porous materials from water damage.
 - b. Protect stored and installed material from flowing or standing water.
 - c. Keep porous and organic materials from coming into prolonged contact with concrete.
 - d. Remove standing water from decks.
 - e. Keep deck openings covered or dammed.
 - f. Use dunnage to create space between concrete decks and stored drywall.
 2. Partially Enclosed Phase of Construction:
 - a. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - b. Keep interior spaces reasonably clean and protected from water damage.
 - c. Periodically collect and remove waste containing cellulose or other organic matter.
 - d. Discard or replace water-damaged material.
 - e. Do not install material that is wet.
 - f. Discard, replace or clean stored or installed material that begins to grow mold.
 - g. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
 3. Controlled Phase of Construction:
 - a. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - b. Utilize permanent HVAC system to control humidity.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 02230
SITE CLEARING AND GRUBBING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Remove surface debris.
- B. Clear site of plant life and grass.
- C. Remove trees and shrubs.
- D. Remove root system of trees and shrubs.
- E. Topsoil excavation.

1.2 RELATED SECTIONS

- A. Erosion and Sediment Control
- B. General Excavating and Grading
- C. Asphalt Paving

1.3 REGULATORY REQUIREMENTS

- A. Conform to applicable code for disposal of debris and burning debris on site.
- B. Conform to requirements of the South Carolina Stormwater Management and Sediment Reduction Act of 1991.
- C. Clearing work shall be coordinated with utility companies.

PART 2 PRODUCTS

NOT APPLICABLE

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify that areas designated to remain undisturbed are correctly flagged or identified.

3.2 PROTECTION

- A. Locate, identify, and protect utilities that remain, from damage.
- B. Protect trees, wetland areas and other designated features to remain.
- C. Protect bench marks and existing structures from damage or displacement.

- D. Trees and vegetation to be left shall be protected from damage incident to clearing, grubbing and construction operations, by the erection of timber barriers or by such other means as the circumstances require. Such barriers must be placed and be approved by the Owner before construction operations can proceed.
- E. Clearing operations shall be conducted so as to prevent damage by falling trees to trees left standing, to existing structures and installations and to those under construction, and so as to provide for the safety of workers and others.

3.3 CLEARING

- A. As indicated on the plans, the site clearing shall consist of the felling and cutting of the trees, stumps and other vegetation designated for removal, including downed timber, snags, brush and rubbish occurring within the areas to be cleared. Trees, stumps, roots, brush and other vegetation in areas to be cleared shall be removed completely from the site, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1 1/2 inches or more in diameter. Limbs and branches to be trimmed shall be neatly cut close to the hole of the tree or main branches.
- B. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work. The Contractor shall include in his clearing and grubbing price, the cost to remove existing debris, trash, dirt piles and all other materials within the clearing limits and to dispose of all materials off site.

3.4 TOPSOIL

- A. Strip and stockpile topsoil that will be reused in the work. Topsoil shall not be utilized under building pads, drive or parking areas. Sufficient topsoil shall be salvaged from the site as necessary to complete landscape work. Excess topsoil shall be stored on the maintenance building site as directed by the Engineer.

3.5 EXISTING ITEMS

- A. Remove existing improvements both above-grade and below-grade, to extent indicated or as otherwise required to permit new construction.
- B. Salvable Items: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated or directed.

3.6 AIR QUALITY

- A. Control air pollution caused by dust and dirt; comply with governing regulations.

3.7 GRADING

- A. Fill depressions and voids resulting from site-clearing operations. Using satisfactory soil materials, place in maximum six (6) inch deep horizontal layers and compact each layer to density of surrounding original ground.
- B. Grade ground surface to conform to required contours and to provide surface drainage.

3.8 REMOVAL

- A. Dispose of waste materials, including trash, debris, and excess topsoil, off construction limits to areas as indicated on drawings and as directed by Owner.
- B. Burning of waste materials resulting from the clearing operation shall not be permitted on the site. All debris must be removed and hauled off site. Contractor shall be responsible for compliance with all applicable regulations.

END OF SECTION 02230

SECTION 02315 BACKFILLING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building perimeter and site structure backfilling.
- B. Site filling and backfilling.
- C. Fill under slabs-on-grade.
- D. Consolidation and compaction.
- E. Fill for over-excavation.

1.02 RELATED SECTIONS

- A. Erosion and Sediment Control.
- B. General Excavating and Grading
- C. Excavating and Backfill for utilities.

1.03 REFERENCES

- A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. Sand: Natural river bank sand; washed, free of silt, clay, loam, friable or soluble materials and organic matter; graded in accordance with NASI/ASTM C136 within the following limits:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING</u>
No. 4	100%
No. 14	10-100%
No. 50	5-90%
No. 100	4-30%
No. 200	0%

- B. Backfill - Imported material, graded, free of lumps larger than 3 inches, rocks larger than 2 inches and debris, conforming to ASTM 02487, Group Symbol GW, GP, SM, SW, and SP. Maximum 35% passing the #200 sieve.
- C. Topsoil - Imported friable loam: Reasonably free of roots, rocks larger than 1/2 inches, subsoil, debris, large woods, and foreign matter, acidity minimum range of 5.5 - 7.5; containing a minimum of 4 percent and a maximum of 25 percent inorganic matter; conforming to ASTM D2487 OH, PT.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify fill material is acceptable. Provide a sample to geotechnical site engineer for approval.

3.02 PREPARATION

- A. Generally, compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill and compact to density equal to or greater than requirements for applicable fill material.

3.03 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Employ a placement method that does not disturb or damage other work.
- D. Maintain optimum moisture content of backfill materials to attain required compaction density.
- E. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise.
- F. Make gradual grade changes. Blend slope into level areas.
- G. Leave fill material stockpile areas free of excess fill materials.

3.04 TOLERANCES

- A. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.
- B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.05 FIELD QUALITY CONTROL

- A. Compaction testing will be performed in accordance with ANSI/ASTM D1557.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the owner.

C. Proof roll compacted fill surfaces under slabs.

3.06 PROTECTION OF FINISHED WORK

A. Re-compact fills subjected to vehicular traffic.

END OF SECTION 02315

SECTION 02316 EXCAVATING AND BACKFILL FOR UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Trench excavation for on-site and off-site utilities up to five feet (5') from any building
- B. Trench dewatering.
- C. Backfilling and Compaction.

1.2 RELATED SECTIONS

- A. Erosion and Sediment Control.
- B. General Excavating and Grading.
- C. Backfilling
- D. Potable Water Systems
- E. Storm Drainage

1.3 REFERENCES

- A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.4 FIELD MEASUREMENTS

- A. Verify that survey bench mark and intended elevations for the Work are as shown on drawings.

1.5 SECTION DESCRIPTION

- A. The Contractor shall perform all work necessary for or incidental to the performance and completion of the excavating and backfilling for utilities. This work shall be completed as shown on the drawings and as specified in the contract documents. This work shall include the furnishing of all labor, materials and equipment. The Contractor shall be responsible for coordinating the work to assure that the work is completed in an orderly manner. Although such work may not be specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation shall be furnished and installed as part of this work

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Type Materials as specified in Section 31 2300 and Section 31 2323.

PART 3 EXECUTION

3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- C. Protect bench marks, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- D. Maintain and protect above and below grade utilities which are to remain.
- E. Locate existing utilities and drainage implements as specified in Section 33 1000.
- F. Clear pathways for utilities prior to beginning trenching.

3.2 EXCAVATION

- A. Trenches will be excavated by the open cut method to the depth and dimension as shown on the drawings, or as necessary to accommodate the work including the bedding.
- B. The Contractor shall take precaution to avoid excavating below the necessary depth in order to maintain the existing integrity of the trench bottom. In the event of over-excavation, the trench will be backfilled and thoroughly compacted in six-inch (6") lifts.
- C. Trench widths will be limited to provide ample room for workmen. The trench width at the top of the pipe will not exceed the total width of the outside diameter of the pipe plus eighteen inches (18") for pipes with outside diameters of thirty-three inches (33") and less. The trench width at the top of the pipe will not exceed the total width of the outside diameter of the pipe plus twenty-four inches (24") for pipes with outside diameters greater than thirty-three inches (33"). When sheeting is necessary the trench width will be increased by the thickness of the sheeting.
- D. Trench walls shall be cut vertically from the trench bottom to the top of the pipe. The Contractor shall take precaution to control the trench width so as to prevent unnecessary damage to adjacent pavement, utilities and other structures as well as to preserve the safety of the workmen and the public. The Contractor shall comply with OSHA requirements regarding trench widths. Top of trenches shall not be unnecessarily wide as to cause damage to surrounding properties. Damage to any item, including pavement, as a result of excessive trench width, and any liability thereof, will be considered the responsibility of the Contractor.
- E. Sheeting; Bracing and sheeting will be provided as to comply with OSHA and other applicable federal, state and local requirements. The use of drag boxes or other similar devices may be acceptable provided the subsequent moving of the box does not result in disturbance of the trench bedding, the pipe or the alignment of the pipe. Sheeting shall be left in place until the pipe has been placed and backfilled in the area of the pipe. If removed, the removal of shoring and sheeting materials must be done in a manner that will not disturb the integrity

of the pipe construction, including the creation of unacceptable voids in the backfill.

- F. If the Contractor elects to place excavated material on paved surfaces, the Contractor must receive written permission from the agency maintaining the road (state, county, private, etc.), and the Contractor must comply with the requirements of the maintenance agency. After removal of material, the Contractor shall fully repair the road as required by the maintenance agency without additional compensation from the Owner. After the project, the Contractor shall present written certification of the road by the respective agency that the road has been satisfactorily repaired and/or cleaned.

3.3 TRENCH DEWATERING

- A. Trenches shall be kept free of water and debris during the installation of pipe. Water shall be disposed of in a manner so as not to damage adjoining public or private properties or in any manner deemed to be a detriment to public health.
- B. Pipe installed shall be plugged at all times when Contractor personnel are not in attendance.
- C. Prevent surface water and subsurface or ground water from entering excavation, from ponding on prepared sub grades, and from flooding project site and surrounding area.
- D. Protect subgrades and foundation soils from softening and damage by rain or water accumulation. Remove water that may have accumulated. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- E. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

3.4 BACKFILLING AND COMPACTING

- A. The Contractor will use only suitable backfill material as previously described in this section.
- B. Backfill will be hand or pneumatically tamped under and around the pipe in six inch (6") lifts up to twenty-four inches (24") above the top of the pipe. Backfill to the top of the ground will be in eight inch (8") loose thickness lifts compacted as specified.
- C. Any pipe displaced or broken during backfilling or compaction will be replaced at the Contractor's expense.
- D. Compaction will be to a maximum of 98 percent (98%) of maximum dry density as determined by ASTM D-698 or AASHTO Method T 99 for paved, concrete parking or other unpaved areas common to traffic. In other areas of the South Carolina Department of Highways and Public Transportation rights-of-way, the backfill must be compacted to 95 percent (95%) maximum dry density or density equal to that prior to the areas disturbance whichever is greater. In all other

areas, trench backfill will be compacted to a minimum of 90 percent (90%) of maximum dry density as determined by ASTM D-698 and AASHTO Method T99. Maximum dry density will be as determined by the Standard Proctor Test. The water method of compaction will not be determined.

- E. When required by the Engineer, moisture-density tests will be performed through a recognized testing laboratory with all costs to be paid by the Owner with results distributed to the Contractor and the Engineer. Should the compacted backfill fail the moisture and density tests, the Contractor will uncover backfill until additional tests show adequate density exists. Additional tests as a result of initially failed testing will be paid for by the Contractor. Additional backfilling and compaction requirements and bedding requirements are discussed in the section on Potable Water System and Sanitary Sewage System.

3.5 TOLERANCES

- A. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.
- B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.6 FIELD QUALITY CONTROL

- A. Compaction testing will be performed in accordance with ANSI/ASTM D1557.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest at not cost to the Owner.

3.7 PROTECTION OF FINISHED WORK

- A. Re-compact fills subjected to vehicular traffic during construction.

END OF SECTION 02316

SECTION 02317 GENERAL EXCAVATING AND GRADING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Removal of topsoil and unsuitable material.
- B. Cutting, grading, filling and rough contouring the site.
- C. Excavating for building foundations, slabs on grade, site structures.
- D. Excavating for Roadways and Parking, Lake and Stormwater Detention Basins
- E. Subgrade preparation

1.2 RELATED SECTIONS

- A. Erosion and Sediment Control.
- B. Backfilling.
- C. Excavating and Backfilling for Utilities

1.3 REFERENCES

- A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.4 QUALITY ASSURANCE

- A. The term "excavation" used hereinafter is defined as "unclassified excavation".

PART 2 PRODUCTS

2.1 MATERIALS

- A. Topsoil: as specified in Section 31 2333.
- B. Subsoil Fill: as specified in Section 31 2333.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

- A. The Contractor will stake out and establish proposed elevations of all items including driveways, structures, sidewalks, parking areas and utilities and any other layout work necessary for construction of the project.
- B. Existing utilities, structures and drainage improvements shall be verified as specified in Section 31 3000.
- C. Erosion and sediment control measures should be installed as specified in Section 31 2500.

3.3 EXCAVATION

- A. Excavation of every description regardless of material encountered within the grading limits of the project, shall be performed to the lines and grades as indicated. Suitable excavated material shall be transported to and placed in fill areas within the limits of work.
- B. During construction, excavation and filling shall be performed in a manner and sequence that will provide drainage at all times.
- C. Excavate subgrade required to accommodate building foundations, slab on grade, site structures, roadways, parking areas and construction operations.
- D. As directed, unsuitable material encountered within the limits of work shall be excavated below the grade shown and replaced with suitable material. Unsuitable and surplus excavation material not required for fill shall be disposed of in designated waste or spoil areas.
- E. Do not interfere with 45 degree bearing splay of foundation.
- F. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- G. Hand trim excavation. Remove loose matter.
- H. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume.
- I. Correct unauthorized excavation at no extra cost to the owner.
- J. Correct areas over excavated by error.
- K. Stockpile excavated material in area designated on site and remove as indicated on plans.
- L. The soils engineer shall determine the acceptability of the subgrade prior to backfilling and compaction. Remove additional unsuitable material to depths as directed by the soils engineer.

3.4 TOPSOIL

- A. Topsoil shall be stripped in a manner as to prevent intermingling with subgrade materials.
- B. Sufficient topsoil shall be salvaged from the site as necessary to complete landscape work. Topsoil for landscape work may be stored at the site and extra fill will be hauled off or may be stored on-site as indicated on drawings.
- C. Areas of thick topsoil containing root mats shall be removed from site.

3.5 GRADING

- A. Grading work will be completed in accordance with the plans.

- B. Grading operations will be performed only under acceptable weather conditions and soil moisture contents.
- C. Final grades of proposed disturbed areas will be brought to proposed grades as shown on the plans, in a manner acceptable to the Engineer's representative even if minor adjustments from plan grades are required.
- D. During grading operations, the Contractor will be responsible for maintaining proper drainage and for minimizing erosion. The Contractor will be responsible for re-establishing grades due to washout, settlement or other manner prior to acceptance.

3.6 SUBGRADING PREPARATION, REMOVAL OF UNSUITABLE MATERIAL AND PLACEMENT OF FILL MATERIAL

- A. All soil material on this project will be considered unclassified. All rock, hard pan, loose shale, loose stone, sticks and other deleterious material will be removed from the site in a manner acceptable to the soils engineer.
- B. All soft, unstable unsuitable or otherwise objectionable material shall be removed from the subgrade and replaced with suitable material. In excavated areas all objectionable loose rock, roots or other objectionable material shall be removed within the building area and to a distance of 10 feet outside the building for a depth not less than twelve-inches (12") below the original ground surface. All inherent soft spots, holes and other deviations shall be corrected by loosening, adding or removing material, reshaping and compacting.
- C. Unsuitable materials shall be considered highly plastic clay soils, of the CH and MH description, border line description based on the Unified Soils classification System. The unsuitable soils shall be removed to a depth to be determined in the field and backfilled with selected sands and sand-clays of the general site excavations or borrow excavations that will provide a firm unyielding sub-grade at the specified density.
- D. The subgrade area shall be proofrolled to detect unsuitable soil conditions. Proofrolling shall be performed with a heavily loaded dump truck or similar approved construction equipment. Fill soils shall be placed in six (6) inch compacted lifts and brought to final subgrade. The equipment should make at least six (6) passes over each section and where practical with the last three (3) passes perpendicular to the first. Soft, organic, highly plastic or excessively wet soils or old fill materials encountered during proofrolling shall be excavated and replaced with well compacted fill.
- E. The Contractor shall satisfy himself as to the adequacy of the subbase prior to proceeding further with construction. Should problems persist with the subbase, the Contractor shall be responsible for notifying the Engineer of the condition prior to proceeding with work.
- F. The subgrade shall be prepared between lines six to twelve-inches (6"-12") beyond the edges of the pavement or back of curb in accordance with the base width as shown on the plans. The subgrade shall be rolled and compacted to 98 % of the maximum dry density, Standard Proctor Density (ASTM D698-78).
- G. The subgrade shall be scarified, bladed and rolled to obtain a uniform texture and to provide as nearly as practicable a uniform density for the top six-inches (6") of the subgrade. The subgrade shall be shaped in conformity with the typical cross sections and the lines and grades as shown on the plans.

- H. Fill material shall have less than five percent (5%) by weight of fibrous organic material, a liquid limit less than thirty-five (35) and a plasticity index of less than fifteen (15).
- I. Fill materials will be free from any deleterious material such as roots, organic material, trash, frozen material and large stones (greater than six-inch (6") maximum dimension). Material larger than four inches (4") maximum dimension will not be placed in the top six inches (6") of fill. Fill or embankment material placed will not exceed the optimum moisture content of the soil by two percent (2%) or be two percent (2%) below the optimum moisture content. Add water or aerate to dry as necessary. Fill material should be well graded and have no more than twenty percent (20%) passing the number 200 sieve.
- J. Materials will be placed in 8-inch lifts and compacted prior to the placing of the next layer. Areas under roadways and parking areas (plus twelve inches (12") beyond curb or edge of pavement lines) and around proposed building sites will be compacted to a density not less than ninety-eight percent 98 % maximum dry density, Standard Proctor Density.
- K. The final top foot beneath the building floor slab shall be compacted to 100 % maximum dry density, Standard Proctor. All other fill soils within structural and pavement areas shall be compacted to 98 % of the Standard Proctor Dry Density. The base course within all pavement areas shall be compacted to 100 % of the modified Proctor Maximum Dry Density (ASTM D1557). All remaining fill soils in other areas not subject to structural or pavement loads shall be compacted to 95 % of the Standard Proctor Maximum Dry Density.
- L. The following shall be required:
 - 1. Unsuitable material beneath proposed and future buildings and proposed and future parking areas shall be removed and replaced with properly compacted backfill for proper foundation and pavement support. The depth of the unsuitable topsoil layer is expected to range from six (6) to twelve (12) inches throughout the site. In the Phase 3 area of the site, portions of the subgrade shall be undercut a minimum of 12 inches below stripped grade.
- M. Unsuitable soil material excavation and backfilling shall be completed by the Contractor and coordinated and directed by the geotechnical consultant.
- N. The use of on-site excavated materials as fill or backfill shall be directed by the geotechnical consultant.

3.7 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 1/10 foot.

3.8 FIELD QUALITY CONTROL

- A. Tests and Analysis of fill material will be performed in accordance with ANSI/ASTM D1557.
- B. All compaction testing will be performed in accordance with ANSI/ASTM D1557 and shall be fully paid for by the Contractor.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the Owner.

D. Provide for visual inspection of bearing surfaces.

3.9 PROTECTION

- A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- B. Protect bottom of excavations and soil adjacent to and beneath foundations, from freezing.

END OF SECTION 02317

SECTION 02360
TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following for termite control:
 - 1. Soil treatment.

1.3 SUBMITTALS

- A. Product Data: Treatments and application instructions, including EPA-Registered Label.
- B. Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following as applicable:
 - 1. Date and time of application.
 - 2. Moisture content of soil before application.
 - 3. Brand name and manufacturer of termiticide.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes, and rates of application used.
 - 6. Areas of application.
 - 7. Water source for application.
- E. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: A PCO who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance.

- B. Regulatory Requirements: Formulate and apply termiticides, and label with a Federal registration number, to comply with EPA regulations and authorities having jurisdiction.
- C. Standards for Application: Current edition of North Carolina Division of Regulatory and Public Service Programs Standard 27-1085.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with EPA-Registered Label requirements and requirements of authorities having jurisdiction.

1.6 COORDINATION

- A. Coordinate soil treatment application with excavating, filling, and grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs, before construction.

1.7 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, signed by applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
- C. Warranty Period: Five years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

- A. Continuing Service: Provide a proposal for continuing service, including monitoring, inspection and retreatment for occurrences of termite activity, from applicator to Owner, in the form of a standard yearly continuing service agreement, starting on the date of Substantial Completion. State services, obligations, conditions and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aventis Environmental Science USA LP; Termidor.
2. Bayer Corporation; Premise 75.
3. Dow AgroSciences LLC; Dursban TC or Equity.
4. FMC Corporation, Agricultural Products Group; Prevail FT.
5. Syngenta; Demon TC.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.
- C. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.
1. Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.

2. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers, piers, and chimney bases; and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 3. Masonry: Treat voids.
 4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
 - C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
 - D. Post warning signs in areas of application.
 - E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 02630

SECTION 02374 EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Installation of silt barriers such as silt fence or straw bales.
- B. Installation of rock check dams.
- C. Seeding for the purpose of slope stabilization or erosion control.
- D. Installation of rip-rap for slope stabilization.
- E. Removal of erosion control devices.

1.2 RELATED WORK

- A. General Excavating and Rough Grading
- B. Backfilling
- C. Excavation and Backfill for Utilities

1.3 REFERENCED STANDARDS

- A. South Carolina State Highway Department (SCSHD): Standard Specification for Highway Construction, 1986 Edition
- B. South Carolina Code of Regulations, Chapter 72, Article 2 (Erosion & Sediment Reduction & Stormwater Management Regulations)
- C. Guide to Site Development and Best Management Practices for Storm Water Management and Sediment Control (SCLRCC).

1.4 SUBMITTALS

- A. Proposed materials to be employed, for siltation control and preventing erosion damage shall be submitted for approval. Submittals shall include:
 - 1. List of proposed materials including manufacturer's product data.

1.5 EROSION CONTROL PRINCIPLES

- A. The following erosion control principles shall apply to the land grading and construction phases:
 - 1. Stripping of vegetation, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.
 - 2. Whenever feasible, natural vegetation shall be retained and protected.
 - 3. Extent of area which is exposed and free of vegetation shall be kept within practical limits.

4. Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbance.
 5. Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.
 6. Sediment shall be retained on-site.
 7. Erosion control devices shall be installed as early as possible in the construction sequence prior to start of clearing and grubbing operations and excavation work.
- B. Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to two (2) weeks, and temporary erosion protection when erosion exposure period is expected to be less than two (2) weeks.
1. Permanent erosion protection shall be accomplished by seeding with grass and covering with an erosion protection material, as appropriate for prevailing conditions.
 2. Temporary erosion protection shall be accomplished by covering with erosion protection materials, as appropriate for prevailing conditions.
 3. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 2:1 (horizontal: vertical) cut slopes shall be limited to a grade of 1.5:1.

1.6 SECTION DESCRIPTION

- A. Provide all equipment and materials, and do all work necessary to construct a complete erosion and sediment control program for minimizing erosion and siltation during the construction phase of the project. The Contractor shall provide additional erosion and sediment control materials and methods as required to effect the erosion and siltation control principles specified herein.

PART 2 PRODUCTS

2.1 SILT FENCE

- A. Silt fence shall be a wire-bound woodroll snow fence covered with filter fabric. Fence shall be 4 ft. high minimum, and shall have 3/8 in. by 1-1/2 in. wide pickets, approximately 2 in. apart, bound together with at least 13 gage minimum, galvanized steel wire.
1. Filter fabric shall be one of the following, or approved equal:

<u>Product</u>	<u>Manufacturer</u>
MIRAFI Silt Fence	MIRAFI, Charlotte, NC 28224
 2. Silt fence shall be supported by wooded posts, driven a minimum of 3 ft. into the ground. Posts shall be spaced 10 ft. o.c. maximum.

3. Fencing other than that specified above shall be subject to review and acceptance by the Engineer.

2.2 HAY BALES

- A. Hay bales for construction of erosion control devices shall be new, firm, wire- or nylon-bound livestock feed-grade.

2.3 TEMPORARY SEED COVER

- A. Grass seed for temporary seed cover shall be previous year's crop. Not more than 0.5% by weight shall be weed seed and not more than 1.75% by weight crop seed. Seed shall be delivered to site in sealed containers, labeled with name of seed grower and seed formula, in form stated below. Seed shall be dry and free of mold. Seed shall meet the requirements of SCDOT Standard Specifications Sections 810.03 and 810.04 for temporary vegetation.
- B. Seed for temporary seed cover shall conform to the following requirements:
 1. All seed must meet the requirements of the state seed laws including the labeling requirements for showing pure live seed, (PLS - purity x germination), name and type of seed.
 2. Seed furnished shall be of the previous season's crop and the date of analysis shown on each bag shall be within nine months of the time of use on the project. Each variety of seed shall be furnished and delivered in separate bags or containers.
 3. A sample of each variety of seed shall be furnished for analysis and testing when directed by the Architect/Engineer. The amount and type of seed planted per acre shall be as specified below.
 4. All seed shall be treated with fungicide approved by the Engineer.
 5. Seed application rate shall conform to SCDOT Standard Specifications Section 810.04.

2.4 RIP-RAP

- A. Rip-rap shall consist of hard quarry of field stone and shall be of such quality that it will be resistant to exposure to the action of water and air.
- B. Stone shall consist of well graded mixture of 6" to 8" stone.

2.5 CHECK DAM

- A. Check dams may be placed in swale and ditch sections to reduce velocities and erosion. Check dams shall consist of 12 inch or hand placed sized rip rap. The Contractor shall place the stone at locations shown on the plans and in other areas as approved by the Engineer where erosion occurs. The check dams shall be cleaned and otherwise maintained by the Contractor on a regular basis.

PART 3 EXECUTION

3.1 TEMPORARY SEED COVER

- A. Grass seed shall be spread by mechanical spreader at the specified rate.
- B. Following seeding, area shall be lightly raked to mingle seed with the top 1/8 to 1/4 in. of soil. Areas shall then be smoothed and rolled.
- C. Following rolling, entire area shall be watered until equivalent of a 2 in. depth of water has been applied to entire seeded surface, at a rate which will not dislodge seed. Watering shall be repeated thereafter as frequently as required to prevent drying of surface, until grass attains an average height of 1-1/2 in.
- D. At the Contractor's option, seed may be spread by the hydroseeding method, utilizing power equipment commonly used for that purpose. Seed and mulch shall be mixed and applied to achieve application quantities specified herein for the conventional seeding method, with mulch applied at the rate of 2700 lb. dry weight of mulch per acre. A mulching machine, acceptable to the Engineer, shall be equipped to eject the thoroughly wet mulch material at a uniform rate to provide the mulch coverage specified. Other provisions specified above for conventional seeding shall apply to hydroseeding.
 - 1. If the results of hydroseeding application are unsatisfactory, the mixture and/or application rate and methods shall be modified to achieve the required results.
 - 2. After the grass has appeared, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be re-seeded and such areas and parts of areas seeded repeatedly until all areas are covered with a satisfactory growth of grass.

3.2 SILT FENCE

- A. Silt fence shall be constructed and installed as shown on the plans, prior to start of clearing and grubbing operations.

3.3 HAY BALE DIKE

- A. Bales shall be placed in a row with ends tightly abutting the adjacent bales. Each bale shall be embedded in the soil a minimum of 4 in. Bales shall be securely anchored in place by stakes or steel bars driven through the bales. The first stake in each bale shall be angled toward the previously laid bale to force the bales together.

3.4 HAY BALE CATCH BASIN FILTER

- A. Catch basin filters shall be placed at all inlets to drainage structures as structures are installed. Outlet protection work shall be constructed before runoff is allowed to enter the drainage system.

3.5 MAINTENANCE AND REMOVAL OF EROSION CONTROL DEVICES

- A. Wetland areas, water courses, and drainage swales adjacent to construction activities shall be monitored twice each month for evidence of silt intrusion and

other adverse environmental impacts, which shall be corrected immediately upon discovery.

- B. Culverts and drainage ditches shall be kept clean and clear of obstructions during construction period.
- C. Erosion control devices
 - 1. Sediment behind the erosion control device shall be checked twice each month and after each heavy rain. Silt shall be removed if greater than 6 in. deep.
 - 2. Condition of erosion control device shall be checked twice each month or more frequently as required. Damaged and/or deteriorated items shall be replaced. Erosion control devices shall be maintained in place and in effective condition.
 - 3. Hay bales shall be inspected frequently and maintained or replaced as required to maintain both their effectiveness and essentially their original condition. Underside of bales shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath bales.
 - 4. Sediment deposits shall be disposed of off-site, in a location and manner which will not cause sediment nuisance elsewhere.
- D. Removal of Erosion Control Devices
 - 1. Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be re-graded and seeded.
 - 2. Erosion protection material shall be kept securely anchored until acceptance of completed slope or entire Project, whichever is later.

END OF SECTION 02374

**SECTION 02501
CONSTRUCTION IN PUBLIC
RIGHT-OF-WAYS AND EASEMENTS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Encroachment permits
- B. Road repair
- C. Traffic maintenance and safety during construction
- D. Maintaining drainage during construction

1.2 RELATED SECTIONS

- A. Erosion and Sediment Control
- B. Excavating and Backfilling for Utilities
- C. Aggregate Base Course
- D. Asphalt Paving
- E. Storm Drainage

1.3 REGULATORY REQUIREMENTS

- A. Comply with requirements of the South Carolina Department of Transportation.
- B. Comply with the South Carolina Stormwater Management and Sediment Reduction Act.

1.4 SUBMITTALS

- A. The Contractor shall submit data or shop drawings on all materials to be used under this section.

1.5 ENCROACHMENT PERMITS

- A. The Contractor will not proceed with construction along any South Carolina Department of Transportation (SCDOT) or other local county or municipal right-of-ways or easements without approved encroachment permits from the appropriate agency having jurisdiction.
- B. The Contractor will be provided copies of the approved encroachment permit by the Engineer. The Contractor will keep a copy of approved encroachment permits at the project site at all times during construction.
- C. The Contractor will be responsible for obtaining, through the Engineer, necessary copies of the encroachment permits from the appropriate agency, SCDOT, the county or municipality prior to initiating construction on any public right-of-way or easement.

- D. All work performed in SCDOT right-of-way will be in full accordance with the approved encroachment permits including any "Special Provisions" and SCDOT's, "A Policy for Accommodating Utilities on Highway Rights-of-Way", latest edition, and these specifications.
- E. All work performed in local county or municipal right-of-ways and easements shall be in full accordance with approved encroachment permits and these specifications.

1.6 GENERAL DESCRIPTION

- A. The Contractor shall perform all work necessary for or incidental to the performance and completion of construction in all public right-of-ways and easements. This work shall be completed as shown on the drawings and as specified in the contract documents. This work shall include the furnishing of all labor, materials and equipment. The Contractor shall be responsible for coordinating the work to assure that the work is completed in an orderly manner.
- B. Although such work may not be specifically shown or specified, all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure and complete installation shall be furnished and installed as part of this work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Stone for roadway repair will be in accordance with Section 32 1123 – Aggregate Base Course.
- B. Asphalt shall be in accordance with section 32 1216 – Asphalt Paving.
- C. Fill material shall be in compliance with section 31 2323 – Backfilling.
- D. Any culverts or drainage structures shall be in compliance with Section 33 4000 – Storm Drainage.

PART 3 EXECUTION

3.1 ASPHALT ROAD REPAIR

- A. Any asphalt pavement cut or damaged during the course of construction will be the responsibility of the contractor and will be repaired by the Contractor. The Contractor must take due caution in controlling pavement damage during necessary pavement cuts.
- B. After backfilling to 98 percent (98%) density and compaction of the trench as discussed in these specifications, for a pavement cut, the Contractor will backfill and compact base material in accordance with Section 306 of the SCDOT Standard Specifications from ten inches (10") below the existing pavement surface to the point flush with the pavement.
- C. The contractor will maintain the cut in good order until such time as the patching is completed. Immediately prior to patching, the Contractor will remove the backfilled stone from the point flush with the pavement to the proposed two-inch (2") depth of pavement patch.

- D. The Contractor will then trim pavement and cut edges to true line. The pavement will be trimmed an additional six inches (6") beyond the trench edge to provide firm support on undistributed material for the patch. No ragged edge repairs will be acceptable. Compaction requirements will be strictly enforced in pavement areas.
- E. After removal of the stone and trimming of the edges an asphalt primer will be applied at .25 to .45 gallons per square yard over the entire surface of the stone in the cut and allowed to set.
- F. Existing asphalt surfaces contacted with the new asphalt will have applied a thin coat of hot asphalt cement or asphalt thinned with naphtha immediately prior to placing of the asphalt.
- G. Asphalt joints shall be cut back to form a bond with freshly mixed asphalt and chilled asphalt.
- H. Unless otherwise specified, the compacted depth of the asphaltic concrete patch will be two-inches (2") and placed flush with the existing asphalt surface. For asphalt thickness' greater than three-inches (3"), the asphalt will be placed in two lifts.
- I. For longitudinal cuts in pavement or for areas of extensive pavement damage, the cut will be patched and the entire width of the roadway will be resurfaced for the longitudinal length of the cut or other damage as required by the Engineer. The depth of the resurfacing will be one and one quarter inches (1-1/4").
- J. Damage to pavement as a result of excessive trench width or in the opinion of the Engineer, as a result of contractor carelessness during construction operations outside the immediate pavement area and requiring resurfacing will be the responsibility of the Contractor and will be repaired by the Contractor at no cost to the Owner.

3.2 TRAFFIC MAINTENANCE, SAFETY AND CONTROL

- A. The Contractor must maintain at least one lane of traffic at all times and no trenches will be left open over night.
- B. The Contractor will receive permission from the local SCDOT Maintenance Engineer or the appropriate representative of the county or local municipality having jurisdiction prior to closing of a roadway.
- C. Work will be conducted so as to assure the least possible obstruction to traffic. The convenience of the general public and residences adjacent to the property are of prime importance and shall be provided for in an adequate and satisfactory manner.
- D. All obstructions in right-of-ways will be protected by the Contractor providing signs, barricades and lights. Signs and flagmen in the construction area will comply with the 1972 SCDOT "Manual of Uniform Traffic Control Devices for streets and Highways", Rev. 6-1-76 and all subsequent addendums.
- E. All trenches which traffic will pass over will be maintained in a condition that will allow normal vehicular traffic to pass over. Temporary access drives will be provided when necessary.

3.3 MAINTENANCE OF EXISTING DRAINAGE

- A. The Contractor will be responsible for maintaining drainage in the project area during the course of construction. The Contractor will be responsible for damage due to flooding as a result of construction practices. The Contractor will take precautions to minimize erosion during construction including the use of sediment and erosion control methods and protection of wetlands.
- B. The Contractor will be responsible for backfilling and re-establishing in similar condition for proper drainage any swales, ditches, culverts, etc., existing prior to the project for drainage use after completion of the project.
- C. For lines installed under culverts, the minimum distance between the top of the proposed pipe and the bottom of the culvert will be as required in these specifications. The Contractor will compact soil around and above the line to 95 percent (95%) of the maximum density (Modified Proctor - ASTM D-1557).

3.4 VEGETATION AND GRASSING

- A. The Contractor will take due precautions to avoid any unnecessary damage to trees, shrubbery, or other vegetation in the right-of-ways.
- B. Shoulders, swales, easements, and other similarly disturbed areas will be grassed in accordance with Section 810, "Seeding" of the South Carolina Department of Highways and Public Transportation Standard Specifications for Highway Construction and as follows:
 - 1. Seeding schedules will be in accordance with SCDOT Standard Specifications for permanent vegetation - lower state.
 - 2. Commercial fertilizer following ground preparation will be applied at a rate of 500 lbs. per acre.
 - 3. Seeding shall be uniformly sown in accordance with seeding schedules within 24 hours of application of fertilizers.
 - 4. Straw or hay mulch will be uniformly applied at a rate of two tons per acres. Emulsified asphalt RS-2 diluted with an equal amount of water will be uniformly applied over the mulch at a rate of .20 gallons per square yard. As an alternate method of seeding, wood cellulose fiber mulch shall be applied at a rate of 1,500 pounds per acre in a mixture of seed and fertilizer with hydraulic equipment in accordance with South Carolina Department of Transportation's Standard Specifications for Highway Construction Section 810.17, Method B.
 - 5. A satisfactory strand of perennial grass as permanent vegetation will be developed.

3.5 UNPAVED ROADS

Unpaved or gravel highways of DOT county or local municipality will be stabilized for the top twelve-inches (12") of backfill with crushed stone or coquina mixed with binder and compacted flush with the roadway. Any other unpaved road, side road, driveway, or other area presently stabilized by use of rock material will be stabilized with four-inches (4") of crushed stone or coquina after backfilling.

3.6 ACCEPTANCE OF WORK

Upon completion of the project, a certification of acceptance of work along the public right-of-way or easement will be obtained by the Contractor from all authorities having jurisdiction over right-of-way or easement encroached upon during the course of the project and submitted to the Engineer prior to final payment.

3.7 WARRANTY

- A. The Contractor will guarantee to the Owner all materials and equipment furnished and work performed for paving, drainage, grassing and other construction in public right-of-ways for a period of one (1) year from the date of the Engineer's certification of the work. For work requiring SC DOT approval on a SC DOT right-of-way, the guarantee will be for two (2) years from the date of certification by SC DOT.
- B. The Contractor should take due caution to assure that Sub-contractors comply with these specifications by causing appropriate provisions to be inserted in all sub-contracts to bind Sub-contractors to the Contractor by terms of the applicable Contract Documents.

END OF SECTION 02501

SECTION 02510 POTABLE WATER SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Installation of pressure piping for potable water system.
- B. Installation of gate valves, valve markers, and fittings.
- C. Installation of fire hydrants and post hydrants.
- D. Installation of all associated and related items necessary for the operation of the system.
- E. Testing and Disinfection of the system.

1.2 RELATED SECTIONS

- A. Excavating and Backfilling for Utilities
- B. Construction in Public Right of Ways
- C. Concrete Work

1.3 REFERENCES

- A. AWWA C150, C151, C600 (Ductile Iron Pipe, Testing, Blocking)
- B. AWWA C900, C905, ASTM D2441 (PVC Pressure Pipe)
- C. AWWA C104, C110, C111, C153 (Fittings)
- D. AWWA C651 (Disinfection)
- E. AWWA C500 (Valves)
- F. AWWA C502 (Hydrants)
- G. SC DHEC State Primary Drinking Water Regulations (R.61-58)

1.4 QUALITY ASSURANCE

- A. The Contractor shall obtain from the pipe manufacturers a certificate of inspection to the effect that the pipe and fittings supplied for this contract have been inspected at the plant and that they meet the requirements of these specifications. All pipe and fittings shall be subjected to visual inspection at time of delivery by rail or truck, also just before they are lowered into the trench to be laid, and joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor. The entire product of any plant may be rejected when, in the opinion of the Owner, the methods of manufacture fail to secure uniform results, or where the materials used are such as to produce inferior pipe or fittings.

1.5 SECTION DESCRIPTION

- A. The Contractor shall perform all work necessary for or incidental to the performance and completion of the water system. This work shall be completed as shown on the drawings and as specified in the contract documents. This work shall include the furnishing of all labor, materials and equipment. The Contractor shall be responsible for coordinating the work to assure that the work is completed in an orderly manner.

Although such work may not be specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation shall be furnished and installed as part of this work.

1.6 SUBMITTALS

The Contractor will submit the necessary number of Shop Drawings as specified in these specifications to the Engineer for all pipe and appurtenant items. For piping, the contractor will submit a notarized sworn statement from the manufacturer stating that inspections and all specified tests have been made and the results comply with the appropriate standards set forth in these specifications. Contractor shall not begin construction of piping or appurtenant items prior to receiving approved shop drawings from the Engineer.

PART 2 PRODUCTS

2.1 MATERIALS--GENERAL

- A. All materials will be delivered, stored and handled in a manner as to protect the materials from damage. All pipe and appurtenant items should be handled as according to manufacturer recommendation with mechanical equipment and no pipe or appurtenant items will be dropped or pushed into trenches. Material will be stored in such a manner as to prevent damage to the materials or storing structure and prevent injury to persons. Equipment will also be protected from damage as necessary. All pipe and appurtenant items shall be protected from damage and inspected for defects prior to installation. Any foreign matter shall be removed from the pipe prior to installation.
- B. Pipe, fittings, packing, jointing materials, valves and fire hydrants shall conform to Section C of the American Water Works Association (AWWA) Standards. All materials or products which come into contact with drinking water shall be certified as meeting the specifications of the American National Standard Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects.
- C. Gaskets, O-rings and other products used for jointing pipes, setting meters or valves, or other appurtenances which will expose the material to the water shall comply with the requirements of the South Carolina Department of Health and Environmental Control State Primary Drinking Water Regulations R.61-58.4(D)(1)

and shall not be made of natural rubber or any other material which will support microbiological growth. Lubricants which will support microbiological growth shall not be used for slip-on joints. The use of vegetable shortening to lubricate joints is prohibited.

2.2 PRESSURE PIPE SPECIFICATIONS

A. GENERAL

1. Potable water pressure pipe installed on this project will be ductile iron meeting the requirements of ANSI A21.50 and ANSI A21.51 or Polyvinyl Chloride (PVC) pipe.
2. PVC pipe in sizes four inches (4") through twelve inches (12") will be in accordance with the latest edition of AWWA C-900, Class 100 psi, DR 25 and in sizes less than four inches (4") will be in accordance with ASTM D2241, 160 psi, SDR 26.
3. Large diameter PVC pipe in sizes fourteen inches (14") through thirty-six inches (36") may be used only when specifically called for in the plans and/or the bid form. Large diameter PVC pipe shall be manufactured in accordance with AWWA C-905, latest edition.
4. PVC pressure pipe installed on this project will be in accordance with ASTM D1784 for PVC Compounds, ASTM D3139 for push on joints and ASTM F-477 for rubber gaskets.
5. All PVC pipe shall be furnished in factory packaged units and each section of pipe clearly marked with the manufacturer's name, pressure class, size and appropriate standard. All PVC pipe conveying potable water will be stamped with NSF seal of approval.

B. POLYVINYL CHLORIDE PIPE LESS THAN THREE (3) INCHES

For main line pipe less than three inches (3") in diameter, SDR-PR PVC will be used and will meet the requirements of ASTM D2241 and will be 160 psi pipe with standard dimension ratio of 26 (SDR-26). Pipe will not fail when tested for the appropriate sustained pressure, burst pressure, flattening and extrusion quality. Installation of Pressure Rated PVC pipe will include an encasement of sand six inches (6") thick around the full perimeter of pipe. The pipe will be furnished in twenty foot (20') laying lengths with no more than fifteen percent (15%) of the system comprised of lengths less than twenty foot (20').

C. POLYVINYL CHLORIDE PIPE 3 INCHES THROUGH 12 INCHES

For PVC pipe three (3) inches through twelve (12) inches, C-900 PVC pipe will be used. C-900 PVC pipe will be pressure class 100 psi meeting the requirements of AWWA C-900 "Standard For Polyvinyl Chloride (PVC) Pressure Pipe Three Inches (3") Through Twelve Inches (12") For Water", latest edition. The pipe will be furnished in twenty foot (20') lengths with smaller lengths comprising no more than fifteen percent (15%) of the system installed. The pipe will be cast iron pipe equivalent outside diameters. Joints will be rubber gasket, integral bell (push-on) type. Pipe bedding requirements will be in accordance with ASTM D2321, except as modified by these specifications.

Pipe will not fail when tested in accordance with AWWA C-900 for sustained pressure, burst pressure, flattening and extrusion quality. Each section C-900 PVC pipe must pass a hydrostatic proof test at four times its rated class pressure for a minimum of five seconds.

D. POLYVINYL CHLORIDE PIPE 14 INCHES TO 36 INCHES

SDR-PR PVC in sizes fourteen inches (14") to thirty-six inches (36") shall meet the requirements of AWWA C-905, latest edition. The pipe shall have outside diameters conforming to cast iron pipe sizes only as shown in Table 2 of C-905. Dimension Ratio (DR) shall be a 25 for a pressure rating of 165 psi. Fittings shall be cast iron or ductile in accordance with these specifications.

E. DUCTILE IRON PIPE

Ductile Iron Pipe will meet the requirements of ANSI 21.50 (AWWA C150) and ANSI 21.51 (AWWA C151), latest edition, and will be installed with push-on joints. Ductile Iron Pipe will be Class 50 pipe, cement mortar lined in accordance with ANSI 21.4. Single rubber gasket push-on joints will be in accordance with ANSI/AWWA C111/21.11, latest edition. Fittings will be cast or ductile iron in accordance with these specifications. Ductile Iron Pipe under this section will be installed in accordance with ANSI/AWWA C600, latest edition.

All pipe material, solder and flux shall be lead free (i.e. less than 0.2 percent lead in solder and flux and less than 8.0 percent lead in pipes and fittings).

2.3 FITTINGS

- A. Fittings for pipe less than three inches (3") nominal diameter will be in accordance with ASTM D2467 for Schedule 40 fittings.
- B. For all PVC pipe three inches (3") through forty-eight inches (48") in diameter, fittings will be cast iron or ductile iron in accordance with ANSI A21.10 (AWWA C110). PVC fittings or sleeve type couplings shall not be allowed. Cast iron or ductile fittings will be cement mortar lined in accordance with ANSI 21.4 (AWWA C104). Fittings will be furnished with an outside coating of bituminous material approximately one (1) ml thick and will be continuous and smooth and strongly adherent to the fittings. The outside coating shall be in accordance with ANSI/AWWA C110/A21.10, latest edition. Fittings will be Class 250 for cast iron and Class 350 for ductile iron up to twelve inches (12") and Class 150 for cast iron and Class 250 for ductile iron for sizes greater than twelve inches (12"). Fittings will be marked in accordance with ANSI 21.10. Joints will be in accordance with ANSI 21.11 (AWWA C111) "Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe Fittings" and will be of the mechanical joint type.
- C. Alternately, compact ductile iron fittings may be installed on this project. Compact ductile iron fittings will be in accordance with ANSI/AWWA C153/A221.53, latest edition for size three inches (3") through sixteen inches (16"). Ductile iron for the fittings will be in accordance with ASTM A536, latest edition, with a standard iron of 70-50-05. Fittings will be 350 psi pressure rating, as defined in AWWA C153. Compact ductile iron fittings will be cement mortar lined in accordance with ANSI 21.4 (AWWA C104), and shall have a one (1) ml thick bituminous outside coating as specified in this section for cast iron and ductile iron fittings.

2.4 VALVES

A. GATE VALVES

1. Double disc parallel seat gate valves will be manufactured in accordance with AWWA C500 and will be iron body, bronze mounted, double disc parallel seat type with Non-Rising Stems (NRS) for underground pipe lines or Outside Screw and Yoke (OS & Y) if noted on the plans.
2. For sizes two-inch (2") to 12-inch (12"), gate valves will be designed for a working pressure of 200 psi and a hydrostatic test pressure of 400 psi.
3. For sizes fourteen-inch (14") to forty-eight-inch (48"), gate valves will be designed for a working pressure of 150 psi and a hydrostatic test pressure of 300 psi static test pressure.
4. Valves will consist of heavy cast iron bodies with corrosion resistant parts or coatings, high tensile manganese bronze stems and bronze disc rings. Flanged valves shall be in conformance with ANSI B16.1, Class 125.
5. Gate valves shall be fitted with cast iron valve boxes and cover with fully adjustable tops for all buried valves.
6. Double disc parallel seat gate valves shall be required on all projects unless otherwise specified.

B. SWING CHECK VALVES

1. The Contractor will furnish and install swing check valves as shown on the plans and in accordance with these specifications.
2. For valves four inches (4") and larger, bodies and bonnets will consist of cast iron or cast steel and will be designed to allow removal of clapper arm and disc assembly through the bonnet opening without requiring removal of the valve from the line. Disc will be of cast iron or cast steel with bronze or alloy disc rings machined into the disc. The seat ring will be bronze or stainless steel and will be threaded for removal with the valve body in line. Clapper arms will be bronze bushed ductile iron. Clapper arm shafts will be manufactured of bronze or high tensile aluminum bronze, will be extended through the body for attachment of the weight or spring and will be capable of being field adjusted. Flanged ends will be faced and drilled in accordance with ANSI B16.1, Class 125.
3. Pressure Rating Requirements:

<u>Valve Size</u>	<u>Min. Working Pressure (psi)</u>	<u>Min. Hydrostatic Test Pressure (psi)</u>
12 inches and smaller	175	350
Larger than 12 inches	150	300

4. The valves will be operated by lever and weight or lever and spring.

C. BALL CHECK VALVES

1. The Contractor shall furnish and install ball check valves of the type and size indicated on the drawings.

2. The valve shall consist of a gray cast iron Class 35 body and cover and a hollow steel ball with a vulcanized nitrile rubber exterior.
3. The ball check valve will have one moving part. The design of the valve shall be such that it keeps solids, stringy material, grit, rags, etc. moving without the need for back flushing. The ball shall clear the waterway providing "full flow" equal to the nominal size. It shall be non-clog. There shall be no outside levers, weights, springs, dash pots or other accessories required for a swing (clapper) type check valve.
4. The ball shall be resistant to grease, petroleum products, animal and vegetable fats, diluted concentrations of acids and alkalines (ph 4-10), tearing and abrasion.
5. Flange drilling shall be according to ANSI B16.1, Class 125.
6. The ball check valve will be installed in the horizontal or vertical position as shown on the plans. If shown, the valve shall be of the type shown on the plans.

D. DOUBLE CHECK VALVE ASSEMBLY

1. Double check valve assemblies shall be installed as shown on the plans on the suction side of the pump to protect the water supply source from contamination. Double check valve assemblies shall meet the requirements of AWWA C506 for flow rates and head loss. Each valve shall consist of a poppet type, toggle lever or other approved check valve in a corrosion resistant compact cast iron epoxy coated maincase. Each valve will operate independently of each other. Springs will consist of stainless steel. The assembly shall consist of a one piece bronze sleeve and seat capable of being disassembled and repaired without removing the unit from the line service. Each assembly shall include two (2) check valves, two (2) gate or shut-off valves and four (4) test cocks properly located for field testing.
2. Double check valve assemblies must be included on the South Carolina Department of Health and Environmental Control's "List of Approved Backflow Prevention Devices", latest edition.
3. Installation of the assembly shall be in accordance with manufacturer recommendations and shall be in such a manner as to provide adequate access to the assembly for operating in the vertical or horizontal position shown on the plans.

E. FIRE PUMP SUCTION CONTROL VALVE

1. A Factory Mutual (FM) approved pump suction control valve shall be installed and capable of controlling pump discharge in relation to the suction head available and to assure that the suction head pressure does not fall below the preset minimum of 20 psi. The main valve shall be a diaphragm-type globe or angle valve, hydraulically operated, pilot controlled for modulating service. The valve shall be actuated by line pressure through a pilot control system affording fast response to changing pressure conditions to maintain the desired minimum pressure at pump suction. Operation shall be automatic and pressure setting adjustable.

2. The main valve shall have removable seat, delrin-sleeve guided stem and renewable resilient disc with rectangular cross section. The pilot control shall be direct acting, adjustable, spring loaded, diaphragm-type valve designed for modulating service to permit flow when controlling pressure exceeds spring setting. A device indicating the percent at which the valve is open or closed shall be supplied on the assembly, together with a sediment evacuator and dampening device.
3. The valve shall be designed to allow for repair and servicing without removing the valve body from the line.
4. The fire pump suction control valve shall be a Cla-Val Co. Model 50B-5KG valve or equal.

2.5 FIRE HYDRANTS AND POST HYDRANTS

Standard fire hydrants will be three (3) way dry top traffic model provided with two (2) two and one-half inch (2-1/2") hose nozzles and one four and one-half inch (4-1/2") steamer nozzle and will be manufactured and provided in full accordance with the latest revision of AWWA C502. The hydrant will include bronze drain ring and bronze thread for hydrant seat and attaching assembly. All standard fire hydrants on this project will be Mueller Centurion Model A421 or Engineer approved equal.

Post-type hydrants shall comply with AWWA specifications and shall consist of a two and one-eighth inch (2-1/8") main size valve opening with one (1) two and one-half inch (2-1/2") hose nozzle. The hydrant shall have a rated working pressure of 150 psi and a test pressure of 300 psi. Post hydrants shall be Mueller Model A041 1 or Engineer approved equal.

2.6 VALVE MARKERS

Valve markers will be installed at all buried valves, plugs and other points as directed by the Engineer. Valve markers will be four inch (4") x four inch (4") posts four feet (4') long consisting of 3,000 psi concrete and four (4) Number 3 bars as shown on the detail on the plans. Brass marker plates will be securely attached to the marker and stamped with an arrow pointing to the valve and the distance (nearest one-half foot) to the valve.

2.7 CONCRETE THRUST BLOCKING

Concrete thrust blocking will be provided to prevent movement of the pipe and appurtenances and shall be in accordance with AWWA C600 Section 3.8 and these specifications.

All tees, bends, plugs and hydrants on lines two and one half inches in diameter and larger shall be provided with reaction blocking, tie rods or other approved restraining methods to prevent movement.

2.8 TRACER TAPE

Foil-back tracer or marking tape is to be buried for the full length of pipe over all water mains at a depth of approximately twelve inches (12") and shall meet AWWA standards and the latest approved ASTM standards. Tensile strength of the tape shall be 28 lbs/inch (5,600 psi per ASTM D882). The tape shall consist of 5.0 mil (0.0050") overall thickness (per ASTM 2103) with a minimum of 35 gauge (0.00035") solid aluminum foil core. Foil must be visible from both sides and the adhesives that bond the protective plastic jacket to both sides of the foil must be applied directly to the film and foil layers with no inks or printing extending to the edges of the tape. The adhesive will not contain any dilutants, pigments or contaminants and shall be specially formulated to resist degradation by elements encountered in the installation. All printing shall be encased to avoid rub-off. Tape shall be Magnatec as manufactured by Thor Enterprises, Inc. of Sun Prairie, Wisconsin or Engineer approved equal.

Colors shall be as follows: Water Distribution System (Blue).

PART 3 EXECUTION

3.1 PREPARATION

- A. Identify required lines, levels, contours and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify and protect utilities that remain from damage.
- D. Protect above and below grade utilities that remain.
- E. Protect plant life, lawns and other features remaining as a portion of final landscaping.
- F. Protect bench marks, sidewalks, paving and curbs from excavating equipment and vehicular traffic.

3.2 INSTALLATION

- A. Piping
 - 1. Pressure pipe trenches will be in accordance with trenching, backfilling and compaction requirements as specified in Section 02318 and Section 02316. Pipe laying for pressure piping will be in accordance with manufacturer's recommendations and these specifications for delivering, protecting, handling, storing, laying and use of the pipe to be installed.
 - 2. Pipe will be laid on true lines according to the plans, without any unnecessary bending or wandering of the pipe along the right-of-way. Minimum nominal lengths of eighteen feet (18') of pipe sections will be used and installed with a minimum of thirty-six inches (36") of cover. Under extraordinary conditions specifically approved by the Engineer, a minimum of thirty inches (30") of cover may be allowed. For depths less than thirty inches (30"), ductile iron pipe will be required if specifically approved by the Engineer. The Contractor must verify this approval with the Engineer prior to installation.
 - 3. The trench bottom will be shaped on the undisturbed trench material so as to provide a firm, stable, uniform support along the full length of pipe. Bell holes will be excavated at each joint to assure support is provided

along the barrel of the pipe and to permit proper assembly of the joint. Ledge rock, boulders and large stones will be removed within six inches (6") of all sides of the pipe. Over-excavations shall be backfilled and compacted in accordance with these specifications.

4. Joints shall be fitted to insure watertight joints and shall be in conformance with manufacturer recommendations. Only one type of pipe will be used on this project, except where ductile iron pipe is specifically required. Transition couplings will be used for joining different type pipes. PVC fittings or Fernco or other couplings will not be allowed on transition couplings.
5. The Pressure Pipe Contractor shall be responsible for installing mains so as not to conflict with existing or proposed wastewater lines, storm sewer lines, culverts, etc. The Contractor will be fully responsible for providing adequate clearances from existing lines and/or proposed lines. No water main shall be in contact with any sewer manhole, storm sewer or catch basin.

B. Separation of Water Mains and Sewers

1. Separation of water and sewer lines will conform as a minimum to the requirements of the SCDHEC State Primary Drinking Water Regulations (R.61-53).
2. Parallel Installation - Water mains shall be laid at least ten feet (10') horizontally from any existing or proposed sewer. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten foot separation, DHEC may allow deviation on a case by case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least eighteen inches (18") above the top of the sewer.
3. Crossings - Water mains crossing sewers shall be laid to provide a minimum vertical separation of eighteen inches (18") between the outside of the water main and the outside of the sewer. This shall be the case whether the water main is either above or below the sewer line. Whenever possible, the water main shall be located above the sewer line. Where a new water main crosses a new sewer line, a full length of pipe shall be used for both the water main and sewer line and the crossing shall be arranged so that the joints of each line will be as far as possible from the point of crossing and each other. Where a new water main crosses an existing sewer line, one full length of water pipe shall be located so both joints will be as far from the sewer line as possible. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer line to prevent damage to the water main.
4. Drain-fields and Spray-fields: Potable water lines shall not be laid less than twenty five feet (25') horizontally from any portion of a wastewater tile-field or spray-field, or shall be otherwise protected by an acceptable method approved by DHEC.

- C. Fire Hydrants and Post Hydrants
 1. The hydrant will be installed with a minimum depth of thirty-six inches (36") over the pipe and will extend approximately thirty inches (30") above the ground surface. The base of the hydrant will be bedded in not less than seven (7) cubic feet of crushed stone and concrete thrust blocking (see "Standard Water Details" sheet". Installation will include assurance that hydrant drain holes are open and clear and free drainage is provided.
 2. Installations will be completed by painting as specified by the Owner with one finish exterior coating above the ground line after installation, clean-up and grassing. Before painting, the Contractor will assure that the finished coat is compatible with the shop coatings, the hydrant is cleaned and damaged areas primed and repainted.
- D. Fittings, Valves, Connections and Valve Markers
 1. Thrust blocking will be required at changes in directions, changes in sizes (reducer), dead ends, hydrants, valves and any other ductile iron fittings. Concrete thrust blocking will be in accordance with details shown on the plans and/or in these specifications. All valve boxes shall have a concrete collar placed around the top of this box as shown on detail sheet.
 2. Rodding: All main line and lateral valves, fire hydrants, vertical fittings, fittings in groups for crossing above or below other lines or obstacles, and fittings located with twenty feet (20') of another fitting shall be secured by rodding back to tees and other fittings. Rods shall be five-eighths inch (5/8") diameter steel all-thread rod.
 3. The marker will be installed a minimum of eighteen inches (18") above grade and will be located within one foot (1') of the property line/right-of-way interface.

3.3 PRESSURE AND LEAKAGE TESTS

- A. All sections of pressure pipe installed under this contract will be subjected to pressure and leakage testing in accordance with AWWA C600, latest edition, except as modified in these specifications. The Contractor shall be responsible for providing all testing equipment and conducting the test. Contractor shall contact the municipality prior to testing or filling of lines to insure policy procedures are met.
- B. After installation and backfilling, the lines will be flushed clean and all air expelled from the lines. The Contractor will provide outlets for air at high points in the line if none are located in the line. The hydrostatic test pressure at the test point in the line will be equal to 150 pounds per square inch gauge (psig) for water mains. The Contractor will be responsible for providing all pumps, connections and any other apparatus, including gauges for the proper completion of the testing.
- C. The Contractor will conduct all pressure and leakage tests in the presence of the Engineer's representative and a representative of the local public utility. Each section of the line between valves will be tested in order to check the tightness of valves for a period of fifteen (15) minutes. After the first section of line has been tested, the valve will be opened and the second section and valve(s) tested. The test will proceed in this manner until an entire area is under pressure.

D. The lines will be pressurized until an entire area is under pressure. Pressure will be maintained over the entire area for a period of two (2) hours. Allowable leakage in the two (2) hour period will be in accordance the following formulas:

1. Ductile Iron Pipe:

$$L = [SD(P)^{1/2}] \div 133,200$$

L = Allowable leakage in gallons per hour

S = Length of pipe tested in feet

D = Nominal diameter of pipe in inches

P = Average test pressure which should be no less than that specified for the pressure test in psig.

2. PVC Pipe:

$$L = [ND(P)^{1/2}] \div 7,400$$

L = Allowable leakage in gallons per hour

N = Number of joints in pipeline being tested

D = Nominal diameter of pipe in inches

P = Average test pressure which should be no less than that specified for the pressure test in psig.

3. An estimate of allowable leakage based on $L = [SD(P)^{1/2}] \div 133,200$ is as follows:

Allowable Leakage (L) in Gallons Per Hour Per 1,000 L.F.

Pipe Size	Allowable Leakage (gal/hour)		
	Test Pressure (psig)		
	<u>100</u>	<u>150</u>	<u>200</u>
2"	0.15	0.18	0.21
3"	0.23	0.28	0.32
4"	0.30	0.37	0.42
6"	0.45	0.55	0.64
8"	0.60	0.74	0.85
10"	0.75	0.92	1.06
12"	0.90	1.10	1.27

- E. If the pipe line under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.
- F. Water main pressure tests shall be conducted after installation of all water services, valves, and other items.
- G. Water used for testing will be paid for by the Contractor.
- H. Any deficiencies in the system will be repaired and/or replaced and re-tested at no cost to the Owner.

3.4 DISINFECTION

- A. After pressure and leakage tests, all sections of potable water line will be disinfected in accordance with AWWA C651, latest edition, except as modified in these specifications. The Contractor shall be responsible for providing all equipment and conducting all tests.
- B. The lines will be thoroughly flushed prior to disinfection at a velocity sufficient to clean the lines. The Contractor must take precautions to assure that proper drainage is achieved where flushing water is discharged.
- C. Flushing and cleaning shall be the responsibility of the Contractor. The Contractor shall pump dry and dispose of all extraneous ground water and other sand, gravel and foreign objects within the water main. Such materials shall not be flushed into the existing operating sewer mains, pump stations or appurtenant facilities. Flushing of water main lines under construction into sewer main lines of the municipality is prohibited.

Water for flushing and cleaning as herein referenced shall be provided by the local water utility upon payment of the appropriate fees for the installation of a fire hydrant meter in keeping with the local water utility established standards, rates and regulations. The water mains shall be flushed at a metered blow-off, fire hydrant or post hydrant.

- D. A valve between the existing and new water lines will be opened slightly to allow a constant rate of water to fill the new line slowly. Chlorine will be pumped by continuous feed methods into the line in sufficient quantities to provide a minimum chlorine residual throughout the system of fifty (50) parts per million (ppm). The new line will then be isolated from the existing system for a period of twenty-four (24) hours.

All valves and hydrants shall be operated within this period to disinfect the appurtenances. After twenty-four (24) hours, the treated water will contain no less than 10 mg/l of chlorine through the lines tested. The lines will again be opened after the twenty-four (24) hour period and thoroughly flushed until no chlorine exists as determined by the DPD test.

- E. A tap will be placed prior to disinfection on the top of the pipe at the end of the line or lines farthest from existing system and will be used to collect samples for bacteriological quality. No hoses or hydrants will be used in collecting samples. After flushing of chlorine from the system, the Contractor will provide sterilized bottles and take a minimum of two (2) samples with the second sample taken a minimum of twenty-four (24) hours after the first sample. The sample analysis will be conducted at a state approved private laboratory for bacteriological analysis. The samples must show the absence of bacteria. Should the analysis show bacteria present, the Contractor is responsible for repeating the disinfection and analysis procedures. The number of sampling points required will be as directed by the Engineer.

The Contractor will be responsible for notifying the South Carolina Department of Health and Environmental Control (SCDHEC) in order to obtain samples necessary to confirm the absence of bacteria. Satisfactory results from SCDHEC testing for bacteria is required prior to placing the lines in service. The Contractor will be responsible for the cost of any extra water required if the first test fails.

3.5 PAYMENT

Payment for items under this section shall be as specified in the Contract Documents.

A. PIPE

Payment for pressure pipe shall include the furnishing and installation of materials, excavation, bedding, backfilling, gaskets, transition couplings, unloading, tracer tape installation, testing, hauling and placing of the pipe. The payment will also include tie-ins (wet and dry) to the existing system, valves and other appurtenant items unless otherwise specifically shown as a separate item on the Bid Form.

B. GATE VALVES, POST INDICATOR VALVE AND CAST IRON BOXES

Payment for valves and cast iron boxes shall include furnishing, installation, materials, supplies, valve, box, steel all-thread rods, crushed stone bedding, pipe adaptors, concrete blocking, concrete collars and any other item or work necessary to complete installation of the work.

C. FIRE HYDRANTS

Hydrants shall include the complete furnishing and installation, cleaning, restoration, threaded tap plugs, threaded nipples, all-thread rods, concrete blocking, stone bedding, excavation, backfill and all other items necessary for a sound, secure and complete installation. This item shall not include the main line tee or cross fittings, gate valve, cast iron box and line from main.

D. CONCRETE VALVE AND LINE MARKERS

Payment for concrete valve and line markers shall include furnishing and installing complete concrete marker with brass marker plate with distance stamped to valve marked.

E. CONCRETE THRUST BLOCKING

Payment for concrete thrust blocking shall include all furnishing and installation of concrete blocking, rodding and any other items necessary. Volume (CY) shall be as shown in the "Concrete Thrust Blocking Schedule" in the specifications.

END OF SECTION 02510

SECTION 02530 SANITARY SEWER SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Install sanitary sewer pipe
- B. Install sanitary sewer manholes
- C. Install sanitary sewer services.
- D. Testing of sewer system

1.2 RELATED SECTIONS

- A. General Excavating and Grading
- B. Backfilling
- C. Excavating and Trenching for Utilities
- D. Storm Drainage

1.3 REGULATORY REQUIREMENTS

- A. Comply with requirements of the South Carolina Department of Health and Environmental Control
- B. Comply with requirements of the local wastewater utility.

1.4 SUBMITTALS

- A. Shop Drawings: The Contractor shall submit six copies of the following data or shop drawings for the following items to the Engineer for approval prior to construction:
 - a. Precast manholes
 - b. Manhole frames, covers and other castings
 - c. Pipe
 - d. Pipe fittings and adapters
- B. For piping, the Contractor will submit a notarized sworn statement from the manufacturer stating that inspections and all specified tests have been made and the results comply with the appropriate standards set forth in these specifications.
- C. Record Drawings: The Contractor will keep an up-to-date record of "Construction Record Drawings" noting any changes during the course of the project including location of wastewater services as directed by the Engineer and these specifications. This set will be sent to the Engineer at the completion of the project. Final inspections will not be conducted by the Engineer without this information. Data and measurements shown in the plans and specifications are believed to be accurate, but accuracy is not guaranteed. The Contractor must verify accuracy.

1.5 QUALITY ASSURANCE

- A. Materials: All pipe and appurtenant items shall be protected from damage and inspected for defects prior to installation. Any foreign matter shall be removed from the pipe prior to installation.
- B. Existing Utilities, Structures and Other Items: The Contractor will take precautions to prevent any unnecessary damage to existing utilities, structures, property, trees, landscaping and other items in the work area. Any work resulting in damage to these items as a direct or indirect result of the Contractor's work shall be the responsibility of the Contractor. The Contractor will be responsible for verifying the location and existence of all underground utilities. Location of utilities on the plans, whether fully and correctly located or partially and/or incorrectly located or omitted will not relieve the Contractor of the responsibility or liability for damage to utilities. The Contractor will be responsible for contacting local utilities for assistance in locating utilities. The Contractor must fully comply with the South Carolina Underground Utilities Damage Prevention Act, General Statutes 58-35-10 Section 20 through 120 and all other applicable underground utilities damage prevention laws and regulations.

The Contractor shall replace and/or repair any drainage culverts necessary to be removed or that have been damaged during work performed. All drainage from ditches or culverts shall be maintained during progression of the work so that any damage to property, public or private will not result from lack of , or diversion of existing drainage courses. At completion of the project, all drainage ditches and culverts will be completely opened and natural drainage restored. The Contractor shall properly restore drainage after construction and shall not represent that adequate drainage was not available prior to damage of the area.

1.6 SECTION DESCRIPTION

- A. The Contractor shall perform all work necessary for or incidental to the performance and completion of the sanitary sewer system. This work shall be completed as shown on the drawings and as specified in the contract documents. This work shall include the furnishing of all labor, materials and equipment. The Contractor shall be responsible for coordinating the work to assure that the work is completed in an orderly manner. Although such work may not be specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation shall be furnished and installed as part of this work

PART 2 PRODUCTS

2.1 GENERAL

- A. All materials will be delivered, stored and handled in a manner as to protect the materials from damage. All pipe and appurtenant items should be handled as

according to manufacturer recommendations with mechanical equipment and no pipe or appurtenant items will be dropped or pushed into trenches.

Materials will be stored in such a manner as to prevent damage to the materials or the storing structure and prevent injury to persons. Equipment will also be protected from damage as necessary.

2.2 MATERIALS

- A. Ductile Iron Pipe: Ductile iron pipe will meet the requirements of ANSI 21.50 and ANSI/ASTM A 746, latest revision and will be installed with push-on or mechanical joints. Fittings will be in accordance with ANSI/AWWA C110A21.10, latest edition.
- B. Polyvinyl Chloride Pipe: All PVC pipe installed on this project will comply with the following:
 - 1. ASTM D 3034 latest revisions for "Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings". Pipe shall have a Standard Dimension Ratio (SDR) of 35. Plastic for pipe and fittings will be in accordance with ASTM D 1784 and have cell classifications 12454-B, 12454-C, 13364-B, or 13343-C.
 - 2. Joints shall meet the requirements of ASTM D 3212 and the gaskets shall meet the requirements of ASTM F 477 (Elastomeric gaskets).
- C. Manholes: Precast concrete manholes furnished on this project will be manufactured in accordance with ASTM C 478 latest edition. Precast manholes will consist of a monolithic precast base, precast barrel, sections as necessary to achieve the required depth and tapered top sections. Top section will be eccentric cones for manholes six feet (6') or greater from the ground surface to the manhole invert. Eccentric or concentric cones may be used for manholes less than six feet (6') deep. Top slabs of manholes must be able to support street traffic and H-20 loadings. All wastewater manholes and manhole sections on this project will be constructed of precast concrete sections in accordance with these specifications unless otherwise specifically noted on the plans.
- D. Manhole frames and covers will be waterproof and cast iron and designed for traffic bearing (H-20) loads and of waterproof design. The frame and cover will be twenty-four inches (24") in diameter. The cover and frame will be machined to fit together so that no rattling will occur when crossed by traffic. Waterproof manhole frames and covers will be as manufactured by Sumter Machinery Company of Sumter, SC. Model MF 50 GT, MC 50 GT or Dewey Brothers, Inc. of Goldsboro, N.C. Model MH-RCP 3000 EC, or other approved equal. Bolt-down type manhole frames and covers will not be installed on this project.
- E. Manhole steps will be furnished in place with the precast manhole section. Steps will be ten-inch (10") clear width and manufactured of one-half inch (1/2") steel reinforced polypropylene plastic with offset step to prevent slippage.
- F. Stone Base: Gravity sewer pipe shall be bedded in SCDOT No. 57 stone. The size range shall be 1/2 inch to 1 inch.
- G. Masonry Cement: Masonry Cement shall conform to ASTM C91, Type II.
- H. Services: Service line pipe will be in conformance with the following specifications:

PVC

ASTM D 3034

PART 3 EXECUTION

3.1 GENERAL

- A. Pipe laying for gravity wastewater will be in accordance with the manufacturer's recommendations and these specifications for delivering, protecting, handling, storing, laying and use of the pipe to be installed.

3.2 WATERLINE AND WASTEWATER LINE SEPARATION

- A. Separation of water and wastewater lines will be as follows unless otherwise specified.
- B. Water line passing over wastewater line shall have a minimum clearance of eighteen-inches (18") from the bottom of the water pipe to the top of the wastewater line. Where the eighteen-inch (18") separation is not possible, both water and wastewater lines shall be ductile iron pipe each with a minimum section of eighteen-inches (18) linear feet of pipe centered at the crossing. Suitable bedding of the sewer lines will be provided to the spring line of the water line for a distance of two feet (2') each side of each pipe at the center of the crossing. For wastewater lines requiring a section of ductile iron pipe for this installation, the total length between manholes shall consist of ductile iron pipe.
- C. Water line passing beneath wastewater line is not considered desirable; however, if in the Engineer's judgment such a case is the most practical routing, water line passing beneath wastewater line shall have a minimum clearance of eighteen-inches (18") from the top of the water line to the bottom of the sewer line. In addition, both water and wastewater lines shall be ductile iron pipe each with a minimum section of eighteen (18) linear feet of pipe centered at the crossing. Suitable bedding material shall be provided from the bedding of the water line to the spring line of the sewer line for a distance of two feet (2') each side of each pipe at the crossing. No dissimilar connections of pipes should be made between manholes. Pipe should be one type from manhole to manhole.
- D. Horizontal separation between water line and wastewater line shall be a minimum of ten feet (10') from the outer edges of each pipe. Where it is not practical to provide ten feet (10') of horizontal separation, the bottom of the water line shall be placed a minimum of eighteen-inches (18") above the top of the wastewater line in a separate trench. Where neither the ten feet (10') nor eighteen-inches (18") of clearance are practical the water line shall be placed as far as practical horizontally and as high as practical above the wastewater line while providing minimum cover and both pipes shall consist of ductile iron pipe until adequate separation is provided. For wastewater lines, all pipe must consist of ductile iron pipe from manhole to manhole.

3.3 PIPE LAYING

- A. Trenches: Gravity sewer pipe trenches will be in accordance with trenching requirements as previously specified in Section 31 2333. Pipe laying will be completed in accordance with manufacturer's recommendations. Line will be laid to true line and grade in the uphill direction with the bell upgrade. Batter boards and strings or laser beams will be used to establish horizontal and vertical alignments. Bell holes will be excavated in the bedding material under each joint to assure proper support along the pipe barrel and to properly form the joint. Blocking will not be used to bring pipe to grade. When using a laser beam, the Contractor will be required to set a survey point fifty feet (50') upstream of each manhole. This check point will be accurate to line and grade. The Contractor will excavate the first fifty feet (50') of trench and transfer the line and grade information from the check hub into the trench to verify the laser alignment prior to laying any pipe in the trench. This hub information will be shown on the cut sheet.
- B. Ductile Iron Pipe Bedding:
1. Bedding requirements will be in accordance with the following: Class bedding (A,B,C, and D) will be as specified in ASTM D1274 (ANSI A106.2). Bedding materials will be as classed (I, II, III, IV and V) and ASTM D232 and classed under the Unified Soil Classification System (USCS) Method D 2487 and Practice D 2488. Ductile iron pipe will be bedded in 3/4" maximum sized granular material.
 2. Ductile Iron Pipe (Depths of 14' or less): For pipe depths fourteen feet or less, ductile iron pipe will be installed in Class "C" granular bedding in accordance with the National Clay Pipe Institute's "Clay Pipe Engineering Manual" and ASTM 1274 (ANSI A106.2). Bedding material will be placed below the pipe barrel for a depth of four inches (4") or one-eighth (1/8) the outside diameter of the pipe, whichever is greater. In addition, the bedding material will be brought up under the haunches of the pipe for a depth of one-sixth (1/6) the outside diameter of the pipe. Backfill will be placed and compacted in accordance with Section 02316. All ductile iron gravity wastewater pipe shall be installed in accordance with this specification.
 3. Ductile Iron Pipe (Depths greater than 14'): All wastewater lines deeper than fourteen feet (14') to the invert will be ductile iron pipe. For pipe depths from fourteen to eighteen feet (14'-18'), pipe will be installed in Class "B": bedding in accordance with the "Clay Pipe Engineering Manual" and ASTM 1274. Bedding material will be placed below the pipe for a depth of four-inches (4") or one-eighth (1/8) the outside diameter of the pipe, whichever is greater. In addition, the bedding will be brought up to the spring line (horizontal centerline) of the pipe. Backfill will be placed and compacted in accordance with Section 02316.
- C. PVC Pipe Bedding
1. Bedding requirements will be in accordance with the following: Class bedding (A, B, C, and D) will be as specified in ASTM D1274 (ANSI A106.2). Bedding materials will be as classed (I, II, III, IV and V) in ASTM D232 and classed under the Unified Soil Classification system (USCS) Method D 3487 and Practice D 2488.
 2. PVC Pipe: Polyvinyl Chloride (PVC) installed in accordance with ASTM D 2321 and as modified in these specifications. Flexible pipe will be bedded

in No. 57 Stone bedding material. Stone bedding material will comply with Class I one fourth inch (1/4") to one and one-half inch (1-1/2") graded stone bedding material. For depths of fourteen feet (14') or less, flexible pipe will be installed in bedding placed four-inches (4") below the pipe barrel and brought up to the top of the pipe. Class I, III or III materials will be used for initial backfill up to twenty-four inches (24") above the top of pipe over the full width of the trench. Class IV material may be used above initial backfill. Backfill will be placed and compacted in accordance with section 02316. For special backfill and compaction requirements under pavement area, see details shown on the plans and discussed in Section 02316 as applicable, of these specifications. For depths greater than fourteen feet (14'), ductile iron gravity wastewater will be installed.

3.4 FLUSHING AND CLEANING

- A. Flushing and cleaning shall be the responsibility of the Contractor. The Contractor shall pump dry and dispose of all extraneous ground water and other sand, gravel and foreign objects within the sewer main. Such material shall not be flushed into the existing operating sewer mains, pump stations or appurtenant facilities. Flushing of main line sewers under construction into main lines of the municipality is prohibited. Water for flushing and cleaning shall be fresh and potable. The contractor shall be responsible for compensating agencies (different from owner) for use on this project. The water mains shall be flushed at a metered blow-off, fire hydrant or post hydrant.

3.5 EXPOSED DUCTILE IRON PIPE

- A. Class 100 Ductile Iron Pipe will be furnished and installed at all aerial crossings as shown on the plans. Exposed pipe will be laid to the exact line and grade shown on the plans. Exposed pipe above grade will be laid on concrete piers at a minimum of one pier per pipe section exposed above grade. Piers will be constructed with 3,000 psi reinforced concrete.

3.6 MANHOLES

- A. Manholes will have mortar inverts with one-inch (1") vertical to twelve-inch (12") horizontal slope for drainage of the shelf area. Mortar inverts will be semi-circular shaped and formed to a depth of three-quarters (3/4) the pipe diameter.
- B. Manhole section will be jointed with butyl mastic showing inside and outside.
- C. Wastewater lines will be connected to manholes by means of flexible connectors or "boots" cast into the manhole section. Flexible connectors will be manufactured of high quality rubber or synthetic rubber in accordance with ASTM C923. All clamps or bolts for connectors will be manufactured from stainless steel.
- D. When entering into an existing manhole or into a precast manhole, a rubberized water stop shall be required. The hole shall not exceed one and one-half (1 1/2) times the diameter of the pipe. All entries into existing manholes shall be cored unless specifically approved by the Engineer.

- E. All manholes that have force main discharging into them shall be required to have a bituminous coating applied to the entire inside. The coating shall be an atmospheric and moisture resistant coating. Surface preparation and applications shall be in accordance with manufacturer recommendations and these specifications and shall be included in the unit price bid for manholes.
The surface of the manhole shall be prepared by cleaning of all dirt, oils and other foreign materials or contaminants. The surface shall be dry and prepared to provide a porous surface with exposed aggregate. Exposed rebar shall be cleaned as specified in SSPC-SP-5 (white metal).
The coating shall be two (2) coats of Bitumastic Super Service Black at 14 mils per coat as manufactured by Koppers or approved equal.
- F. Installed steps will have minimum of one inch (1") thickness between the inserted end of the step and the outer wall. Steps will project at least four inches (4") out from the wall. Steps will be spaced sixteen inches (16") on center.
- G. After excavation, a twelve-inch (12") thick bedding of crushed stone under the concrete base and twelve-inches (12") all around the outer edge of the manhole foundation will be placed prior to setting the manhole base.

3.7 DROP MANHOLES

- A. Drop manholes will be required for all manholes with a fall greater than twenty-four inches (24") between inverts. Drop manhole connections will be installed as shown on the "Standard Wastewater Details" sheet and will be watertight.

3.8 PROFILES AND CUT SHEETS

- A. The Contractor will be required to establish depth-of-cut profile surveys prior to any construction. The profiles will be recorded on cut sheets with a copy provided to the Engineer. The intervals along the lines shall show breaks in grade and be taken at distances between sightings not to exceed fifty (50) lineal feet of line.

3.9 TESTING

- A. General

The contractor will be required to furnish all labor, equipment and materials for conducting testing on gravity wastewater collection lines. The Contractor shall be responsible for the safety of all persons, equipment and public and private property during the conducting of tests. The Contractor will take necessary precautions to insure safety. All tests will be conducted in the presence of the Engineer's representative and a representative of the local public utility. All lines and appurtenant items will be constructed and backfilled including services and cleanouts prior to testing. Lines will be flushed and cleaned prior to all testing. All equipment will be tested and ready for operation prior to initiating the testing. Testing will be conducted at the request of the Engineer as the project progresses.

All testing will be included in the price bid for the work. The following tests may be required for wastewater line installation:

- a. Low Pressure Air Test

- b. Infiltration/Exfiltration Test
- c. Deflection Test

The type and number of tests required will be as directed by the Engineer. The contractor will be responsible for replacing or repairing in accordance with these specifications and retesting any pipe found defective during testing. Cost of repair, replacement and/or retesting of defective pipe will be at the Contractor's expense.

B. Low Pressure Air Test

1. A single control panel will be used for conducting the air test. Individual air hoses will be used from the control panel to pneumatic plugs, from control panel to sealed line for introducing low pressure air, and from sealed line to the control panel for continually monitoring the air pressure in the line. All monitoring gauges will be subject to calibration if requested by the Engineer for wastewater line installation.
2. Pneumatic plugs will be utilized to plug each section of line. The plug will be capable of completely sealing the pipe and will resist internal pressures without bracing or blocking. The plugs will be pressurized to 25 psig.
3. Air will be added to the sealed line until the line is pressurized at four (4) psig. After the pressure stabilizes above 3.5 psig, reduce the pressure to 3.5 psig or greater if desirable. In the event that lines are below groundwater levels, the pressure may be required to be increased at the Engineer's discretion. The test will be initiated and monitored for a period in conformance with ASTM C 328 formulas as shown on the attached "Air Test Table". Should the pressure in the sealed line drop more than one (1) psig in the prescribed time, the section will be unacceptable
4. Should any line segment fail the pressure test, the Contractor shall make any necessary acceptable repairs to correct the air leakage until the segment passes the air test. The repairs and retesting will be done at no additional cost to the Owner.

AIR TEST TABLE
 SPECIFICATION TIME REQUIRED FOR PRESSURE DROP
 FROM 3.5 TO 2.5 PSI
 (MIN:SEC)
 PIPE DIAMETER (INCHES)

LENGTH (FT)	PIPE DIAMETER (INCHES)				
	4	6	8	10	12
25	00:04	00:10	00:18	0:28	0:40
50	00:09	00:20	00:35	0:55	1:19
75	00:13	00:30	00:53	1:23	1:59
100	00:18	00:40	01:10	1:50	2:38
125	00:22	00:50	01:28	2:17	3:18
150	00:26	00:59	01:46	2:45	3:58

LENGTH (FT)	4	6	8	10	12
175	00:31	01:09	02:03	3:12	4:37
200	00:35	01:19	02:21	3:40	5:17
225	00:40	01:29	02:38	4:08	5:36
250	00:44	01:39	02:56	4:35	5:36
275	00:48	01:49	03:14	4:40	5:36
300	00:53	01:59	03:31	4:40	5:36
350	01:02	02:19	03:44	4:40	5:36
400	01:10	02:38	03:44	4:40	6:02
450	01:19	02:48	03:44	4:43	6:47
500	01:28	02:48	03:44	5:14	7:33
550	01:37	02:48	03:44	5:46	8:18
600	01:46	02:48	04:01	6:17	9:03
650	01:52	02:48	04:21	6:49	9:48
700	01:52	02:48	04:42	7:20	10:34

C. Infiltration/Exfiltration Test

1. The Contractor will provide and install a v-notch pipe weir to test for infiltration. The weir will be clearly graduated to identify either flow rate or depth and will be capable of measuring up to 400 gallons per day per inch diameter mile (GPD-IM) of pipe. The weir will be installed both plumb and level and will be watertight around the inside of the pipe.

The maximum allowable infiltration rate or exfiltration rate will be 200 GPD-IM

D. Deflection Test

All flexible wastewater pipe installations will be subject to a deflection test utilizing a Go-No Go Mandrel. Maximum allowable pipe deflection will be five percent (5%) of the base inside pipe diameter as specified in ASTM D3034. The test shall be performed without mechanical pulling devices. The mandrel shall be stamped with the manufacturer's name, serial number, percent deflection and nominal pipe diameter. The Contractor shall provide a proving ring for the mandrel used with the manufacturer's name, serial number opening diameter to the nearest one-thousandths of an inch and percent deflection. Mandrels without this information must be approved by the Engineer and the local wastewater utility.

3.10 SERVICES

A. General

Service lines, fittings, plugs and any other incidentals necessary for installation of wastewater service lines will be provided and installed by the contractor.

B. Single Services

Standard single service will include a main size x 6" service wye branch in main, a six-inch (6") forty-five (45) degree bend connected as necessary to the wye branch in the main, sufficient length of six-inch (6") service line to extend from the main to the service wye and from the service wye to the cleanout and the

service cap, a 6" x 6" service wye, two (2) six-inch (6") forty-five (45) degree bends for the cleanout, a six-inch (6") riser to the ground surface with a six-inch (6") cast iron cleanout cap and a six-inch (6") cap at the end of the service line. The cleanout cap will be encased in 18" x 18" x 4" depth 2,000 psi concrete pad or a reinforced precast concrete "doughnut".

C. Connections

Wye branches in main for service line connections will be set by the Contractor at a location as directed by the Engineer's representative. For depth of wyes less than eight feet (8') the wye branch will be set at a thirty (30) degree angle with the horizontal. The service line will be uniformly supported along the barrel of the pipe. The line will have a uniform grade at not less than one-eighth inch (1/8") per foot of slope. The minimum depth of service line at the property line shall be three feet (3') unless approved by the Engineer. The Contractor must take due caution in assuring adequate service line depth is provided to assure future plumbing connections to the service line location at the right-of-way line.

D. Double Services

For double services include the main size x 6" wye branch in main, sufficient six-inch (6") service line to extend from the main wye branch to the double wye and from the double wye to the cleanout and to the two (2) service line caps. The cleanout will consist of two (2) six-inch (6") forty-five (45) degree bends, a six-inch (6") riser to the ground surface, six-inch (6") cast iron cap and 18" x 18" x 4" concrete pad or a precast reinforced concrete "doughnut".

E. Location

The exact location of each service from the downstream manhole will be measured and recorded in a permanent book by the Contractor prior to backfilling. These records will be made available to the Engineer. The engineer's final inspection will not be conducted unless this information is provided in writing prior to the inspection.

F. Deep Services

In cases where the wye branch is greater than eight feet (8') deep a riser pipe will be used to bring the connection within eight feet (8') of the surface (unless a greater depth is required to achieve the one-eighth inch (1/8") per foot slope requirement). Install the necessary fittings or specials and make joints as specified for the sewer line. Encase the wye branch and the riser in 3,000 psi concrete as shown on the plans.

END OF SECTION 02530

SECTION 02621 CONSTRUCTION FABRICS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Installation of construction fabrics.

1.2 SECTION DESCRIPTION

- A. The Contractor shall perform all work necessary for or incidental to the installation of construction fabrics. This work shall be completed as shown on the drawings and as specified in the contract documents. This work shall include the furnishing of all labor, materials and equipment. The Contractor shall be responsible for coordinating the work to assure that the work is completed in an orderly manner. Although such work may not be specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation shall be furnished and installed as part of this work.

PART 2 PRODUCTS

2.1 MATERIALS-GENERAL

- A. Fabric shall consist of non-woven, needlepunched continuous filament polyester or polypropylene material. Fibers shall be oriented into a multi-directional stable network and shall allow passage of water.
- B. The fabric will be non-biodegradable and inert to chemicals commonly found in soils of the area of the project.
- C. The manufactured fabric physical properties will meet the following specifications:

<u>PHYSICAL PROPERTY</u>	<u>TEST</u>	<u>RESULTS</u>
Tensile Strength	ASTM D-1682	90
Elongation	ASTM D-1682	40
Water Permeability	Constant Head	0.1 cm/see
Coefficient (K)		
Puncture Strength	ASTM D-751	40
Fabric Pore Size (E.D.S)	-----	70-100 sieve (40 m.m.)
Fabric Weight	----	4.1 oz./sy

- D. The fabric shall be furnished in protective wrapping which shall protect the material from ultraviolet rays. The product shall be stored in the protective wrapper out of sunlight and away from heat in accordance with manufacturer recommendations.

PART 3 EXECUTION

3.1 GENERAL

- A. The fabric will be installed as shown on the plans. The trench shall be prepared as a smooth surface free from obstructions to the depth required and the fabric placed. The fabric shall be overlapped a minimum of twelve-inches (12") on edges and when wrapped around infiltration trenches or subsurface drains.
- B. After placement, the material must be covered immediately to prevent exposure to ultraviolet rays and under no circumstance will the material be exposed for a length of time greater than 14 days.
- C. The Contractor shall be responsible for protection of the fabric during construction. Damaged fabric shall be repaired by placing additional fabric over the damage and overlapped a minimum of twelve-inches (12") beyond the damage.

END OF SECTION 02621

SECTION 02630 STORM DRAINAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Trench excavation for storm drainage structures
- B. Installation of stormwater pipe
- C. Installation of stormwater structures.

1.2 RELATED SECTIONS

- A. Erosion and Sediment Control
- B. General Excavating and Grading
- C. Backfilling
- D. Excavating and Backfilling for Utilities
- E. Concrete Work

1.3 REGULATORY REQUIREMENTS

- A. Conform to requirements of Georgetown County Stormwater Ordinance and South Carolina Stormwater Management and Sediment Reduction Act.
- B. Conform to requirements of the SCDOT.

1.4 SECTION DESCRIPTION

The Contractor shall perform all work necessary for or incidental to the performance and completion of the storm drainage system. This work shall be completed as shown on the drawings and as specified in the Contract Documents. This work shall include the furnishing of all labor, materials and equipment. The Contractor shall be responsible for coordinating the work to assure that the work is completed in an orderly manner.

Although such work may not be specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation shall be furnished and installed as part of this work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Concrete Pipe: Reinforced Concrete Gravity Storm Sewer Pipe will be in accordance with ASTM C 76. Testing of pipe to evaluate physical properties will be in accordance with ASTM C 497. Pipe will be Class III wall thickness "B." Joints will be filled with mortar composed of one part Portland Cement and two parts of clean sharp sand to which will be added fifteen percent (15%) hydrated lime.

Joints may be of butyl material as approved by the Engineer in accordance with Federal Specification SS-S-10.5.

- B. Corrugated Metal Pipe: Corrugated metal pipe shall be aluminum alloy with locked seams. Conforming to AASHTO M196 or AASHTO M211. The corrugation profile shall be:

<u>Diameter</u>	<u>Gage</u>	<u>Corrugation Profile</u>
18"	16	2 2/3" x 1/2"
24"	16	2 2/3" x 1/2"
30"	14	3" x 1"
36"	14	3" x 1"
42"	14	3" x 1"
48"	14	3" x 1"
54"	14	3" x 1"
60"	12	3" x 1"
72"	12	3" x 1"

- C. High Density Polyethylene (HDPE) Corrugated Exterior/Smooth Interior Pipe: HDPE corrugated pipe, fittings and couplings shall have corrugated exterior and smooth interior walls and shall be in accordance with the following:
 AASHTO M252: Specification for Corrugated Polyethylene Drainage Tubing, 3 to 10-inch diameter (with smooth interior wall).
 AASHTO M294: Specifications for Corrugated Polyethylene Pipe, 12 to 36 inch diameter (Type S)
 ASTM D1056: Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
 ASTM D1248: Specification for Polyethylene Plastics Molding and Extrusion Materials (Type III, Category 4, Grade P33, Class C)
 ASTM D3350: Specification for Polyethylene Plastics Pipe and Fittings Materials (Cell Classification 324420C)
 ASTM D2321: Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
 Pipe, fittings and couplings shall be Hi-Q pipe as manufactured by Hancor, Inc. of Findlay, Ohio or N-12 pipe as manufactured by Advanced Drainage Systems, Inc. (ADS) of Columbus, Ohio.
- D. Cement Mortar: Cement mortar shall be in accordance with ASTM C270 and shall one part Portland Cement (in accordance with ASTM C150, Type I), 1/4 to 1/2 part hydrated lime (ASTM C207, Type S), mortar aggregate (ASTM C144) in the amount of 2-1/4 to 3 times the sum of cement and lime and clean water. Mortar shall be mixed to proper consistency and applied within 2-1/2 hours after initial mixing and shall not be allowed to set.
- E. Brick: Brick utilized shall be in accordance with ASTM C-62 for grade SW brick.
- F. Catch Basin Frames & Grates: Catch basin frames and grates shall be manufactured as gray iron castings in accordance with ASTM A48, latest edition, Class 30 iron (minimum) or ductile iron in accordance with ASTM A536, latest edition. All castings shall be heavy duty suitable for H-20 loads. Grates shall be machined for a level fit (without rocking). Frames and grates shall be as shown on the plans and as manufactured by Sumter Machinery, Dewey Brothers, or

Neenah Foundry. Manhole frames and covers shall be furnished and installed as discussed in Section 33 3000.

- G. Concrete Block Structures: Concrete block structures shall be constructed as shown on the plans and in accordance with these specifications. Concrete blocks shall consist of one part Portland Cement, 1-1/4 to 2 parts fine aggregate, and four parts or less coarse aggregate. Block shall be steam cured and have a compressive 28-day strength of 2,500 psi (pounds per square inch) of cross-sectional area laid in the wall. The maximum average absorption rate of the block shall not exceed seven percent (7%) by weight and no individual unit shall exceed eight percent (8%) by weight. Concrete blocks shall be furnished by a manufacturer approved by the Engineer.
- H. Precast Concrete Structures: Precast concrete structures may be constructed instead of brick or masonry structures. Precast structures shall be furnished by a manufacturer approved by the Engineer.
- I. Steps: Steps installed in stormwater structures shall be as specified for Precast Manholes in Section 33 3000.

PART 3 EXECUTION

3.1 GENERAL

- A. Stormwater structures may be constructed of brick, block, poured-in-place concrete, precast concrete structures or a combination thereof.
- B. Contractor shall connect all building roof drain lines to the underground site stormdrain lines. These connections shall be made in compliance with the local plumbing code. These connections shall be made even if not fully and completely shown on the plans.

3.2 TRENCH EXCAVATION

- A. Pipe trenches shall be of necessary widths for the proper laying of the pipe and the banks shall be as nearly vertical as practical. In paved areas the trench shall be vertical and sheeted, if required; the clearance between the pipe and trench wall or back of sheeting shall not exceed 18 inches. The bottom of the trenches shall be excavated to a depth of the outside bottom of the pipe barrel. Any over excavation shall be replaced with suitable compacted material. Excavation for inlets and other appurtenances shall be sufficient to provide a clearance between their outer vertical surfaces and the face of the excavation or sheeting, if used, of not less than 12 inches.
- B. Soft, spongy, or otherwise unstable material encountered below the established grade of the excavation which will not provide a firm foundation for subsequent work shall be removed and replaced as directed. Unless otherwise directed, all such unstable materials shall be removed for the full width of the excavation and replaced with approved fill material.
- C. Where sheeting and bracing are necessary to prevent caving of the trench sidewalls or sidewalls of excavation for other structures, and to safeguard the workmen, the trench or excavation for other structures shall be dug to such width

that the proper allowance is made for the space occupied by the sheeting and bracing to provide clearance as specified above.

3.3 CONCRETE PIPE INSTALLATION

- A. All pipe shall be carefully laid true to the line and grade shown on the Drawings. Any deviation from true alignment or grade which would produce a gap exceeding 1/2-inch between section of pipe for more than 1/3 of the circumference of the inside of the pipe, will not be acceptable and where such occurs, the pipe shall be re-laid without additional compensation. No mortar, joint compound, or other filler which would tend to restrict the flexibility of the joint shall be applied to the gap. Pipes having defects that have not caused their rejection are to be so laid that these defects will be in the upper half of the sewer.
- B. All pipes shall be laid with bells or grooves uphill. As the pipes are laid throughout the work, they must be thoroughly cleaned and protected from dirt and water. No length of pipe shall be laid until the two preceding lengths have been thoroughly embedded in place so as to prevent any movement or disturbance of the finished joint. No walking on or working over the pipes after they are laid, except as may be necessary in tamping earth and backfilling, will be permitted until they are covered to a depth of one (1) foot. Fill placed around the pipe shall be deposited on both sides simultaneously to approximately the same elevation and uniformly compacted. Whenever the pipe laying is discontinued, as at night, the unfinished end is to be securely protected from displacement due to caving of the banks or from other injury and a suitable stopper is to be inserted therein.

3.4 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

- A. High Density Polyethylene (HDPE) Corrugated Exterior/Smooth Interior Pipe shall be installed in accordance with the manufacturer's recommendations and these specifications.

3.5 BRICK MASONRY STRUCTURES

- A. Stormwater catch basins, junction boxes and manholes constructed of brick masonry shall be constructed as shown on the plans and in accordance with these specifications.
- B. Excavation for the structure shall be completed and the foundation set as shown on the plans. For concrete foundation see Section 03 3000 for additional information. Foundations must be solid and free from unsuitable materials.
- C. The brick shall be thoroughly saturated with water and placed and boarded into the mortar by the "shove joint" method in such a manner as to thoroughly bond the structure. Joints shall be not less than on-quarter inch (1/4") and not greater than one-half inch (1/2") in thickness and the thickness shall be uniform throughout.

- D. Backfilling shall be completed after the masonry has cured and compaction shall be completed in such a manner as to provide thorough compaction and not endanger the structure.

3.7 DRAINAGE STRUCTURE INSTALLATION

- A. Concrete inlets or other structures shall be constructed in conformity with the Drawings. Forms shall be designed and constructed so that they may be removed without injury to the concrete and shall be left in place for at least 24-hours after concrete is poured. Concrete shall be thoroughly tamped and shall be cured for at least five (5) days after removal of forms. Honeycomb places shall be thoroughly cleaned, saturated with water and pointed up with mortar.
- B. Precast inlets or other structures may be used in lieu of cast-in-place structures. Grates are to be set in place in mortar to the proper line and grade.

END OF SECTION 02630

SECTION 02720 AGGREGATE BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aggregate Base Course

1.02 RELATED SECTIONS

- A. General Excavating and Grading
- B. Backfilling
- C. Asphalt Paving

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aggregate Base Course shall consist of Stabilized Aggregate Base Course (SABC) in compliance with SCDHPT (SCDOT) Standard Specifications, 1986 Edition, Section 305.

PART 3 EXECUTION

3.01 PREPARATIONS

- A. Sub-base material shall be prepared in conformance with Section 02317 and Section 02740.
- B. After placing of the material, the base course shall be bladed throughout the full length, width and depth as shown on the plans until thoroughly and uniformly mixed. The base course area will be rolled with a power roller weighing at least ten (10) tons. The base course will be worked and rolled until the surface is smooth and the entire base uniform and compacted. All deficiencies in the base will be corrected until these specifications are met. Areas not accessible to rollers will be compacted with mechanical or hand tampers.
- C. The base course shall be constructed at the compacted thickness shown on the plans and placed on the prepared subgrade.
- D. Construction of the base course will be in accordance with Section 306 of the SCDHPT (SCDOT) Standard Specifications for Highway Construction.
- E. The base course shall be compacted to 100 percent maximum dry density, Modified Proctor (ASTM D-1557).
- F. Upon request, the Contractor will provide delivery tickets verifying the weight and/or volume of base course material delivered by each truck used on the project.

END OF SECTION 02720

SECTION 02743 ASPHALT PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Base Course
- B. Prime Coat
- C. Tack Coat
- D. Asphalt Placement
- E. Striping

1.02 RELATED SECTIONS

- A. General Excavating and Grading
- B. Construction in Public Right-Of-Ways

1.03 SECTION DESCRIPTION

The Contractor shall perform all work necessary for or incidental to the performance and completion of paving including furnishing all labor, materials and equipment. This work shall be completed as shown on the drawings and as specified in the contract documents. The Contractor shall be responsible for coordinating the work to assure that the work is completed in an orderly manner.

Although such work may not be specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation shall be furnished and installed as part of this work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aggregate Base Course shall consist of Stabilized Aggregate Base Course (SABC) in compliance with SCDOT Standard Specifications, 1986 Edition, Section 305.
- B. Tack Coat: SCDOT Standard Section 406.
- C. Hot Laid Asphalt - Surface Course: All surface course materials shall conform to requirements of SCDOT Standard Specifications, 2007 Edition, Section 403. This shall be Type C Asphalt.
- D. Hot Laid Asphalt-Binder Course: All binder course materials shall conform to SCDOT Standard Specifications, 2007 Edition. Contractor shall provide mix design sheet to be approved by SCDOT before installing pavement.
- E. Lane Marking Paint: Alkyd type, (FS-TT-P-115-F) Type 1. Glass beads are not required.

PART 3 EXECUTION

3.01 GENERAL

- A. The CONTRACTOR shall take precautions to prevent any unnecessary damage to utilities, trees, vegetation and other items in the area. The CONTRACTOR shall not, under any circumstances, encroach on adjoining properties including highway right-of-ways without written permission from the owner of the property.

3.02 BASE COURSE

- A. The base course shall be constructed at the compacted thickness shown on the plans and placed on the prepared subgrade.
- B. After placing of the materials, the base course shall be bladed throughout the full length, width and depth as shown on the plans until thoroughly and uniformly mixed. The base course area will be rolled with a power roller weighing at least ten (10) tons. The base course will be worked and rolled until the surface is smooth and the entire base is uniform and compacted.
- C. All deficiencies in the base will be corrected until these specifications are met. Areas not accessible to rollers will be compacted with mechanical or hand tampers.
- D. Construction of the base course will be in accordance with Section 306 of the SCDOT Standard Specifications for Highway Construction.
- E. The base course shall be compacted per Section 02720.
- F. Upon request, the Contractor will provide delivery tickets verifying the weight and/or volume of base course material delivered by each truck used on the project.

3.03 PRIME COAT

- A. An asphalt primer will be supplied to the entire base course surface area prior to placement of asphalt. The primer will be applied at a rate of .30 to .35 gallons per square yard. The primer coat shall not be applied sufficiently to allow uniform penetration. The prime coat must be applied a minimum of 48 hours prior to application of binder or surface courses.

3.04 TACK COAT

- A. When asphalt course is to be placed on an existing or new asphalt layer, a tack coat of asphalt shall be uniformly applied at a rate of 0.05 to 0.15 gallons per square yard over asphalt areas to be overlaid. The asphalt to be overlaid will be cleared as necessary prior to application of the tack coat. The tack coat shall consist of asphalt cement or acceptable grade of emulsified asphalt (not to exceed 50 percent water).

3.05 ASPHALT PLACEMENT

- A. General: Place asphalt mixture on prepared surface per requirements of SCDOT Standard Specifications Section 401 and 403 as applicable. Asphalt pavement

shall be as shown on the plans and the surface course shall be in full accordance with applicable sections of the SCDOT Standard Specifications, 1986 Edition, Section 400.

- B. Plant Mix: Asphalt courses shall be mixed in an approved batch plant.
- C. The asphalt surface courses will be placed and compacted on the prepared subgrade to the lines, grades, and compacted thickness shown on the plans. The materials will be placed only when the temperature is greater than fifty (50) degrees Fahrenheit in the shade away from artificial heat. The asphalt courses shall be of uniform density and thickness and shall be smooth and free from deficiencies. Asphalt courses will weigh a minimum of one hundred and ten (110) pounds per square yard per inch depth of asphalt placed. Asphalt courses shall not be placed in lifts exceeding two (2) inches per course. Asphalt shall be installed to 98% compaction of target density established in field by a rolling pattern method. Surfaces contacted with the new asphalt will have applied a thin coat of hot asphalt cement or asphalt. Asphalt joints shall be cut back to form a bond with freshly mixed asphalt and chilled asphalt.
- D. The asphalt courses will be compacted by rolling (or tampering for non accessible areas) while the material is hot. A minimum of 250 pounds per inch of width of roller tread will be used to compact the material. Compacted material shall be protected from traffic until the material is hardened by cooling. Failure to protect the asphalt for sufficient time to cool will be the responsibility of the Contractor.

3.06 STRIPING

- A. Cleaning: Sweep and clean surface to remove loose material and dust.
- B. Parking Lot Striping: Use alkyd base traffic lane marking paint, factory mixed, quick drying and non-bleeding. Color: White. Apply two (2) coats of paint at manufacturers' recommended rates.
- C. Apply traffic and lane marking paint only after layout and placement have been verified by Architect/Engineer.
- D. Striping shall be in accordance with SC DOT specifications.

3.07 FIELD QUALITY CONTROL

- A. General: Test in-place compacted sub-base, base course and asphalt for compliance with requirements for thickness and compaction. Unacceptable paving will be repaired or replaced at the CONTRACTORS expense.

END OF SECTION 02743

SECTION 02744 CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete Pavement
- B. Striping

1.02 RELATED SECTIONS

- A. General Excavating and Grading
- B. Construction in Public Right-Of-Ways and Easements

1.03 SECTION DESCRIPTION

The Contractor shall perform all work necessary for or incidental to the performance and completion of paving including furnishing all labor, materials and equipment. This work shall be completed as shown on the drawings and as specified in the contract documents. The Contractor shall be responsible for coordinating the work to assure that the work is completed in an orderly manner.

Although such work may not be specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation shall be furnished and installed as part of this work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete shall be Portland Cement Concrete as described in Part 3 of this section.

PART 3 EXECUTION

3.01 GENERAL

- A. The CONTRACTOR shall take precautions to prevent any unnecessary damage to utilities, trees, vegetation and other items in the area. The CONTRACTOR shall not, under any circumstances, encroach on adjoining properties including highway right-of-ways without written permission from the owner of the property.

3.02 CONCRETE PAVEMENT

- A. General: Portland Cement Concrete Pavement shall be required as shown on the plans and shall be in full accordance with applicable sections of the South Carolina Department of Transportation's "Standard Specifications for Highway Construction" (hereinafter referred to as "SC DOT Standard Specifications), 1986

Section 500, "Rigid Pavement". Materials shall meet the requirement of Section 701 of the DOT Standard Specifications.

- B. Concrete utilized on this project shall be composed of Portland cement, fine aggregate, coarse aggregate, fly ash, water granulated blast furnace slag, water and chemical admixtures as proposed by the Contractor and approved by the Engineer to produce concrete of the specified strength and workability. The concrete flexural strength workability and sampling shall be in accordance with Section 201.11 of the DOT Standard Specifications. The mix will produce a minimum job average flexural strength of 550 pounds per square inch at the age of 14 days. Concrete Aggregate shall be granite or similar hard rock. Limestone shall not be acceptable. Slump shall not exceed four (4) inches during testing. The Contractor shall furnish the concrete necessary for test specimens and furnish labor to assist the Engineer in obtaining samples and testing the material.
- C. The concrete finish shall be broomed unless otherwise noted. Curing materials shall be in accordance with Section 501.10 of the DOT Standard Specifications. Curing shall be completed in accordance with Section 501.24 of the DOT Standard Specifications by curing compound sprayed on or by covering with plastic. For placement of concrete, the Contractor must use a mechanical, vibratory screed.
- D. Reinforcing steel shall be as specified in Section 703 "Reinforcing Steel" of the DOT Standard Specifications Section 501.09. Reinforcing steel shall be Grade 40 steel.
- E. Joints shall be saw-cut at one-quarter inch (1/4") width and one and one-quarter inch (1-1/4") depth for the full length of the centerline of road and cross cut at maximum fifteen feet (15') traverse intervals. Joints to be saw-cut within twenty four (24) hours of placement. Joints shall be sealed in accordance with Section 501.27 "Sealing Joints" for installation. Joint filler shall be nitril rubber. The manufacturer name and product information shall be submitted to the Engineer for approval.
- F. Concrete areas for the project shall require the following:
 - 1. Six inches (6") of Portland Cement Concrete with four inches (4") of approved sand base course on a prepared subgrade.
 - 2. Bars and spacing shall be as follows:
 - a. Longitudinal Joints - No. 4 bars with thirty inch (30") lengths and spacing of thirty inches (30") on center.
 - b. Transverse Joints (Construction Joints Only) - No. bars with eighteen inch (18") lengths and twelve inches (12") on center.

3.03 STRIPING

- A. Cleaning: Sweep and clean surface to remove loose material and dust.
- B. Parking Lot Striping: Use alkyd base traffic lane marking paint, factory mixed, quick drying and non-bleeding. Color: White. Apply two (2) coats of paint at manufacturers' recommended rates.
- C. Apply traffic and lane marking paint only after layout and placement have been verified by Architect/Engineer.
- D. Striping shall be in accordance with SC DOT specifications.

3.04 FIELD QUALITY CONTROL

- A. General: Test in-place compacted sub-base, base course and asphalt for compliance with requirements for thickness and compaction. Unacceptable paving will be repaired or replaced at the CONTRACTORS expense.

END OF SECTION 02744

SECTION 02770 CONCRETE CURB AND GUTTER

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Installation of concrete curb and gutter.

1.2 RELATED SECTIONS

- A. General Excavating and Grading
- B. Concrete Work

1.3 REFERENCES

- A. ACI 304 - Recommended Practice for measuring, Mixing, Transporting and Placing Concrete.
- B. ANSI/ASTM D1751 - Performed Expansion Joint Fillers for Concrete Paving and Structural Construction.
- C. ANSI/ASTM D1752 - Performed Sponge Rubber and Cork Expansion Joint fillers for Concrete Paving and Structural Construction.
- D. ASTM C33 - Concrete Aggregates.
- E. ASTM C94 - Ready Mix Concrete.
- F. ASTM C150 - Portland Cement
- G. ASTM C260 - Air-Entraining Admixtures for Concrete.
- H. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- I. ASTM C494 - Chemical Admixtures for Concrete.
- J. FS TT-C-800 - Curing Compound, Concrete, for New and Existing Surfaces.

1.4 SECTION DESCRIPTION

- A. The Contractor shall perform all work necessary for or incidental to the performance and completion of concrete curb, concrete gutter and combination curb and gutter. This work shall be completed as shown on the drawings and as specified in the contract documents.

This work shall include the furnishing of all labor, materials and equipment. The Contractor shall be responsible for coordinating the work to assure that the work is completed in an orderly manner. Although such work may not be specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation shall be furnished and installed as part of this work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. The Contractor will submit the names of suppliers of all concrete materials. Materials supplied on the project will meet the requirements of ACI 301-72, "Specifications for Structural Concrete for Buildings." Concrete will be a minimum of 3,000 psi standard 28 cylinder strength as shown on the plans with a maximum design slump of four (4) inches. Ready Mix Concrete must meet the requirements of ASTM C 94 "Specifications for Ready Mix Concrete". Concrete form work will meet the requirements of ACI 347 "Recommended Practice for Concrete Form Work."
- B. Aggregate base course material will comply with Section 02511 - Asphalt Paving.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect utilities that remain, from damage.
- D. Protect above and below grade utilities that remain.
- E. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- F. Protect bench marks, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- G. Notify Engineer minimum 24 hours prior to commencement of concreting operations.
- H. The Contractor shall verify suitability of the subgrade prior to placing the curb and gutter.

3.3 INSTALLATION

- A. This work shall consist of grading for setting of forms, placing of concrete, finishing and curing of Portland Cement curb, gutter and combination curb and gutter constructed on a prepared base course and subgrade, in one course, in conformity with the typical section shown on the plans and these specifications.
- B. The subgrade shall be excavated to the required depth below the finished surface in accordance with the cross-section shown on the plans. All soft, yielding or other unsuitable material shall be removed and replaced with suitable materials and the finished subgrade left in a thoroughly compacted smooth condition.
- C. All forms used shall be metal forms manufactured to the shape of the cross section given on the plans and designed so as to be set to the true line and grade given on the plans anchored securely in positions.

- D. After forms have been accurately set to the lines and grades, joints shall be formed in the curb and gutter at ten foot (10') uniform spacings by use of steel templates one-eighth inch (1/8") in thickness and cut to the section of the curb and gutter.
- These templates shall be placed ahead of pouring of concrete and left in place during the pouring operation and until the concrete has set sufficiently to hold its shape but shall be removed while the forms are still in place.
- E. Concrete shall be mixed and placed as specified in Section 02520. The base course material shall be kept moistened ahead of placing concrete and the concrete shall be placed in the forms and tamped sufficiently to bring the mortar to the surface, after which it shall be finished smooth and even by means of a wooden float.
- F. The edges of the curb and gutter shall be finished with an approved edging tool of three-quarter inch (3/4") radius; and upon removal of steel templates in joints, these joints shall be finished by use of a double edging tool with a one-quarter inch (1/4") radius.
- G. Contractor is advised that curb and gutter may be constructed by use of extruding machine in lieu of formed pours as previously specified; however, all work shall comply with current specifications of the South Carolina Department of Transportation.

END OF SECTION 02770

**SECTION 02920
GRASSING**

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Fertilizing
- B. Seeding or Hydroseeding
- C. Mulching
- D. Maintenance

1.2 RELATED SECTIONS

- A. General Excavating and Grading
- B. Excavation and Backfill for Utilities

1.3 REFERENCES

- A. FS O-F-241 - Fertilizers, Mixed, Commercial

1.4 DEFINITIONS

- A. Weeds: Includes Dandelion, Jimsonweed, Quack Grass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambs quarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy, Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.5 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.6 QUALITY ASSURANCE

- A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.7 MAINTENANCE DATA

- A. Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver packaged materials in container showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

- B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.9 MAINTENANCE SERVICE

- A. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition for two (2) cuttings.

PART 2 PRODUCTS

2.1 ACCEPTABLE SEED

- A. Standard grade seed of current or latest season's crop with 99% pure live seed by weight with weed seed not exceeding 0.5% by weight.

2.2 SEED MIXTURE

- A. Seed Mixture: March 15 to September 15 only.
 - 1. Centipede: 1/2 lb. per 1,000 sq. ft.
 - 2. Bermuda: 1-1/2 lb per 1,000 sq. ft. (hulled)
- B. If the season does not permit planting of specified grass variety, then the Contractor shall provide temporary cover grass until season permits establishing permanent grass.

2.3 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Wood cellulose fiber, free of growth or germination inhibiting ingredients is acceptable.
- B. Lime: Pelletized, natural, ground limestone combined with soluble binder containing not less than eighty-eight (88) percent of total carbonates, so that not less than ninety (90) percent passes a 100-mesh sieve. Apply at the rate of 60 lbs. per 1,000 square feet. If slacked lime is used, apply at 2/3 as much as of ground limestone.
- C. Peat Humus: Natural product conforming to ASTM D-2607 shredded and granulated to pass a 1/2 inch mesh screen.
- D. Commercial Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and containing following percentages of available plant nutrients. Provide fertilizer with not less than ten (10) percent potassium, and not less than ten (10) percent nitrogen. Provide nitrogen in a form that will be available to lawns during initial period of growth.
- E. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.
- F. Erosion Fabric: Jut matting, open weave.
- G. Herbicide: Mixed commercial.
- H. Stakes: Softwood lumber, chisel pointed.
- I. String: Inorganic Fiber.

PART 3 EXECUTION

3.1 PREPARATION

- A. After loosening subgrade of lawn to a minimum depth of four (4) inches work in soil mixture to a depth of four (4) inches. Remove stones over 1-1/2 inches in any dimension and sticks, roots, rubbish and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation. Work in fertilizer.
- B. Grade lawn areas to smooth, even surface with loose, uniformly fine texture, void of footprints or other depressions. Roll and rake and remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.
- C. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.

3.2 INSPECTION

- A. Verify that prepared soil base is ready to receive the work of this Section
- B. Beginning of installation means acceptance of existing site conditions.

3.3 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper two (2) inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

3.4 SEEDING

- A. Apply seed at a rate of two (2) lbs. per 1,000 sq. ft. evenly in two (2) intersection directions. Do not seed area in excess of that which can be mulched on same day.
- B. Planting Season: March 15 to September 15
- C. Do not sow immediately following rain or when ground is too dry.
- D. Immediately following seeding and compacting, apply mulch to a thickness of 1/2 inch. Maintain clear of shrubs and trees.
- E. Apply water with a fine spray immediately after each area has been mulched. Saturate to four (4) inches of soil.
- F. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.
- G. Seeds shall be sown within thirty (30) days of disturbing contours.

- H. Sow seed using a spreader or seeding machine. Do not seed when wind velocity exceeds five (5) miles per hour. Distribute seed evenly over entire area by sowing equal quantity in two (2) directions at right angles to each other.
- I. Sow not less than the quantity of seed specified or scheduled.
- J. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with a fine spray.
- K. Limestone shall be broadcast after establishment of the stand of grass.

3.5 HYDROSEEDING

- A. Apply seeded slurry at a rate of two (2) lbs. per 1,000 sq. ft. evenly in two (2) intersection directions, with a hydraulic seeder. Do not hydroseed area in excess of that which can be mulched on same day.
- B. Immediately following seeding, apply a mulch to a thickness of 1/2 inch. Maintain clear of shrubs and trees.
- C. Apply water with a fine spray immediately after each area has been mulched. Saturate to four (4) inches of soil.

3.6 SEED PROTECTION

- A. Identify seeded areas with stakes and strings around periphery. Set string height to eighteen (18) inches.
- B. Cover seeded slopes where grade is four (4) inches per foot or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.
- C. Lay fabric smoothly on surface, bury top end of each section in six (6) inch deep excavated topsoil trench. Provide twelve (12) inch overlap of adjacent rolls. Backfill trench and rake smooth, level with adjacent soil.
- D. Secure outside edges and overlaps at 36 inch intervals with stakes.
- E. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- F. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum six (6) inches.

3.7 MAINTENANCE

- A. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming.
- D. Water to prevent grass and soil from drying out.
- E. Roll surface to remove minor depressions or irregularities.
- F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- G. Immediately reseed areas which show bare spots.
- H. Protect seeded areas with warning signs during maintenance period.

3.8 SCHEDULE

- A. Seed all disturbed areas within the limits of work. Do not seed wetlands or any wetland buffer areas as defined on drawings.

END OF SECTION 02920

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.2 RELATED SECTIONS

- A. Section 01400 - Quality Requirements: Testing Laboratory Services.
- B. Section 03300 - Cast-in-Place Concrete.
- C. Section 04810- Unit Masonry Systems: Reinforcement for Masonry.

1.3 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 318 - Building Code Requirements For Reinforced Concrete.
- C. ACI SP-66 - American Concrete Institute - Detailing Manual.

D.ASTM International:

- 1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - 2. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 - 3. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
 - 4. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - 5. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 6. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
 - 7. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 8. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - 9. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
- E. ANSI/AWS D1.4 - Structural Welding Code for Reinforcing Steel.
 - F. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction.
 - G. CRSI - Concrete Reinforcing Steel Institute - Manual of Standard Practice.

- H. CRSI - Recommended Practice For Placing Reinforcing Bars.
- I. CRSI - Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Certificates: Submit AWS Qualification Certificate for welders employed on the Work.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI and Manual of Practice; ACI 301; ACI 318.
- B. Submit certified copies of mill test report of reinforcement materials analysis.
- C. Prepare shop drawings in accordance with ACI SP-66.
- D. Maintain one (1) copy of each document on site

1.6 QUALIFICATIONS

- A. Design reinforcement under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of North Carolina.

1.7 COORDINATION

- A. Section 01300 - Administrative Requirements - Coordination and Project Conditions.
- B. Coordinate work with all related trades to include but not limited to masonry and structural steel.
- C. Coordinate with placement of formwork, formed openings and other Work.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield strength; deformed billet steel bars, unfinished.
- B. Welded Steel Wire Fabric: ASTM A185 Plain Type in flat sheets or coiled rolls; unfinished.

WWF 6x6 w1.4x w1.4 or as indicated on the documents (whichever is more stringent).

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on the bottom to prevent puncture of the vapor retarder.

2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice/ ACI 318.
- B. Weld reinforcement in accordance with ANSI/AWS D1.4.
- C. Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI.
- D. Locate reinforcing splices not indicated on drawings, at point of minimum stress. Review location of splices with Architect/Engineer prior to installation.
- E. Form spiral column reinforcement from minimum 3/8 inch diameter continuous deformed bar or wire.
- F. Weld reinforcement in accordance with AWS D1.4.
- G. Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.
 - 1. Do not weld crossing reinforcement bars for assembly except as permitted by Architect/Engineer.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.

3.2 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements and 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform field inspection and testing in accordance with ACI 318.
- C. Provide free access to Work and cooperate with appointed firm.
- D. Reinforcement Inspection:
 - 1. Placement Acceptance: Specified and ACI 318 material requirements and specified placement tolerances.
 - 2. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.

END OF SECTION 03200

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cast-in-place concrete floor slabs on grade and footings.
- B. Control, and construction joint devices associated with concrete work, including joint sealants.
- C. Equipment pads
- D. Sidewalks

1.2 RELATED SECTIONS

- A. Section 01400 - Quality Requirements: Testing Laboratory Services.
- B. Division 2 – All related sections for sitework and earthwork
- C. Section 03200 - Concrete Reinforcement.
- D. Section 07900 - Joint Sealers
- E. Section 09686 – Sheet Carpet.
- F. Section 09650 - Resilient Flooring.
- G. Division 15 - Mechanical: Mechanical items for casting into concrete.
- H. Division 16 - Electrical: Electrical items for casting into concrete.

1.3 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 117 - Specifications for Tolerances for Concrete Construction Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 305 - Hot Weather Concreting.
 - 4. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 - 5. ACI 308.1 - Standard Specification for Curing Concrete.
 - 6. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
 - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 2. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 3. ASTM C33 - Standard Specification for Concrete Aggregates.

4. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
5. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
6. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
7. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
8. ASTM C150 - Standard Specification for Portland Cement.
9. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
10. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
14. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
15. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
16. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.
17. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
18. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
19. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
20. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
21. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
22. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
23. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
24. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
25. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.4 PERFORMANCE REQUIREMENTS

- A. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96, Procedure A.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on joint devices, attachment accessories and admixtures. Provide data on curing and finishing compounds, product characteristics, compatibility and limitations.

- C. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent work. Indicate criteria for preparation and application.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301/ACI 318, ACI 117 unless more stringent provisions are provided.
- B. Acquire cement and aggregate from same source for all work.
- C. Conform to ACI 305 when concreting during hot weather.
- D. Conform to ACI 306.1 when concreting during cold weather.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01600 - Product Requirements: Environmental conditions affecting products on site.
- B. Maintain concrete temperature after installation at minimum 50 degrees F for minimum 7 days.

1.8 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I - Normal or Type IA - Air Entraining.
- B. Normal Weight Aggregates: ASTM C33.
- C. Coarse Aggregate Maximum Size: In accordance with ACI 318.
- C. Water: ACI 318, ASTM C94: Potable clean and not detrimental to concrete.

2.2 ADMIXTURES

- A. Air Entrainment: Conform to requirement of ASTM C260.
- B. Fly Ash and Calcinated Pozzolan: Shall not be used and will be rejected.

- C. Silica Fume: ASTM C1240.

2.3 ACCESSORIES

- A. Vapor Barrier: ASTM E1745 Class A, type recommended for below grade application, furnish joint tape recommended by manufacturer.
 - 1. Manufacturers:
 - a. Raven Engineered Films – Vaporblock Underslab Vapor Barrier VE15
 - 1) Color: Blue
 - 2) Thickness (nominal) 15 mil
 - 3) Water vapor permeance 0.01 perms.
 - 4) Tensile Strength: 60 lb/in.
 - 5) Puncture Resistance: 3000 GMS.
 - 6) Use Vaporbond 4” seaming tape at all joints.
 - 7) Use all Vaporblock accessories – VaporBoot Tape and make screened support in accordance with manufacturer’s recommendations.
 - b. Substitutions: Section 01600 - Product Requirements.
- B. Non-Shrink Grout: ASTM C1107 Grade C premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,500 psi in 48 hours and 7,000 psi in 28 days.
- C. Curing Compound: SpecChem: ECure, Waterbased concrete curing compound

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler Type A: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/2 inch thick; tongue and groove profile.
- B. Construction Joint Devices: Integral galvanized steel; full thickness of slab, less 1/2 inch, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge.
- C. Sealant: Cold applied two part liquid neoprene.

2.5 CONCRETE MIX

- A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.
- B. Select proportions for normal weight concrete in accordance with ACI 301 Method 2.
- C. Provide concrete to the following criteria:
 - As per Structural Drawing, S1.0, Note Section: Concrete, Item 3.

- D. Use accelerating admixtures in cold weather only when approved by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.
- E. Use calcium chloride only when approved by Architect/Engineer.
- F. Use set retarding admixtures during hot weather only when approved by Architect/Engineer.
- G. Add air entraining agent to normal weight concrete mix for work exposed to exterior.
- H. Water shall not be added at the site unless approved by the Engineer.
- I. Average Compressive Strength Reduction: Not permitted.
- J. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M.
- K. Site Mixed Concrete: Mix concrete in accordance with ACI 318.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Section 01300.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.
- D. Verify compatibility of sealers and substrate finish with finish surface material bonding, in accordance with Manufacturer's recommendations.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Remove debris and ice from formwork, reinforcement, and concrete substrates.
- D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301 and ACI 318.
- B. Notify Architect/Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- D. Install vapor barrier under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight by taping edges and ends (use taped lap method). End laps should be staggered to avoid build up of layers, Lap vapor retarder over footings and seal to foundation walls.
- E. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight. Seal around all pipe penetrations.
- F. Unless noted otherwise place slab joints such that control joints are spaced approximately 24 to 36 times the thickness. Limit slab area to 450 sf. The length to width area of jointed section of slab shall not exceed 1 – 1/2.
- G. Apply sealants in joint devices in accordance with Section 07900.
- H. Deposit concrete at final position. Prevent segregation of mix.
- I. Place concrete in continuous operation for each panel or section determined by predetermined joints.
- J. Consolidate concrete.
- K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- L. Place concrete continuously between predetermined expansion, control, and construction joints.
- M. Do not interrupt successive placement; do not permit cold joints to occur.
- N. Place floor slabs in saw cut pattern indicated.
- O. Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut into 1/3 depth of slab thickness.
- P. Screed floors and slabs on grade level, maintaining surface flatness of F_r of 20 maximum 1/4 inch in 10 ft.

3.4 CONCRETE FINISHING

- A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 318.
- B. Steel trowel surfaces which will receive carpeting, resilient flooring or seamless flooring.

- C. Wood float surfaces which will receive ceramic tile with full bed setting system.
- D. Light Broom finish the exterior concrete walks to provide a non-slip surface, in accordance with ADA regulations.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1/8 inch per foot nominal or as indicated on drawings.
- F. Finish and measure the concrete surface so that the gap at any point between the concrete surface and unlevelled, freestanding, 10 foot long straightedge resting on two high spots and placed anywhere else on the surface does not exceed 1/4 inch.

3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. Protect concrete footings from freezing for a minimum of five (5) days.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure floor surfaces in accordance with ACI 308.1 and apply curing compound in accordance with manufacturer's instructions.
- D. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for 7 days.
- E. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
- F. Polyethylene Film: Spread polyethylene film over floor slab areas, lapping edges and sides and sealing with pressure sensitive tape; maintain in place for 7 days.
- G. Apply sealer in accordance with manufacturer's instructions on floor surfaces scheduled to receive carpeting and ceramic tile.
- H. Compound curing will not be permitted for surfaces to receive glue adhered floor coverings to include carpet and resilient flooring, or coatings (penetrants) such as point, epoxy liquid hardener or fluid applied waterproofing.

3.6 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements and 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform field inspection and testing in accordance with ACI 318.
- C. Submit proposed mix design to Architect/Engineer for review prior to commencement of Work.

- D. Tests of cement and aggregates may be performed at no cost to the Owner to ensure conformance with specified requirements.
- E. Three concrete test cylinders will be taken for every concrete pour.
- F. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. One slump test will be taken for each set of test cylinders taken.
- H. Concrete Inspections:
 - 1. Continuous Placement Inspection: Inspect for proper installation procedures.
 - 2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
- I. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured.
 - 3. Sample concrete and make one set of three cylinders for every 50 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls.
 - 4. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
 - 5. Make one additional cylinder during cold weather concreting, and field cure under same conditions as concrete represents.
 - 6. One slump test will be taken for each set of test cylinders taken.
- J. Field Testing:
 - 1. Slump Test Method: ASTM C143/C143M.
 - 2. Air Content Test Method: ASTM C173/C173M and ASTM C231.
 - 3. Temperature Test Method: ASTM C1064/C1064M.
 - 4. Measure slump and temperature for each compressive strength concrete sample.
 - 5. Measure air content in air entrained concrete for each compressive strength concrete sample.
- K. Cylinder Compressive Strength Testing:
 - 1. Test Method: ASTM C39.
 - 2. Test Acceptance: In accordance with ACI 318.
 - 3. Test one cylinder at 7 days.
 - 4. Test two cylinders at 28 days.
 - 5. Dispose remaining cylinders when testing is not required.
- L. Core Compressive Strength Testing:
 - 1. Sampling and Testing Procedures: ASTM C42/C42M.
 - 2. Test Acceptance: In accordance with ACI 318.
 - 3. Drill three cores for each failed strength test from concrete represented by failed strength test.
- M. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

3.7 PATCHING

- A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
- C. Patch imperfections as directed and in accordance with ACI 301 and ACI 318.

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Architect/Engineer. **Any visible hairline crack will be considered defective.**
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

3.9 PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Section 01500.
- B. Do not permit traffic over unprotected floor surface.

3.10 TOLERANCES

- A. Maximum Variation of surface flatness for exposed concrete floors: 1/4 inch in 10 feet.
- B. Maximum Variation of surface flatness under carpet: 1/8 inch in 10 feet.

END OF SECTION 03300

SECTION 03300 CAST-IN-PLACE CONCRETE: SITE MISCELLANEOUS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installation of sidewalks and dumpster pad.
- B. General concrete work associated with utility installation.

1.02 RELATED SECTIONS

- A. General Excavating and Grading
- B. Potable Water System
- C. Storm Drainage
- D. Sanitary Sewer System

1.03 REFERENCES

- A. ACI 304 - Recommended Practice for measuring, Mixing, Transporting and Placing Concrete.
- B. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- C. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
- D. ANSI/ASTM D1751 - Performed Expansion Joint Fillers for Concrete Paving and Structural Construction.
- E. ANSI/ASTM D1752 - Performed Sponge Rubber and Cork Expansion Joint fillers for Concrete Paving and Structural Construction.
- F. ASTM A615 - Deformed and Plain Billet-Steel for a Concrete Reinforcement.
- G. ASTM C33 - Concrete Aggregates.
- H. ASTM C94 - Ready Mix Concrete.
- I. ASTM C150 - Portland Cement
- J. ASTM C260 - Air-Entraining Admixtures for Concrete.
- K. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- L. ASTM C494 - Chemical Admixtures for Concrete.
- M. FS TT-C-800 - Curing Compound, Concrete, for New and Existing Surfaces.

1.04 SECTION DESCRIPTION

- A. The Contractor shall perform all work necessary for or incidental to the performance and completion of concrete work. This work shall be completed as shown on the drawings and as specified in the contract documents. This work shall include the furnishing of all labor, materials and equipment. The Contractor shall be responsible for coordinating the work to assure that the work is

completed in an orderly manner. Although such work may not be specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation shall be furnished and installed as part of this work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The Contractor will submit the names of suppliers of all concrete materials. Materials supplied on the project will meet the requirements of ACI 301-72, "Specifications for Structural Concrete for Buildings." Concrete will be a minimum of 3,000 psi standard 28 cylinder strength as shown on the plans with a maximum design slump of four (4) inches. Ready Mix Concrete must meet the requirements of ASTM C 94 "Specifications for Ready Mix Concrete". Concrete form work will meet the requirements of ACI 347 "Recommended Practice for Concrete Form Work."
- B. Reinforcing steel bars will be Grade 60 for bars No. 4 and larger and Grade 40 for No. 3 bars. Reinforcement bars will meet the requirements of ASTM A 615 for Billet Steel Bars.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect utilities that remain, from damage.
- D. Protect above and below grade utilities that remain.
- E. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- F. Protect bench marks, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- G. Moisten base to minimize absorption of water from fresh concrete.
- H. Coat surfaces of manhole and catch basin frames or other surfaces to be protected, with oil to prevent bond with concrete pavement.
- I. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

3.03 INSTALLATION

- A. FORMING
 - 1. Place and secure forms to correct location, dimension, and profile.
 - 2. Assemble form work to permit easy stripping and dismantling without damaging concrete.

3. Place joint filler vertical in position, in straight lines. Secure to form work during concrete placement.
- B. REINFORCEMENT
1. Place reinforcement as indicated on plans.
 2. Interrupt reinforcement at contraction joints.
- C. INSTALLATION
1. Concrete will not be placed when the temperature is forty (40) degrees Fahrenheit and falling or when freezing weather is predicted within twenty-four (24) hours. The Contractor may place concrete in cold weather if approved by the Engineer and the requirements of ACI 306, "Recommended Practice for Winter Concreting," are met. However, accelerator antifreezes and high early strength (Type III) concrete may not be utilized.
- D. JOINTS
1. Place expansion joints at fifteen (15) foot intervals. Align curb, gutter, and sidewalk joints.
 2. Place joint filler between paving components and building or other appurtenances. Recess top of filler 1/4 inch for sealant placement.
 3. Provide grooved joints at five (5) foot intervals.
- E. TESTING
1. Concrete testing will conform with ACI 301-72 Chapter H. Two concrete cylinders will be provided per test with two tested at seven days and two additional cylinders at twenty-eight days. One test (four cylinders) will be required per one hundred (100) cubic yards for each type concrete poured. Concrete failing the strength test will be repaired and/or replaced and retested at the Contractor's expense.
 2. Concrete testing will be conducted by a laboratory selected by the Owner at the Owner's expense. The Contractor will be responsible for notifying the Owner, Engineer and testing laboratory a minimum of twenty-four (24) hours prior to placement of concrete.
 3. Concrete mix test results will be submitted to the Engineer prior to initiating concrete work showing compliance with specifications. Engineer's approval of concrete mix does not relieve the Contractor of the responsibility for the performance of the concrete.

END OF SECTION 03300

SECTION 04810
UNIT MASONRY SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Facebrick units.
- B. Reinforcement, anchorage, and accessories.
- C. Mortar and grout for masonry.
- D. Pea gravel at base of cavity wall.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 07620 - Sheet Metal, Flashing and Trim: Placement of reglets for flashings.

1.3 RELATED SECTIONS

- A. Section 01400 - Quality Requirements: Testing Laboratory Services.
- B. Section 03200 - Concrete Reinforcement: Reinforcing bars.
- C. Section 07900 - Joint Sealers: Rod and sealant at control and expansion joints.

1.4 REFERENCES

- A. ANSI/ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.
- B. ANSI/ASTM C55 - Concrete Building Brick.
- C. ANSI/ASTM C216 - Facing Brick (Solid Masonry Units Made From Clay or Shale).
- D. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- E. ASTM A525 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.
- F. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- G. ASTM C90 - Hollow Load Bearing Concrete Masonry Units.
- H. ASTM C129 - Non-Load Bearing Concrete Masonry Units.
- I. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction.
- J. UL - Underwriters' Laboratories.

- K. ASTM B370 - Copper Sheet and Strip for Building Construction
- L. NCMA - National Concrete Masonry Association--NCMA Tech Notes
- M. ASTM C5 - Quickline for Structural Purposes.
- N. ASTM C91 - Masonry Cement.
- O. ASTM C94 - Ready-Mixed Concrete.
- P. ASTM C144 - Aggregate for Masonry Mortar.
- Q. ASTM C150 - Portland Cement.
- R. ASTM C207 - Hydrated Lime for Masonry Purposes.
- S. ASTM C270 - Mortar for Unit Masonry.
- T. ASTM C387 - Packaged, Dry, Combined Materials for Mortar and Concrete.
- U. ASTM C404 - Aggregates for Masonry Grout.
- V. ASTM C476 - Grout for Masonry.
- W. ASTM C595 - Blended Hydraulic Cement.
- X. ASTM C780 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- Y. ASTM C1019 - Method of Sampling and Testing Grout.
- Z. ASTM A510 - Wire Rods and Coarse Round Wire, Carbon Steel

1.5 SUBMITTALS

- A. Submit product data for each different masonry unit, accessory and other manufactured products indicated under provisions of Section 01330.
- B. Submit samples under provisions of Section 01330. Samples to be used in field mock-up.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 Building Code Requirements for Masonry Structures and ACI 530.1 Specification for Masonry Structures.
- B. Fire Rated Wall Construction: Rating as indicated on Drawings.
 - 1. Tested Rating: Determined in accordance with ASTM E119.
- C. Surface Burning Characteristics:

1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
 - D. Apply label from agency approved by authority having jurisdiction to identify each foam plastic insulation insert.
 - E. Perform Work in accordance with State of North Carolina standards.
 - F. Maintain one copy of each document on site
- 1.7 MOCK-UP
- A. Provide mock-up of composite masonry wall under, provisions of Section 01400.
 - B. Erect facebrick, sill brick with metal stud wall to 4' - 0" wide x full height panel size (6' - 8"), to include specified mortar and accessories.
 - C. When accepted mock-up will demonstrate minimum standard for the work. Mock-up may remain part of the work.
 - D. The mock-up will aid in determining the color selections and compatibility with other material textures and colors.
- 1.8 PRE-INSTALLATION CONFERENCE
- A. Convene one (1) week prior to commencing work of this Section, under provisions of Section 01200.
- 1.9 DELIVERY, STORAGE, AND HANDLING
- A. Deliver products to site under provisions of Section 01600.
 - B. Store and protect products under provisions of Section 01600.
 - C. Accept concrete masonry units on site. Inspect for damage.
 - D. Store and handle masonry units off the ground, under cover, and in a dry location. If unit becomes wet, do not place units until they are in an air dried condition.
- 1.10 ENVIRONMENTAL REQUIREMENTS
- A. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.
 - B. Cold-weather requirements: IMIAC--Recommended practices and specifications for cold-weather masonry construction.
- 1.11 SEQUENCING AND SCHEDULING
- A. Coordinate work under provisions of Section 01039.
 - B. Coordinate all masonry work with all other disciplines.

PART 2 PRODUCTS

2.1 FACE BRICK

- A. Face Brick:
 - 1. Brick Type 1 – Statesville Brick Walnut Creek “Authentic Nutmeg” – Modular. Provide solid bricks at all end conditions.
- B. Brick Mason Units: Modular
- C. Mortar color be beige/tan with standard concave tooled joint. Color to be approved after field mock up.
- D. Hollow Load Bearing Concrete Masonry Units CMU: ASTM C90; Grade N, Type II, non-moisture controlled, light weight.
- E. Hollow Non-Load Bearing Concrete Masonry Units (CMU): ASTM C129; Type II, non-moisture controlled light weight.
- C. Concrete Masonry Unit Size and Shape: Nominal modular size of 7-5/8”x7-5/8”x15-5/8” inches or as indicated on drawings. Furnish special units for 90 degree corners, bond beams, lintels.

2.2 MORTAR MIXES

- A. Mortar for Reinforced Masonry: ASTM C270, Type M or S using the Property Method:
 - 1. For masonry below grade and in contact with earth, and where indicated, use type indicated below:
 - a. Type: M or S
 - 2. For exterior, above-grade load bearing and non-load bearing walls and parapet walls; and for other applications where another type is not indicated, use type indicated below:
 - a. Type: M or S
- B. Pointing Mortar: ASTM C270, Type N using the Property Method.
- C. Stain Resistant Pointing Mortar: One part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate equal to 2 percent (2%) of Portland cement by weight.
- D. Grout for Unit Masonry: Comply with ASTM C476 and referenced unit masonry standard:
 - 1. 3000 psi strength at twenty-eight (28) days: Eight (8) inch slump

2.3 MORTAR MIXING

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C94 / C 94M.

- B. Add mortar color and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. If water is lost by evaporation, re-temper only within two hours of mixing.
- E. Use mortar within two hours after mixing at temperatures of 80 degrees F (26 degrees C), or two-and-one-half hours at temperature under 50 degrees (10 degrees C).

2.4 REINFORCING AND ANCHORAGE

- A. Provide adjustable wall ties by Durowall DA-213 S System; hot dipped galvanized with screws of same coating, D/A 807 – 1 ½” long screws with neoprene washer.
- B. Provide anchors at 16" o.c. vertically and horizontally, as well as at each opening, jamb, and control joint.

2.5 JOINT REINFORCEMENT

- A. General: Provide joint reinforcement complying with requirements of referenced unit masonry standard and this article, formed from the following:
 - 1. Galvanized Carbon Steel Wire: ASTM A82, coating class as follows:
 - a. Where installed in interior walls unless specified otherwise: ASTM A641, Class 1
 - b. Where installed in exterior walls and interior walls at toilets, showers: ASTM A153, Class B-2.
- B. Description: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with requirements indicated below:
 - 1. Wire Diameter for Side Rods: 0.1483 inch (9 gage).
 - 2. Wire Diameter for Cross Rods: 0.1483 inch (9 gage).
 - 3. For single-wythe masonry, provide type as follows with single pair of side rods:
 - a. Pencil rod – hot dipped galvanized at 16” o.c.
- C. Manufacturers: Subject to compliance with requirements, provide joint reinforcement by one of the following:
 - 1. AA Wire Products
 - 2. Dur-O-Wal, Inc.
 - 3. Heckman Building Products, Inc.
 - 4. Hohmann & Barnard, Inc.
 - 5. Masonry Reinforcing Corp. of America
 - 6. National Wire Products Industries
 - 7. Southern Construction Products, Inc.

2.6 ADJUSTABLE MASONRY VENEER ANCHORS

- A. General: Provide two-piece assemblies allowing vertical or horizontal differential movement between wall and framework parallel to plane of wall, but resisting tension and compression forces perpendicular to it; for attachment over sheathing to metal studs or for embedment in masonry back-up; and with the following structural performance characteristics:
 - 1. Structural Performance Characteristics: Capable of withstanding a 100 lb/ft load in either tension or compression without deforming over, or developing play in excess of, 0.05 inch.
- B. Masonry Veneer Anchors for Metal Stud Back-Up: consisting of 3/16" rectangular wire section for embedment in masonry back-up with eye ends sections protruding from masonry beyond masonry cavity insulation (if any) and 3/16" rectangular wire section with turned-down ends to fit into eyes in back-up section and allowing approximately 1-1/4" vertical adjustment; hot-dip galvanized.
- C. Neoprene Gaskets: For use at screw-attached masonry veneer anchor. Manufacturer's standard closed cell neoprene gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating through screw holes to steel studs behind sheathing.

2.7 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints, manufactured by No. AA1000 AA Wire Products.
- B. Joint Filler: Closed cell rubber; oversized 50 percent to joint width; self-expanding; 2 inches wide by maximum lengths.
- C. Weeps: Provide the following:
 - 1. Wicking Material: material as indicated below, required to produce 2 inches exposure on exterior and up into cavity between wythes:
 - a. Cotton sash cord.
- D. Cleaning Solutions: Non-acidic, not harmful to masonry work or adjacent materials.
- E. Building Paper: #15 asphalt saturated felt.

2.8 FLASHING

For all thru-wall flashing and sill pan flashing:

- A. York Flashings: Cop-R-Tex Duplex 5 oz copper bonded on both sides to heavy creped kraft paper reinforced with heavy fibers. Use Cop-R-Mastic at all splices.
- B. Substitutions under provisions of Section 01600.
- C. All masonry surfaces receiving thru-wall flashing shall be free from loose materials, and reasonably smooth. There shall be no slopes that will form pockets or prevent free drainage of water to the exterior surfaces of the wall.

The metal drip edge the forms the exposed edge of all the through wall flashing shall be 26 gauge stainless steel as defined on the contract documents (reference the wall sections). Manufactured by Hohmann & Bernard, Inc. (Sandell FTSA-LB Drip Plate 3" wide Type 304 stainless steel 26 gauge standard)

1. Foundation Sill Flashing: The flashing for foundation sills shall be laid in a slurry of fresh mortar and topped with a fresh full bed of mortar. Flashing shall be left flush with the exterior face of the masonry and turned up on the inside not less than 2" or be carried upward across the cavity a minimum of 6". Flashing will then be secured in the back wall in a reglet or mortar joint. Where sill and column meet, flashing shall be brought a minimum of 10" up the column and be secured with Cop-R-Tite Mastic.
2. Cavity Wall Flashing: Flashing shall be laid in a slurry of fresh mortar and topped with a fresh full slurry of mortar. Flashing shall be left flush with the exterior face of the masonry wall and carried through the wall, upward across the cavity a minimum of 6" and secured in the back wall mortar joint or reglet.
3. Head and Sill Flashing: The flashing shall start with the outside of the wall or lintel angle, then carried through or up the wall as indicated. Flashing shall extend 6" beyond each side of the opening and be turned up at the sides forming a pan. All corners shall be folded, not cut.
4. Joining of Material: Joints shall be made by lapping a minimum of 4" and coating the contacting surfaces with Cop-R-Tite Mastic.
5. Weep Holes: All flashing installed through masonry shall be provided with proper drainage to the outside. Weep holes shall be provided in the head joint, the first course immediately above the flashing. Weep holes shall be kept free of mortar droppings.
6. Mortar Deflection: A mortar deflection device should be installed at all flashing locations to ensure proper weepage.
7. Inspection: In each area where membrane flashing has been installed, a minimum of three locations in the wall joint above the flashing shall be left clean of mortar for water to be forced into the opening to determine if flashing has been installed properly and weep holes provided in accordance with these specifications. All flashing that has been left exposed to the exterior should be trimmed flush with the exterior masonry at this time.
8. All Cop-R-Tex Duplex 5 oz ,flashing shall extend past the brick veneer edge by ¼" and be cut and hemmed to form a clean straight, plumb condition. The Stainless Steel metal drip flashing shall be palced below the through wall flashing to form an expdsed edge condition. This condition will be reviewed at the mock-up panel.

2.9 ACCESSORIES

- A. Single Wythe Joint Reinforcement: ASTM A951; ladder type; steel; 9 gage, 0.148 inch diameter side rods with 0.148 inch diameter cross ties; hot dip galvanized. Provide prefabricated corners and tees.

- B. Multiple Wythe Joint Reinforcement: ASTM A951; ladder type; steel; with moisture drip; adjustable type; 0.148 inch diameter side rods with 0.148 inch diameter cross ties; hot dip galvanized. Provide prefabricated corners and tees.
- C. Adjustable Wall Ties: Durowall DA-213 S System: hot dipped galvanized with screws of same coating. D/A 807 3" long screws with neoprene washers. Provide anchors at 16" oc vertically and horizontally, as well as at each opening, jamb and control joint. ASTM A82; steel wire 9 gauge; ASTM A153/A153M hot dip galvanized.
- D. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars, uncoated finish.
- E. Strap Anchors: Hot dip galvanized – See Structural General Notes.
- F. Anchor Rods: ASTM A307; Grade C; J-shaped or L-shaped; complete with washers and heavy hex nuts; sized for minimum 15 inch embedment; galvanized finish.
 - 1. Hot-Dipped Galvanizing: ASTM A153/A153M.
 - 2. Mechanical Galvanizing: ASTM B695; Class 55.
- G. Mortar and Grout: As specified in Section 04065.
- H. Copper/Kraft Paper Flashings: 5 oz/sq ft rolled sheet copper bonded to fiber reinforced asphalt treated Kraft paper; manufactured by York Flashing.
 - 1. All masonry surfaces receiving thru wall flashing shall be free from loose materials, and reasonably smooth. There shall be no slopes that will form pockets or prevent free drainage of water to the exterior surfaces of the wall.
 - a. Foundation Sill flashing:
 - 1) The flashing for foundation sills shall be laid in a slurry of fresh mortar and topped with a fresh full bed of mortar. Flashing shall be left protruding from the exterior face of the masonry and turned up the inside of the cavity a minimum of 6 inches. The flashing will be secured into the mortar joint a minimum of 4 inches. Secure all joints with Cop-R Tite mastic.
 - b. Cavity Wall Flashing:
 - 1) The flashing for foundation sills shall be laid in a slurry of fresh mortar and topped with a fresh full bed of mortar. Flashing shall be left protruding from the exterior face of the masonry and turned up the inside of the cavity a minimum of 8 inches. The flashing will be secured into the mortar joint a minimum of 4 inches. Secure all joints with Cop-R Tite mastic.
 - c. Head and Sill Flashing:
 - 1) The flashing shall start with the outside of the wall of lintel angle, then carried through or up the wall as indicated. Flashing shall extend 6" beyond each side of the opening and be turned up at the sides 2 inches forming a pan. All corners shall be folded and not cut.
 - d. Joining of Materials:
 - 1) Joints shall be made by lapping a minimum of 8 inches and coating the contacting surfaces with Cop-R-Tite Mastic.
 - e. Weep Holes:
 - 1) All flashing installed through masonry shall be provided with proper drainage to the outside. Weep holes shall be provided in the head joint, and in the first course immediately above

the flashing. Weep holes shall be kept free of mortar droppings.

- f. Mortar Deflection:
 - 1) A mortar deflection device should be installed at all flashing locations to ensure proper weepage.
- g. Inspection:
 - 1) In each area where membrane flashing has been installed, a minimum of three locations in the wall joint above the flashing shall be left clear of mortar for water to be forced into the opening to determine if the flashing has been installed properly and the weep holes are provided in accordance with these specifications. All flashing that has been left exposed to the exterior should be trimmed to 1/2" of the exterior masonry wall at this time.
- I. Self Stick SRAB Membrane Type Flashing: 32 mils self adhesive rubberized asphalt integrally bonded to 8 mil cross laminated, high density polyethylene film to provide a 40 mil thick membrane shall be interleaved with disposable silicone-coated release paper until installed: Perm-a-Barrier wall flashing and Perm a Barrier Liquid Air/Vapor fluid applied synthetic latex rubber membrane by Grace Construction Products.
 - 1. Locate SRAB flashing at
 - a. Connections of wall to roof air barrier
 - b. Connection of wall to foundations
 - c. Control joints
 - d. Openings and penetrations of curtain wall frames and door openings.
 - e. Piping, conduit, duct and similar penetrations.
 - f. Entire vertical dens-glas (exterior sheathing) surfaces
 - g. All other air leakage pathways in the building envelope
 - 2. SRAB flashings shall provide a continuous network of materials and joints providing air tightness, with adequate strength and stiffness to not deflect excessively under air pressure differences to which it will be subjected. It is to be comprised of SRAB flashing in conjunction with damproofing, building insulation, exterior sheathing and any other materials compromising the unit masonry cavity wall.
 - 3. The Contractor is to ensure compatibility of all materials compromising the unit masonry cavity wall.
- J. Lap Sealant: Cop-R Tite Mastic and other types as specified in Section 07900.
- K. Preformed Control Joints: Neoprene material. Furnish with corner and tee accessories, heat fused joints.
- L. Joint Filler: Closed cell rubber; oversized 50 percent to joint width; self expanding; 2 inches by maximum lengths.
- M. Cavity Drain Material: Pea gravel as indicated on drawings or open polyethylene mesh thickness required to fill cavity space, and shaped to ensure moisture drainage to cavity weeps.
 - 1. Advanced Building Products, Inc.
 - 2. CavClear/Archovations Inc.
 - 3. Mortar Net USA, Ltd.
 - 4. Dur-O-Wal, Inc.
 - 5. Substitutions: Section 01600 - Product Requirements.

- N. Building Paper: ASTM D226; Type II, No. 30 unperforated asphalt felt.
- O. Nailing Strips: Softwood, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.
- P. Weeps: Cotton sash cord. Provide two inch exposure on exterior and up into cavity between wythes.
- Q. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
- R. Steel Lintels: Size as indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- D. Beginning of installation means installer accepts existing conditions.
- E. Verify the actual locations of piping prior to installation.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other Sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
- C. Cut masonry units with water driven blade saws to provide clean, sharp, unchipped edges. Wash units immediately after cutting to remove saw slurry. Use full size units without cutting where possible.
- D. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.
- E. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
- F. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.

- G. Install mortar in accordance with ASTM C780. Install grout in accordance with ASTM C475.

3.3 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Lay concrete masonry units in running bond. Course one unit and one mortar joint to equal 8 inches. Form concave mortar joints. Lay brick units in running bond course three brick units and three mortar joints equal to 8 inches from concave mortar joints.
- D. For starting course to be placed on footings where cells are not grouted spread out full mortar bed including areas under cells.
- E. Tool exposed joints slightly concave using a joint larger than the joint thickness unless noted otherwise.

3.4 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
- D. Remove excess mortar as Work progresses.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Build cavity walls and other masonry construction to the full thickness shown.
- I. During erection of cavity wall, cover tops of walls and sills with waterproof sheeting at the end of each days work. Cover partially completed masonry when construction is not in progress, extend cover, and work in place furring that work day or a minimum of 24" below non work a minimum of 24 inches down both sides and secure cover in place. All in place masonry work during the installed work day shall be covered a minimum of 24" below new work.
- J. Do not apply uniform load (roof or floor) for a minimum of 12 hours and concentrated loads for at least 3 days after erecting masonry wall or columns.

3.5 WEEPS AND VENTS

- A. Install weep vent holes in veneer at 24 inches on center horizontally above through-wall flashing above shelf angles and at bottom of walls.
- B. Install weeps in the head joints in exterior wythes of the first course of masonry immediately above embedded flashings and as follows:
 - 1. Install weeps with product specified in Part 2 of this Section.
 - 2. Space weeps 24 inches o.c. unless otherwise indicated.
 - 3. Install weeps to extend 6" up into cavity and to allow 2" extension beyond exterior face of veneer.
 - 4. In all exterior cavities/air spaces place pea gravel to a height equal to height of first course but not less than 2 inches immediately above flashing embedded in the wall, as masonry construction progresses, to splatter any mortar droppings and to maintain drainage.

3.6 CAVITY WALL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep holes.
- B. Build inner wythe ahead of outer wythe to receive cavity insulation air/vapor barrier adhesive.

3.7 HORIZONTAL JOINT REINFORCEMENT

- A. General: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere; lap reinforcing a minimum of 6 inches.
 - 1. Space horizontal joint reinforcement 16" o.c. vertically, unless otherwise indicated.
- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
- D. Place masonry reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

3.8 SINGLE WYTHE MASONRY VENEER ATTACHED TO METAL STUD BACK-UP

- A. Erect interior wythe first with specified joint reinforcement and ties.
 - 1. Secure exterior wythe to metal stud back-up with masonry veneer anchors spaced not more than 16" o.c. vertically and 16" o.c. horizontally. Stagger in alternate vertical courses between horizontal joint reinforcing.
- B. Place at maximum 3" o.c. each way around perimeter of opening within 12" o.c. of openings and center joints.
- C. Do not "strike-off" mortar and allow it to drop into cavity.

3.9 FLASHINGS

- A. General: Install embedded through-wall flashing and weeps in masonry at shelf angels, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.
- B. Prepare masonry surfaces so that they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive/sealant/tape as recommended by flashing manufacturer before covering with mortar.

3.10 TOLERANCES (as specified in AGI 530.1 or as indicated whichever is stricter)

- A. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.
- B. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
- C. Maximum Variation From Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- D. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
- E. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.
- F. Maximum Variation From Cross Sectional Thickness of Walls: 1/4 inch.

3.11 CLEANING

- A. Clean work under provisions of Section 01700.
- B. Remove excess mortar and mortar smears.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations.

3.12 PROTECTION OF FINISHED WORK

- A. Protect finished installation under provisions of Section 01500.
- B. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.
- C. Prevent grout, mortar and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on the ground and over the wall surface.
 - 2. Protect sills, ledges and projections from mortar droppings.

END OF SECTION 04810

SECTION 05400
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

- A. To furnish and install all cold-formed structural framing studs for load bearing and non-load bearing steel stud walls for exterior and interior wall framing to include framing studs, tracks, bracing, angles, plates and all related accessories indicated in the construction documents.

- B. Related Sections:
 - 1. Section 04810 - Unit Masonry Assemblies: Head and sill flashings.
 - 2. Section 04810 - Unit Masonry Assemblies: Veneer masonry supported by wall stud metal framing.
 - 3. Section 06114 - Wood Blocking and Curbing: Rough wood blocking.
 - 4. Section 08410 - Aluminum Framed Storefronts & Entrances: Anchors for support of curtain wall window and door frames.
 - 5. Section 09260 - Gypsum Board Assemblies: Light weight, non-load bearing metal stud framing, insulation, sound attenuation and wall sheathing.

1.2 REFERENCES

- A. American Iron and Steel Institute:
 - 1. AISI General - Standard for Cold-Formed Steel Framing - General Provisions.
 - 2. AISI Header - Standard for Cold-Formed Steel Framing - Header Design.
 - 3. AISI NASPEC - North American Specification for Design of Cold-Formed Steel Structural Members.
 - 4. AISI - Residential Steel Framing Manual.

- B. ASTM International:
 - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - 3. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
 - 4. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - 5. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - 6. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
 - 7. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.

- C. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
 - 2. AWS D1.3 - Structural Welding Code - Sheet Steel.
- D. National Association of Architectural Metal Manufacturers:
 - 1. NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.
- E. SSPC: The Society for Protective Coatings:
 - 1. SSPC Paint 15 - Steel Joist Shop Paint.
 - 2. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
- F. Steel Stud Manufacturers Association:
 - 1. SSMA - Product Technical Information.

1.3 SYSTEM DESCRIPTION

- 1. Size components to withstand design loads as shown on Structural Drawings.
- B. Maximum Allowable Deflection: 1: 240 of span.
- C. Wall System:
 - 1. Design to AISI NASPEC, AISC General, and AISC Header.
 - 2. Design to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 - 3. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.4 PERFORMANCE REQUIREMENTS

- A. Select stud thickness to resist minimum 5 psf uniform load and maximum 1/240 deflection.

1.5 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal requirements.
- B. Product Data: Submit data on standard framing members; describe materials and finish, product criteria and limitations.
- C. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.
- D. Mill Certifications: Submit mill certifications for steel delivered to site. Certify steel bare metal thickness in 0.001 inch, yield strength, tensile strength, total elongation in 2 inch or 8 inch gauge length, chemical analysis, and galvanized coating thickness.

1.6 QUALITY ASSURANCE

- A. Calculate structural properties of framing members in accordance with AISI NASPEC.
- B. Furnish framing materials in accordance with SSMA - Product Technical Information.

- C. Maintain one copy on site.
- D. **Single Source Responsibility for the Metal Stud Framing Section 05400, Gypsum Board installation Section 09260 and Acoustical Ceiling Tile Section 09510**

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
 - 1. Current member of Steel Stud Manufacturers Association.
- B. Installer: Company specializing in performing Work of this section with minimum 5 years documented experience approved by manufacturer.
- C. Form, fabricate, provide, and connect components in accordance with NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.

1.8 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate placement of components within stud framing system.
- C. Upon delivery, the structural framing materials shall be protected from the elements by storing them in a sheltered area or using protective covering.

PART 2 PRODUCTS

2.1 COLD-FORMED METAL FRAMING

- A. Manufacturers:
 - 1. Clark Steel Framing Systems.
 - 2. Harrison Manufacturing Co.
 - 3. Marino\Ware
 - 4. Unimast Incorporated.
 - 5. Dale / Incor
 - 6. Substitutions: Section 01600 - Product Requirements.
- B. Cold-Formed Metal Framing: ASTM C955.

2.2 FRAMING COMPONENTS

- A. Steel Sheet: ASTM A1003/A1003M; Structural Grade, Type H, painted metallic coated: equivalent to G-60 galvanized finish.
 - 1. Grade: ST33H.
 - 2. Coating: G-60 galvanized finish - See Structural General Notes.

2.3 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined by performance requirements specified.

2.4 FASTENERS

- A. Self-drilling, Self-tapping Screws, Bolts, Nuts, and Washers: Steel, hot dip galvanized.
- B. Anchorage Devices: Power actuated, drilled expansion bolts, screws with sleeves,.
- C. Welding: In conformance with AWS D1.1 and AWS D1.3.

2.5 FABRICATION

- A. Fabricate assemblies of formed sections of sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.
- C. Fit and assemble in largest practical sections for delivery to site, ready for installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces and building framing components are ready to receive Work.
- C. Verify rough-in utilities are in proper location.

3.2 ERECTION OF STUDS

- A. Align floor and ceiling tracks; locate to wall partition layout. Secure in place with fasteners at each stud. Coordinate installation of acoustic sealant with floor and ceiling tracks.
- B. Place studs at 16 inches oc (unless noted otherwise in contract documents); not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using fastener.
- C. Construct corners using minimum three studs. Double stud wall openings, door jambs, and window jambs.
- D. Erect load bearing studs one piece full length. Splicing of studs is not permitted.
- E. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.
- F. Fully seat axial loaded studs in receiving tracks maximum 1/16 inch gap between stud and track web.

- G. Coordinate placement of insulation in multiple stud spaces after erection.
- H. Install intermediate studs above and below openings to align with wall stud spacing.
- I. Install studs with deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- J. Attach cross studs and furring channels to studs for attachment of fixtures anchored to walls.
- K. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- L. Touch-up field welds and damaged primed surfaces with primer to match shop coating.
- M. Complete framing ready to receive finish surface material.

3.3 ERECTION TOLERANCES

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Maximum Variation from Indicated Position: 1/4 inch.
- C. Maximum Variation of Members from Plane: 1/4 inch.

END OF SECTION

SECTION 06100
ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Grounds, nailers, blocking, furring, sheathing.
- B. Miscellaneous framing and sheathing – framing above top plate of metal stud walls
- C. Telephone and electrical panel boards.
- D. Concealed wood blocking for support of toilet and bath accessories, wall cabinets, and wood trim.
- E. Window/door opening flashing wall seam - membrane

1.2 RELATED SECTIONS

- A. Section 04200 - Unit Masonry System: Cavity Wall System.
Section 05400 – Cold Formed Structural Framing
- B. Section 06193 - Plate Connected Wood Trusses.
- C. Section 07620 - Sheet Metal Flashing and Trim
- D. Section 07640 – Fiber Cement Siding.

1.3 REFERENCES

- A. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.
- B. APA: American Plywood Association.
- C. AWWA (American Wood Preservers Association) C1 - All Timber Products Preservative Treatment by Pressure Process.
- D. NFPA: National Forest Products Association.
- E. SPIB: Southern Pine Inspection Bureau.
- F. WWPA: Western Wood Products Association.
- G. ANSI A117.1: Providing Accessibility and Usability for Physically Handicapped People.
- H. American Disability Act.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide technical data on wood preservative materials, and application instructions.
- C. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
 - 1. Lumber Grading Agency: Certified by DOC PS 20.
 - 1. Wood Structural Panel Grading Agency: Certified by EWA - The Engineered Wood Association.
 - 2. Lumber: DOC PS 20.
 - 3. Wood Structural Panels: DOC PS 1 or DOC PS 2.
- B. Surface Burning Characteristics:
 - 1. Fire Retardant Treated Materials: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- C. Apply label from agency approved by authority having jurisdiction to identify each preservative treated material.
- D. Perform Work in accordance with State of South Carolina standards.
- E. Maintain one copy of each document on site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Section 01600.

PART 2 PRODUCTS

2.1 LUMBER MATERIALS

- A. Lumber Grading Rules: NFPA, SPIB, and WWPA as applicable.
- B. Non-Structural Light Misc. Framing and Blocking: Southern Yellow Pine species, No. 2 grade, 19 percent maximum moisture content.
- C. Grounds and Blocking: Preservative; Wolman CCA Type C: Arch Wood Protection above ground, Southern Yellow Pine species, No. 2 grade, NIST PS 20, 19 percent maximum moisture content.

2.2 SHEATHING MATERIALS

- A. Plywood Roof Sheathing: APA Rated Sheathing, Span Rating 42/20; Exposure Durability 1; unsanded.
- B. Plywood Wall Sheathing: APA Rated Sheathing, Span Rating 32/16; Exposure

Durability 1; unsanded.

- C. Plywood Floor Sheathing: APA Rated Sheathing, Span Rating 36/16; Exposure Durability 1, sanded.
- D. Telephone and Electrical Panel Boards: Plywood.

2.3 SHEATHING LOCATIONS

- A. Sloped Roof Sheathing: 5/8 inch thick, 48 x 96 inch sized sheets, square edges.
- B. Flat Roof Sheathing: 3/4 inch thick, 48 x 96 inch sized sheets, tongue and groove edges.
- C. Wall Sheathing: 1/2 inch thick, 48 x 96 inch sized sheets, square edges.
- D. Floor Sheathing/Mezzanine Area: 3/4 inch thick, 48 x 96 inch sized sheets, tongue and groove edges.

2.4 ACCESSORIES

- A. Nails, Fasteners and Anchors:
 - 1. Nails and Fasteners; hot dipped galvanized or stainless steel see Structural Drawings. Must be compatible with wolmanized lumber (preservative treated).
 - 2. Anchors: Unless otherwise noted the following applies; Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.
- B. Joists Hangers and Connectors: Hot-dipped galvanized steel, size to suit framing conditions (U.N.O.).
- C. Glue: APA AFG-01, waterproof of water solvent base, air cure type, cartridge dispensed.
- D. Building Paper: ASTM D226, Type I and Type II asphalt saturated felt, plain untreated cellulose building paper. 15# on walls, the roof will receive a weatherproofing membrane.
- E. Straps and Connectors - By Simpson Strong Tie, galvanized with approved fasteners. Provide as noted on drawings and as required to meet uplift requirements.
- F. **Window and Door Opening Flashing: Perma-A-Barrier Wall Seam Tape by W.R. Grace and Co.. A 30 mil, cold applied self adhering membrane composed of a 2-1/2" mil high density, cross laminated polyethylene film coated on one side with a 27-1/2' mil layer of rubberized asphalt adhesive. To be applied at all window/door openings and at all exterior plywood seams.**
- G. Bituthane behind brick veneer as indicated on architectural wall sections; W.R. Grace and Co. 3000 flexible water proof membrane roll – to extend from thru wall flashing at base of wall to 6" above the brick veneer.

PART 3 EXECUTION

- 3.1 FRAMING - COORDINATE NAILING PATTERN WITH STRUCTURAL NOTES AND COMPLY WITH THE MOST STRINGENT (for all framing above the top plate of the metal stud walls)
- A. Set structural members level and plumb, in correct position.
 - B. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until alignment until completion of erection and installation of permanent bracing.
 - C. Place horizontal members flat, crown side up.
 - D. Construct framing members full length without splices
 - E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists. Frame rigidly into joists.
 - F. Bridge framing in excess of 8 feet span and/or at mid-span. Fit solid blocking and bridging at ends of members.
 - G. Contractor is to confirm any cutting or drilling of joists, rafters, or studs with Architect prior to any installation of Electrical, Mechanical, or Plumbing work.
 - H. Contractor shall provide a continuous path of uplift resistance from the roof to the foundation.
 - I. Provide solid bridging at all wall and floor framing, at all plywood joints, glue and nail to sheathing.
 - J. Draftstop/Firestop all holes in top plates of framed wall.
 - K. Coordinate installation of wood blocking for support of all bathroom accessories with Architect prior to installation of Gypsum board.
 - L. Building Felt - Provide 15 lb. felt for walls. Place building felt horizontally over wall sheathing weather lap edges a minimum of 2" and lap ends a minimum of 6". Fasten to wall with corrosive resistant nails. Provide an additional lap of felt to extend 12" from each corner at both the inside and outside. Provide a positive resistance to water flow with lapping.
 - M. At all window and door openings install Perm-A-Barrier wall seam tape as indicated on the opening details in accordance with the manufactures recommendation. The tape when install on the exterior casing flange of the window opening shall be set back from the exterior edge of the flange to assure proper sealant compatibility between the window casing and the wood trim. Submit data that illustrates that there compatibility with the sealant and the window casing. (see Section 07900).**
 - N. Install all straps, connectors and fasteners as required by manufacturer.

3.2 SHEATHING

- A. Wall sheathing: Install with long dimensions or strength axis across supports. Allow 1/8" spacing at panel ends and edges. Fasten in accordance with the Structural Drawings - wall sheathing shall bridge discontinuities in all wall framing; i.e. plywood seam shall not align with seam of joint. Install Perm-A-Barrier wall seam membrane at all exterior plywood seams.
- B. Place building paper horizontal over wall sheathing, weather lap edges and ends.
- C. Install telephone and electrical panel boards with plywood sheathing material where required. Over sized the panel by 12 inches on all sides.

3.3 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor; 1/4 inch in 10 feet maximum, and 1/2 inch maximum in 30 feet.

END OF SECTION 06100

SECTION 06193
PLATE CONNECTED WOOD TRUSSES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Shop fabricated wood trusses for roof framing.
- B. Bridging, bracing, and anchorage.

1.2 RELATED SECTIONS

- A. Section 06100 – Rough Carpentry
- B. Section 07613 – Manufactured Sheet Metal Roofing
- C. Division 15 - Mechanical: Coordination with Ductwork

1.3 REFERENCES

- A. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.
- B. ASTM A446 - Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- C. AWPA (American Wood Preservers Association) C1 - All Timber Products Preservative Treatment by Pressure Process.
- D. AWPA (American Wood Preservers Association) C20 - Structural Lumber Fire Retardant Treatment by Pressure Process.
- E. NFPA: National Forest Products Association.
- F. SPIB: Southern Pine Inspection Bureau.
- G. TPI (Truss Plate Institute) BWT-76 - Bracing Wood Trusses.
- H. TPI (Truss Plate Institute) HET-80 - Handling and Erecting Wood Trusses.
- I. TPI (Truss Plate Institute) PCT-80 - Metal Plate Connected Parallel Chord Wood Trusses.
- J. TPI (Truss Plate Institute) TPI-85 - Metal Plate Connected Wood Trusses.
- K. TPI (Truss Plate Institute) QST-88 - Metal Plate Connected Wood Trusses.
- L. WWPA: Western Wood Products Association.

1.4 SYSTEM DESCRIPTION

- A. Design roof live load: 20 lb./sq. ft with deflection limited to 1/240. Include weight of HVAC Units per Mechanical Drawings located at mechanical mezzanine. Dead loads per materials shown on all plans.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01330.
- B. **Shop Drawings: Indicate sizes and spacing of trusses, loads and truss cambers, framed openings. Submit design calculations. Coordinate with mechanical ductwork layout and coordinate with steel column and anchor bolt layout. Shop drawings must be submitted within the first 30 days.**
- C. Product Data: Provide truss configurations, bearing and anchor details, bridging and bracing, and connection details.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with the following agencies:
 - 1. Lumber Grading Agency: Certified by ALSC.
- B. Truss Design, Fabrication, and Installation: In accordance with Truss Plate Institute BWT-76, HET-80, PCT-80 including Supplement, TPI-85 including Supplement, QST-88.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- B. Design trusses under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of South Carolina.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable code for loads, seismic zoning, other governing load criteria, and fire retardant requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site in accordance with manufacturer's recommendations and applicable codes.
- B. Handle and erect trusses in accordance with TPI HET-80.
- C. Store trusses in vertical position resting on bearing ends.

1.10 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Lumber Grading Rules: NFPA and SPIB.
- B. Wood Members: Single top and bottom chord, Southern Pine, species; minimum grade structural No. 2 kiln dried.
- C. Steel Connectors: ASTM A446 steel, Grade B, hot dip galvanized; designed by truss manufacturer. Truss supplier to design and supply all truss to truss connections.
- D. Truss Bridging: Type, size and spacing recommended by truss manufacturer.

2.2 ACCESSORIES

- A. Wood Blocking and Plating: In accordance with Section 06112.
- B. Fasteners: Unfinished steel, sized by truss manufacturer.
- C. Bearing Plates: Hot dip galvanized, sized by truss manufacturer.

2.3 FABRICATION

- A. Fabricate trusses to achieve structural requirements specified.

- B. Brace wood trusses in accordance with TPI BWT-76.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that supports and openings are ready to receive trusses.

3.2 PREPARATION

- A. Coordinate placement of bearing and support items.

3.3 ERECTION

- A. Install trusses in accordance with manufacturer's instructions.
- B. Set members level and plumb, in correct position.
- C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure plumb, and in true alignment until completion of erection and installation of permanent bracing.
- D. Do not field cut or alter structural members without approval of Architect/Engineer.
- E. Place headers and supports to frame openings required.
- F. Frame openings between trusses with lumber.
- G. Coordinate placement of decking with work of this section.
- H. After erection, touch-up galvanized surfaces with zinc primer.

3.4 TOLERANCES

- A. Framing Members: 1/2 inch maximum, from true position.

END OF SECTION 06193

SECTION 06200
FINISH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Finish carpentry items other than shop prefabricated casework.
- B. Attachment accessories

1.2 RELATED SECTIONS

- A. Section 06112 - Framing and Sheathing.
- B. Section 08211 - Flush Wood Doors.
- C. Section 08800 - Glazing: Glass and Glazing of Doors.
- D. Section 09900 - Painting: Painting and Finishing of Finish Carpentry Items.

1.3 REFERENCES

- A. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials
- B. AWI – American Woodworking Institute

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit samples of each product for review of conformance and quality.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with AWI (Architectural Woodwork Institute) Architectural Woodwork Quality Standards Illustrated, Premium Grade.
- B. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- C. Apply label from agency approved by authority having jurisdiction to identify each preservative treated and fire retardant treated material.
- A. Perform Work in accordance with State of North Carolina standards.
- B. Maintain one copy of each document on site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Protect work from moisture damage.

PART 2 PRODUCTS

2.1 INTERIOR STANDING AND RUNNING TRIM

- A. AWI Quality Grade: Custom grade, Lumber grade II opaque, plain saw finger joint not permitted.
- B. Solid Wood:
 - 1. Poplar "D" and better paint grade to be painted or sealed in accordance with Section 09900 Painting.
 - 2. Fastened with stainless steel type 316 angular chisel point nails
 - 3. Moisture content not to exceed 10% and relative indoor humidity of 45-70%
 - 4. At interior walls as indicated as "wood" on room finish schedule on Contract Documents - horizontal running select cypress B and better S1S2E. Final selection to be made by Architect. Tongue & groove joint (1x8) – 6" exposure 1x8 base
- C. Smoothness: 20 KCPI and 30 grit.
- D. Flushness variation not to exceed .015".
- E. Sizes and locations as indicated on the drawings 12'0" lengths.
- F. Provide a moisture content not to exceed 10% and a relative indoor humidity of 45-70%.

2.3 MISCELLANEOUS SHELVING AND BUILT-IN WORK

- A. Softwood Limber: PS 20; Graded in accordance with AWI Custom; Douglas Fir, Western Red Cedar, Western Pine, and Yellow Cypress species, plain swan, maximum moisture content of 6-8 percent; with mixed grain, of quality suitable for transparent finish.
- B. Softwood Plywood: PS 1 Grade AB; Graded in accordance with AWI, veneer core; Douglas Fir face species, plain cut.
- C. Fasteners: Sizetype to suit application. Hot dipped galvanized steel for exterior exposed, interior concealed, high humidity, and treated wood locations; stainless steel where exposed at interior locations.
- D. Contact Adhesives: Water base type.
- E. Lumber for Shimming and Blocking: Softwood lumber of SYP species.
- F. Wood Filler: Solvent or oil base, tinted to match surface finish color.

2.3 FABRICATION

- A. Fabricate to AWI Custom Standards.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.
- C. Interior trim must be stacked and stored on site in accordance with AWI guidelines for wood to acclimate to local conditions and achieve a maximum moisture content of 12% prior to back priming.

3.2 INSTALLATION

- A. Install Work in accordance with AWI Quality Standards.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Install trim with nails at 8 inch on center.
- E. Apply sealant as required (see Section 07900).

3.3 PREPARATION FOR SITE FINISHING

- A. Site Finishing: Refer to Section 09900.
- B. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.
- C. Interior Back Primer: Alkyd primer sealer.

3.4 ERECTION TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION 06200

SECTION 06410
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Shop Built cabinet units.
- B. Countertops.
- C. Cabinet hardware.

1.2 RELATED SECTIONS

- A. Section 06112 - Framing and Sheathing: Grounds and support framing.
- B. Section 06200 - Finish Carpentry: Related trim not specified in this section.
- C. Section 09900 - Painting: Finishing cabinet exterior and interior.
- D. Section 15440 - Plumbing Fixtures and Trim.

1.3 REFERENCES

- A. ANSI/BHMA A156.9 - Cabinet Hardware.
- B. AWI - Quality Standards.
- C. FS MM-L-736 - Lumber Hardwood.
- D. PS 1 - Construction and Industrial Plywood.
- E. PS 20 - American Softwood Lumber Standard.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01330.
- B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location, and schedule of finishes.
- C. Samples: Submit two, 12 x 12 inch size samples illustrating cabinet finish.
- D. Samples: Submit two, 12 x 12 inch size samples illustrating counter top finish.
- E. Samples: Submit two samples of drawer pulls, hinges and, shelf brackets, locks, and standards illustrating hardware finish.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with State of South Carolina standards.
- B. Maintain one (1) copy of each document on site.
- C. Perform work in accordance with AWI Custom quality.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products to site under provisions of Section 01600.
- B. Protect units from moisture damage.

1.8 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.9 COORDINATION

- A. Coordinate work under provisions of Section 01039.
- B. Coordinate the work with Division 15, Plumbing Rough-In, Division 16, Electrical Rough-In. Coordinate location of grommets with data outlets.
- C. Conform to all ADA Regulations for counter height and clearances.

1.10 SYSTEM DESCRIPTION

- A. All countertops and exposed surfaces of cabinets to be plastic laminate. Inside of drawers and inside base cabinets, sealed wood.
- B. Coordinate prior to fabrication for exact size and clearances.
- C. All cabinets to be flush overlay.
- D. Coordinate all blocking and provide clearance for a pull-out keyboard (N.I.C.) to be installed in the future at areas.

PART 2 PRODUCTS

2.0 ACCEPTABLE MANUFACTURERS

- A. Shop Built Cabinets

2.2 SHEET MATERIALS

- A. Hardwood Plywood: Ps 1; graded in accordance with AWI, type of glue recommended for application; face veneer and cuts as follows:

<u>ITEM</u>	<u>FACE SPECIES</u>	<u>CUT</u>
Drawer & Cabinet Face	Birch	Rift Sawn
Gables and Backs	Birch	Plain Sawn
Shelving	Birch	Plain Sawn
Drawer Bottoms	Spruce, Fir	Plain Sawn
Backs	Spruce, Fir	Plain Sawn

- B. Wood Particle Board: PS 1; AWI standard, composed of wood chips, medium density, made with high waterproof resin binders; of grade to suit application; sanded faces, located as follows:

ITEM
Tops, Backsplash

2.3 MANUFACTURERS - PLASTIC LAMINATE

- A. Wilson Art
- B. Formica
- C. Nevamar

2.4 LAMINATE MATERIALS

- A. Plastic Laminate: NEMA LD3, GP-50 General Purpose type; color pattern to be selected, and matte surface texture as selected.
- B. Laminate Backing Sheet: LD3 BK20 backing grade, undecorated plastic laminate.

2.5 ACCESSORIES

- A. Fasteners: Size and type to suit application.
- B. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application.
- C. Concealed Joint Fasteners: Threaded steel.
- D. Grommets: Provide the number equal to data and electrical outlets within corresponding casework.

2.6 HARDWARE

- A. Drawer and Door Pulls: Hafele or equal brushed chrome, Bow Handles, Wire design; attached with machine screws at 4 inch centers.
- B. Drawer Slides: Blum BS 230E or equal sliding epoxy coated steel glides with nylon tired rollers.
- C. Hinges: Blum Module 170 or equal, concealed design, all metal construction 170 degree opening, full adjustable for door alignment: provide tow hinges per door.

- D. At Entry Lobby Display Case, as noted on Elevation E13, Sheet A6.0 – provide the following:
 - 1. 3/8” tempered glass
 - 2. 180 degree offset pivot hinge by CR Lawrence Company, file FA044. Provide three hinges per door.
 - 3. Lock CRL plunger lock, file EH100. Provide a lock per door.
 - 4. Finish for both will be ‘chrome’.

2.7 FABRICATION

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- B. Fit shelves, doors, and exposed edges with 3/8 inch matching veneer edging. Use one piece for full length only.
- C. Door and Drawer Fronts: 3/4 inch thick; flush overlay style with trim as indicated on drawings.
- D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- E. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, fixtures and fittings. Verify locations of cutout from on-site dimensions. Prime paint and seal contact surfaces of cut edges.
- F. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Locate counter butt joints minimum two feet from sink cutouts. Provide eased edge corners, sharp corners will not be accepted.
- G. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

2.8 FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.
- D. Seal and stain exposed to view surfaces.
- E. Seal, stain and varnish internal exposed to view surfaces. Brush apply only.
- F. Seal surfaces in contact with cementitious material.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify adequacy of backing and support framing.

3.2 INSTALLATION

- A. Set and secure casework in place; rigid, plumb and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinet and counter bases to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.3 ADJUSTING

- A. Adjust work under provisions of Section 01700.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

- A. Clean work under provision of Section 01700.
- B. Clean casework, counters, shelves, hardware, fittings and fixtures.

END OF DOCUMENT 06410

SECTION 07212

SPRAYED INSULATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes insulation applied to underside of structure.

1.2 REFERENCES

- A. Underwriters Laboratories, Inc.:
 - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
 - 2. UL - Fire Resistance Directory.

1.3 SUBMITTALS

- A. Section 01330: submittal procedures.
- B. Product Data: Submit data on materials, describing insulation properties
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- D. Manufacturer's Certificate: Certify products meet or exceed requirements.

1.4 QUALITY ASSURANCE

- A. Insulation Installed in Concealed Locations Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84, NFPA 255, UL 723.
- B. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01600 - Product Requirements.

- B. Maintain acceptable ambient and substrate surface temperatures prior to, during, and after installation of insulation materials.

1.7 SCHEDULING

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Apply insulation after hangers and supporting clips are installed but before subsequent construction is erected.

PART 2 PRODUCTS

2.1 SPRAYED INSULATION

- 1. Quik Shield 112XC by SWD Urethane is a two component, 2lb closed cell spray applied rigid polyurethane foam system.

- B. Furnish materials in accordance with the state of South Carolina standards.

2.2 COMPONENTS

PHYSICAL PROPERTIES:	Procedure	Values
Core Density (lb/ft ³)	D-3522	1.9-2.3
Water Vapor Permeance (perms/in)	E-06	1.17
Water Absorption (%)	D-3841	1
Dimensional Stability (%)	D-3126	<10
Tensile Strength (psi)	D-3823	10-25
Open Cell, content (%)	D-4226	1-10
Air Leakage (L/(m ² h))	E-283	0.002
Noise Absorption (coefficient)	C-423	0.25
Sound Transmission Class (STC)	E-90	15

2.3 ACCESSORIES

- A. Primer: As required by insulation manufacturer.
- B. Insulation Surface Sealer: Clear, latex base.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify surfaces are clean, dry, and free of matter capable of inhibiting adhesion.
- C. Verify other Work on and within spaces to be insulated is complete prior to application.

3.2 PREPARATION

- A. Mask and protect adjacent surfaces from overspray or damage.
- B. Apply primer.

3.3 INSTALLATION

- A. Apply insulation to a uniform monolithic density without voids.
- B. Apply to achieve thermal resistance R-Value at 1" = 6.3; Total R-Value of 38 +/- 6" total thickness.
- C. Tamp wet insulation surface to improve adhesion and to achieve smooth surface.
- D. Install Work in accordance with the state of South Carolina standards.

3.4 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements, 01700 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspection includes verification of insulation thickness and density.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01700 - Execution and Closeout Requirements: Protecting installed construction.
- B. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

SECTION 07213
BATT AND BLANKET INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Batt insulation and vapor barrier in exterior wall and ceiling.
- B. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.
- C. Spray foam at entire roof area. See Section 07212.

1.2 RELATED SECTIONS

- A. Section 05400 – Metal Stud Framing
- B. Section 06193 – Plate Connected Wood Trusses
- C. Section 06100 – Rough Carpentry
- D. Section 07270 - Firestopping.
- E. Section 09260 - Gypsum Board Systems: Acoustic insulation.

1.3 REFERENCES

- A. FS HH-I-521 - Insulation Blankets, Thermal, (Mineral Fiber for Ambient Temperatures).
- B. FS HH-I-558 - Insulation, Blocks, Boards, Blankets, Felts, Sleeving (Pipe and Tube Covering), and Pipe Fitting Covering, Thermal (Mineral Fiber, Industrial Type).

1.4 PERFORMANCE REQUIREMENTS

- A. Materials of this Section shall provide continuity of thermal barrier at building enclosure elements.
- B. Materials of this Section shall provide continuity of vapor and air barrier at building enclosure elements.
- C. Comply with South Carolina Energy Code, IEC 2009

1.7 QUALITY ASSURANCE

- A. Insulation Installed in Concealed Locations Surface Burning Characteristics:

1. Batt Insulation: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- B. Insulation Installed in Exposed Locations Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
 1. Attic Floor Insulation: Minimum 0.12 watt per sq cm critical radiant flux when tested in accordance with ASTM E970.
- C. Carolina standards.
- D. Maintain one copy (1) copy of each document on site.

1.8 COORDINATION

- A. Coordinate Work under provisions of Section 01039.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Owens Corning Fiberglass Corp. FS-25
- B. Manville FSK-25
- C. CertainTeed FSK-25
- D. Batt Insulation: FS HH-I-521 Type II - with non-reflective membrane one side mineral fiber; friction fit, conforming to the following:

Batt Size	Exterior walls: R-21 - Unfaced
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- E. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Section 01039.
- B. Verify that substrate, adjacent materials, and insulation are dry and ready to receive insulation.

3.2 INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in exterior walls, roof and ceiling spaces without gaps or voids.

- C. Trim insulation neatly to fit spaces.
- D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.
- E. Install with factory applied membrane facing warm side of building spaces. Lap ends and side flanges of membrane between framing members.
- F. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

3.3 SCHEDULES

- A. Wall Insulation (6" metal stud wall): R21 batt, unfaced.
- B. Install sprayfoam at entire attic. See Section 07212.

END OF SECTION 07213

SECTION 07460
FIBER CEMENT SIDING

PART 1 GENERAL

1.1 SCOPE

- A. Furnish and install Hardiplank fiber-cement siding, Hardtrim fascia and moulding and accessories where shown on drawings or as specified herein.
- B. Coordinate this section with interfacing and adjoining work for proper sequence of installation.
- C. Work in other sections affecting this work.
 - 1. Section 05400 - Metal Stud Framing
 - 2. Section 06100 – Rough Carpentry: Wood Framing and Bracing, Sheathing
 - 3. Section 07213 – Batt and Blanket Insulation: Insulation
 - 4. Section 07620 – Sheet Metal Flashing & Trim: Typical Flashing Conditions
 - 5. Section 09900 – Paints and Coatings

1.2 SUBMITTALS

- A. Submit three 6 inch x 6 inch pieces of Hardiplank / Harditrim claddings in texture and widths shown and specified herein. Submittal to include a sample of the batton strip.
- B. Submit three copies of specifications, installation data and other pertinent manufacturer’s literature.
- C. Submit with Submittal Action Form provided in Section 01300

1.3 PRODUCT HANDLING

- A. Stack Hardiplank / Harditrim claddings on edge or lay flat on a smooth, level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

1.4 JOB CONDITIONS

- A. Install weather-resistive barriers and claddings to dry surfaces.
- B. Repair any punctures or tears in the weather-resistive barrier prior to the installation of the siding.
- C. Protect siding from other trades.

1.5 WARRANTY

- A. Provide a limited product warranty against manufacturing defects in Hardiplank lap for 30 years, HardiTrim for 10 years.

1.6 MOCK UP

- A. **Provide mock-up of an area minimum 8 feet wide by full height to include all trim boards, flashing , window trim for review and approval as per provisions of Section**

01400. Mock-up shall indicate the installation and finish quality to include nailing patterns.

- B. When accepted mock-up will demonstrate minimum standard for the work. Mock-up may remain part of the work.
- C. The mock-up will aid in determining the color selections and compatibility with other material textures and colors.

PART 2 PRODUCTS

2.1 HARDIPLANK / HARDITRIM FASCIA AND MOULDING

by James Hardie: Basis of Design; Any and all substitutions must receive prior approval in accordance with Section 01600: Product Requirements. If approval is not stated in an addendum, a substitution will not be acceptable. All products shall be primed and meet HZ10 criteria.

- A. Non-asbestos fiber-cement siding to comply with ASTM Standard Specification C1186 Grade II, Type A.
- B. Siding – Horizontal siding type “smooth” 8”w 6-3/4” exposure – 5/16” thick and 12’-0” length
- C. Siding to meet the following building code compliance National Evaluation Report No. NER 405 (BOCA, ICBO, SBCCI); Non-asbestos fiber-cement siding to be non-combustible when tested in accordance with ASTM test method E136.
- D. Trim Type: HardiTrim XLD 1” Smooth Planks 5/4” nominal by the width as required and as indicated on the drawings. Provide the full length boards. All boards to be solid boards, not to have holes at back.
- E. Soffit panel/board: Hardisoffit NonVented 1/4” x 16” x 144” smooth finish to be used only on horizontal surface not on sloped rakes.
- F. Ceiling Board: Hardi-Panel for use as indicated for ceiling at the Porch unless noted otherwise.
Panel Type: Hardipanel Smooth 5/16” x 4’ x 10’.

2.2 FASTENERS

- A. Wood framing: 0.093” shank x 0.222” head x 2” corrosion resistant (Stainless Steel) siding nails for trim and as per manufacturers recommendations whichever is more stringent. For batten use 2 inch minimum 16 ga. Stainless steel finish nail.
- B. Metal Stud Framing – Screws: Ribbed bugle head (No. 8- 18 x 1-5/8” long x 0.323” HD) Must penetrate minimum three threads into metal framing. Nails: ET & F Pin (0.10” shank x 0.25 HD and 1-1/2” long). Nails must penetrate minimum ¼” into metal framing.
- C. Do not place fasteners closer than ¾ inches from the edges

- D. Submit fastener for approval for metal framing prior to installation.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Correct conditions detrimental to timely and proper completion of work.

3.2 INSTALLATION

- A. Install flashing around all wall openings.
- B. Block framing between studs where horizontal joints of Hardi Panel occur.
- C. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum $\frac{3}{4}$ inch or full thickness or sheathing.
- D. Place fasteners no closer than $\frac{3}{4}$ inch and no further than 2 inch from side edge of trim board and no closer than 1 inch from end. Fasten maximum 16 inch on center.
- E. Allow minimum 1-1/2" inch vertical clearance between roofing and bottom edge of siding.
- F. Align vertical joints of the planks over wood framing members. Leave a small gap between the boards in accordance with the manufacturers recommendation and apply sealant prior to installing the batten strip.
- G. Maintain clearance between siding and adjacent finished grade. Minimum of 6" inches.
- H. Fasteners should be driven snug with the exterior surface of the siding (no airspace). Do not overdrive fastener into the siding or batten. Do not drive fastener in to surface at an angle. The use of Aluminum fasteners, staples and clipped head nails is not allowed.
- I. Maintain clearance between trim and adjacent finished grade.
- J. Trim inside corner with single board.
- K. Install single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten Harditrim board to Harditrim board.
- L. Allow 1/8 inch gab between trim and siding.
- M. Seal gap with high quality, paint-able caulk. See Section 07900 - Joint Sealants.
- N. Shim frieze board as required to align with corner trim.
- O. Install Harditrim fascia over structural wood subfascia.

3.3 INSTALLATION – HARDIPLANK SIDING

- A. Starting: Install a minimum ¼ inch thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum ¼ inch wide laps at the top. The bottom edge of the first plank overlaps the starter strip.
- B. Allow minimum 1 inch vertical clearance between roofing and bottom edge of siding.
- C. Align vertical joints of the planks over framing members.
- D. Maintain clearance between siding and adjacent finished grade.
- E. Locate splices at least one stud cavity away from window and door openings.
- F. Use off-stud metal joiner when vertical joints occur between framing members. Position metal joiner so that the bottom lip is resting on the solid course of planks. Fasten plank to the framing. Position and fasten abutting plank into place insuring that the lower edges of the two planks align. Locate metal joiner centrally behind the joint. Locate off-stud splices a minimum of two stud cavities from wall corners and stagger all subsequent course splices at minimum 24 inch intervals when located in the same wall cavity.
- G. Wind Resistance: A wind resistance is required and Hardiplank lab siding should be installed to framing members and secured with fasteners described in Table No. 2 in National Evaluation Service Report No. NER-405.
- H. All field cut edges shall receive prime and paint.

3.4 FINISHING

- A. Finish primed siding with two coats high quality, alkali-resistant, 100% acrylic exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions. Use Elastomeric Sealant: ASTM C920 Grade NS or higher in accordance with ASTM C1193
- B. See Section 09900 – Paints and Coatings. Paint must be applied with a brush, no spray application will be allowed.

END OF SECTION 07460

SECTION 07613
MANUFACTURED SHEET METAL ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Preformed, prefinished metal roofing and flashing for sloped roofing to include rigid insulation
- B. Miscellaneous trim, flashing, closures, drip flashing, and accessories.
- C. Sealant
- D. Fastening devices, ridge vents.
- E. Weatherproofing Membrane.

1.2 RELATED SECTIONS

- A. Section 02225 - Selective Minor Renovation and Demotion
- B. Section 04810 - Unit Masonry Systems
- C. Section 05312 – Steel Roof Deck
- D. Section 05440 - Pre Engineered Cold Formed Steel Trusses
- E. Section 06100 – Rough Carpentry
- F. Section 06200 – Finish Carpentry
- G. Section 07620 - Sheet Metal Flashing & Trim
- G. Section 07900 - Joint Sealers

1.3 REFERENCES

- A. American Iron & Steel Institute (AISI) Specification for the Design of Coldformed Steel Structural Member
- B. ASTM A-525 Steel Sheet, Zinc-Coated (Galvanized)
- C. ASTM E-283-84 Air Infiltration
- D. ASTM E-331-86 Water Infiltration
- E. Spec Data Sheet - Gal Valume Sheet Metal By Bethlehem Corp.
- F. SMACNA – Sheet Metal and Air Conditioning Contractors National Association, Inc.: Architectural Sheet Metal Manual

G. NCRA – The National Roofing Contractors Association: Roofing and Waterproofing Manual (including Construction Details), and Handbook of Accepted Roofing Knowledge

H. Manufacturer’s Construction Details Handbook

I. ASIC Steel Construction Manual

J. AISI Cold Formed Steel Design Manual

1.4 ASSEMBLY DESCRIPTION

A. The roofing assembly includes preformed sheet metal panels, related accessories, valleys, hips, ridges, eaves, crickets, miscellaneous flashing and attaching devices.

1.5 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Submit a sample of each type of roof panel, complete with factory finish.

C. Submit detailed drawings showing layout of panels, anchoring details, joint details, trim, flashing, and accessories. Show details of weatherproofing and terminations. A complete analysis/report shall be submitted indicating clip attachment and spacing.

D. Submit results indicating compliance with minimum requirements of the following performance tests:

1. Air Infiltration ASTM E 283-84
2. Water Infiltration ASTM E331-86

E. Submit calculations with registered SC engineer seal, verifying roof panel and attachment method resists wind pressures imposed on it pursuant to applicable building codes. The design is to include clip spacing design. The work will not commence without approval of submitted data.

F. Submit manufacturer’s warranty covering the substrate (metal) against rupture, perforation, and structural failure due to normal atmospheric corrosion for twenty (20) years.

G. Submit manufacturer’s thirty (30) year warranty on paint finish against cracking, peeling, blistering, chalk, and color change.

H. Submit test reports complying with finish specifications per section 2.02 C5 through C8.

1.6 QUALITY ASSURANCE

A. Manufacturer: Company specializing in Architectural Sheet Metal Products with ten (10) years minimum experience.

- B. No product substitutions shall be permitted without meeting specifications.
- C. Substitutions shall be submitted 10 days prior to Bid Date and acceptance put forth in an addendum as per Section 01600 - Material & Equipment.
- E. Before Fabrication: The contractor shall take field measurements of the structure and substrates indicated and specified to ensure that panel lengths and brakeformed flashings are dimensioned accurately to facilitate easy installation. Fabrication shall not begin until all field conditions have been verified. Allow for sufficient trimming of panel units at caves, valleys, and gables prior to fabrication.
- F. Perform Work in accordance with State of South Carolina standards.
- G. Maintain one (1) copy of each document on site.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Upon receipt of panels and other materials, installer shall examine the shipment for damage and completeness.
- B. Panels should be stored in clean, dry place. One end should be elevated to allow moisture to run off.
- C. Panels with strippable film must not be stored in the open, exposed to the sun.
- D. Stack all materials to prevent damage and to allow for adequate ventilation.
- E. Store materials above ground, on skids. Protect material with waterproof covering and allow sufficient ventilation to prevent condensation build-up or moisture entrapment in the materials.

1.8 WARRANTY

- A. Paint finish shall have a twenty (20) year guarantee against cracking, peeling and fade (not to exceed 5 N.B.S. units).
- B. Galvalume material shall have a twenty (20) year guarantee against failure due to corrosion, rupture, or perforation.
- C. Applicator shall furnish guarantee covering watertightness of the roofing system for the period of two (2) years from the date of substantial completion where the installer shall assure weathertightness and watertightness on the roof, without any cost to the building owner.
- D. Provide a twenty (20) year manufacturers watertightness warranty. The twenty (20) year weather tightness warranty must be issued to the Owner by the metal manufacturer, there will be no third party warranty permitted.

1.9 SINGLE SOURCE CONTRACTOR

- A. For Sections 07620, 07613, the project will require a single source roofing contractor. The single source contractor shall be responsible for all products

and services and may use various suppliers and subcontractors for this work under their supervision.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Englert, Inc. - Series 2000
- B. Merchant & Evans (2" zip lock)
- C. Morin - SWL
- D. Or approved substitution in accordance with Section 01600: Product Requirements.

2.2 SHEET MATERIALS

- A. Panel System should be:
 - 1. Englert Series 2000, 1-3/4" x 14" Architectural Snap-Lock Standing Seam System with **pencil ribs**. The panels shall have baked on finish as specified.
 - 2. Manufacturers Standard Color:
Dove Gray (R 45.7, E .91, SI 53.1).
Final color selection to be determined by Architect.
- B. Substrate: .032 Aluminum Alloy 3105-H14 approved equal.
- C. Performance:
 - 1. Panel shall meet the requirements of Underwriter's Laboratories, Inc. for Class 90 wind uplift resistance and 580 classification for 90 lb./sq. ft. uplift test.
 - 2. Air Infiltration/Water Penetration: No evidence of uncontrolled leakage on Snap-Lock Seam at 100 mph with simulated water spray of 8.8" of rainfall per hour.
 - 3. Panel shall display a flame spread classification of a (Class 1) when tested in accordance with ASTM E-84-87.
 - 4. Permacolor 2000 Finish (30 year Warranty: Englert's Permacolor coatings comprises of a .8 to .9 mil full strength 70% Kynar 500 fluorocarbon (Polyvinylidene Fluoride PVF2) coating over a urethane primer of .2 to .3 mil on the finish side, with primer and a wash coat on the reverse, on steel with just a wash coat on aluminum. Face film thickness 1.0 mil ± .2 mil.
 - 5. Film Thickness: Topside finish primer shall be .2 - .3 mil. Kynar 500 top coat shall be .8 - .9 mil. Reverse side finish shall be .2 - .3 mil primer with a wash coat. Total dry film thickness for the coating system shall be 1.00 mil nominal. All measurements per NCCA Technical Bulletin II-4 or ASTM D1005-84.
 - 6. Specular Gloss: As determined per ASTM D523-85 at a glossmeter angle of 60 degrees. 35% ± 5 specular reflectance.
 - 7. Humidity Resistance: No blistering, cracking, peeling, loss of gloss or softening of the finish after 3000 hours aluminum 1000 hours coated

steel, of exposure at 100% humidity at 95 degrees F, per Federal Test Method Standard 141, Method 6201 or ASTM D2247-87.

8. Salt Spray Resistance: Samples diagonally scored and subjected to 5% - at 95 degrees F, neutral salt spray per ASTM B117-85, then taped with Scotch #610 cellophane tape: 3000 hours aluminum/1000 hours coated steel, no blistering and no loss of adhesion greater than 1/8 from score line. (Samples taped one hour after removal from test cabinet).
 9. Chemical Resistance: No effect after 24 hour exposure of a 10% solution of hydrochloric acid, and 18-hour exposure to 20% sulfuric acid, per ASTM D1308-85, including exposure to 10% muriatic acid and nitric acid fumes.
 10. Chalking Resistance: No chalking greater than #8 rating, per ASTM D659-86 test procedure after a 3000-hour weatherometer test.
 11. Color Change: Finish coat color change shall not exceed 5 NBS units per ASTM D822-86, ASTM G23-88 and ASTM D2244-85 (South Florida 10-years) test procedure after 3000-hour weatherometer test.
 12. Abrasion Resistance: Shall pass 60 liters.mil., minimum of falling sand per ASTM D968-81. Method A.
- D. Strippable film shall be applied to the top side of the painted coil to protect finish during fabrication, shipping and field handling. This strippable film must be removed before installation.

2.3 ACCESSORY MATERIALS

- A. Fasteners: Stainless steel with washers.
- B. In-seam sealant: Weathermaster Metal Roof Sealant
- C. Vinyl weatherseal insert.
- D. Clips: 050760R clip 2000 universal 18 gauge stainless steel
- E. Concealor profile clip fastener; carbon steel epoxy coated #2 square recessed; size to penetrate insulation and securely fasten to metal decking.

2.4 FABRICATION

- A. Panel Construction: Panels shall be uniformly dimensioned, roll formed to exact lengths to avoid trimming. The panel system shall be anchored as recommended by the Manufacturer. All fasteners shall be concealed. Panels shall be continuous from ridge to eaves with not end laps. There shall be no face penetration of panels.
- B. Flashing and Trim: All exposed standard or special flashing/trim and such other brake formed in the same gauge, color, and finish to match roofing panels, furnished with protective strippable film to be removed upon installation.
- C. Accessories such as clips, closures, fasteners, etc., shall be as recommended by the Manufacturer.
- D. All exposed adjacent flashing shall be of the same material and finish as the roof panels.

- E. Hem all exposed edges of flashing on underside, 1/2 inch.

2.5 STANDING SEAM PANEL

- A. 1-3/4" high vertical legs shall be spaced at 16" o.c. and shall have no exposed fasteners.
- B. Panels shall be site formed with Portable Roll Former in continuous lengths from ridge to eave or factory formed to 40' max.
- C. Continuous Rib panel shall be 1-3/4" in height. Rib shall be connected to substrate with panel clips and the clips attached with two (2) screw fasteners. Clips are to be spaced in accordance with submitted and approved engineer report.
- D. Vinyl Weatherseal to be factory installed over Continuous Snap Lock Standing Seam.
- E. Certification shall be submitted, based on independent testing laboratory, indicating no measurable water penetration or air leakage through the system when tested in accordance with ASTM E-331-86 and E-283-84.

2.6 WEATHERPROOFING MEMBRANE

- A. Midstates Asphalt; Quick-Stick HT, 60mil thick, SBS modified self-adhering membrane reinforced with non woven fiber glass mat, composite underlayment, ASTM D1970 installed over entire roof on the polyisocyanurate insulation in accordance with manufacturer's recommendations.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify substrate is uniform, even and symmetrical by running a string test. Inspect to assure that all purlins or substructure/framing members are flat and insulation is embedded symmetrically so when the metal panels are applied, they will not appear wavy or distorted.
- B. Prior To Installation
 1. Inspect support members and anchorage to ensure that they have been installed in accordance with AISC Manual of Steel Construction "Code of Standard Practice" and meet the requirements of the roof panel manufacturer.
 2. Ensure that the substrate is not out of plane and that there are not defects that may promote oil canning or prevent proper installation.
 3. Inspect each panel prior to installation to ensure that there was no objectionable oil canning induced during fabrication. If objectionable oil canning is observed, notify the roof panel manufacturer promptly for evaluation and determination. Do not install questionable panels.
 4. Inspect each panel to assure that the factory applied seam sealant is present in female rib, and complete from eave to ridge, end to end.
 5. Install a 16 ga. Galvanized valley and ridge stiffener plate centered over the valley and ridge. Secure to the substrate metal decking with epoxy coated long life deck fasteners at

12" OC. Joggle the ridge stiffener up 3/8" to flush out with the plane of the roofing panels.

During Installation:

1. Continuously inspect installed panels for visible oil canning and other imperfections during installation. If oil canning is noticed, stop installation and promptly notify the roof panel manufacturer for evaluation and determination. If installed panels were acceptable prior to installation, oil canning may be induced by substrate conditions. Unless thermally induced, oil canning does not normally occur over time. If the substrate is not in tolerance, oil canning will usually occur as the panels are installed.

3.2 INSTALLING SOLID SUPPORT

A. Remove ice, frost, snow, and moisture from the roof deck and broom clean all surfaces.

B. When required to achieve solid support for the edges of the boards, cut wood blocking boards neat and true so that edges of boards occur over the center of the steel deck flutes to provide full solid edge bearing for the boards.

C. Install no more solid support than will be covered with completed roof the same day, or at end of work day, or before arrival of inclement weather. Cover all materials before leaving the roof for more than 30 minutes. All support not covered at the end of the day shall be removed from the project site and replaced with new.

D. Install solid support with tightly butted joints and without deformation or damage to the materials. Recut boards as necessary to ensure that joints are tightly butted. Provide fill in any gap greater than 1/4".

E. Do not use boards that are broken or crushed, have less than perfect edges, have holes or depressions or are less than half width.

F. Remove fasteners that do not penetrate the upper flange. Provide additional perimeter fastening as required by the manufacturer to meet specified wind uplift requirements.

G. Ensure that all edges of the boards are flush and that edges do not bounce or deflect when walked on after fasteners have been installed. Install additional fasteners to make all edges flush and eliminated bounce and deflection.

H. No fastener shall be closer than 6 inches to or 12 inches from the edge of the insulation.

I. Remove fasteners that are overdriven that have crushed the boards, or that have cupped the fastener disk and replace with properly driven fasteners. When a fastener has crushed a board, remove the board and install a new and true board.

J. Remove fasteners that extend below the edge of the bottom flute and replace with fasteners of proper length.

3.3 FLEXIBLE UNDERLAYMENT INSTALLATION

A. Install where underlayment over solid support according to the recommendations and instructions of the manufacturers of the roof panels and underlayment for the specified watertightness warranty. At minimum provide one roll width at eaves, rakes and ridges; and two

roll widths lapped over centerline of valley conditions 2'.

- B. Turn up vertical terminations as indicated on the Drawings.
- C. Fold over roof edge at eaves and rakes and protect by metal gutter, trim or flashings.
- D. Cover immediately with roof panels. Do not allow to be exposed to sunlight.
- E. Do not install in temperatures below 40 deg. F.
- F. Form 4-inch side laps and 6-inch end laps.
- G. Remove all wrinkles and gaps so that underlayment lays smooth and even.

3.2 METAL ROOFING INSTALLATION:

- A. The metal panel system shall be installed plumb, level, and straight over a layer weatherproofing membrane.
- B. The standing seam shall be equidistant and shall align for corners, hips, valleys, mullions, and columns in accordance with architectural design parameters as shown on the drawings.
- C. Installation shall be made in accordance with manufacturer' recommended procedures and layout drawings. Manufacturers of construction Detail Handbook, SMACNA Architectural Sheet Metal Manual, NRCA Roofing and Waterproofing Manual and Handbook of Roofing Knowledge shall be used as guides and details whenever applicable. Because of various levels of each manufacturers and SMACNA , the Architect will accept only the most restrictive guide and it is at the discretion of the Architect.
- D. No face penetrations or perforation shall be made in metal panels by fasteners without architect's specific approval. All panels shall be continuous from ridge to eaves with no horizontal end laps.
- E. End lap all flashing and trim at least 3". All butt joints must be caulked. Soldered areas shall be counter flashed or painted to match. All valleys shall be treated with a layer of Ice and Watershield spread out at least 24" each side from the center of the valley, on both sides, before applying valley flashing. End lap at least 6" at joints.
- F. Exercise proper care during installation to avoid damage or scratching of the panels. Avoid walking over the metal roof after installation is completed.
- G. Comply with manufacturers standard instructions and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation.
- H. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb.
- I. Install starter and edge trim before installing roof panels.

- J. Remove protective strippable film prior to installation of roof panels.
- K. Attach panels using manufacturer's standard clips and fasteners, spaced in accordance with approved shop drawings.
- L. Install sealants for preformed roofing panels as approved on shop drawings.
- M. Do not allow panels or trim to come into contact with dissimilar materials.
- N. Do not allow traffic on completed roof. If required, provide cushioned walk boards.
- O. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
- P. Remove and replace any panels or components which are damaged beyond successful repair.
- Q. All ridge and flashing shall be attached with long life fasteners at 6" oc. The Z closure requires a minimum of 4 fasteners per panel on 1" inch butyl tape that is separating the Z closure and the panel pan.

3.3 CLEANING

- A. Clean any grease, finger marks, or stains from the panels per manufacturer's recommendations.
- B. Remove all scrap and construction debris from the site.

3.4 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements and 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspection will involve surveillance of Work by third party inspector during installation to ascertain compliance with specified requirements.
- C. Owner will provide third party roofing inspections during the work. See Section 01200 Price and Payment Procedures: Allowances. Such inspections may be daily or periodic. Inspector to be Shepard & Associates, LLC.
- D. Contractor Responsibilities: Unless otherwise indicated, provide quality control inspections with Contractor's own work force. Repair or replace non-conforming work.
- E. Associated Services: Co-operate with Owner's Inspectors and Agencies performing inspections, and similar quality control services, and provide reasonable auxiliary services as requested by such parties. Provide the following minimum assistance:
 1. Access to the work
 2. Incidental labor and materials to facilitate the inspections and testing as may be deemed appropriate.

END OF SECTION 07613

SECTION 07620
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes flashings and counterflashings, and fabricated sheet metal items associated with Section 07613 – Sheet Metal Roofing as indicated in Schedule.
 - 1. Provide accessories.
- B. Related Sections:
 - 1. Section 01200 - Price and Payment Procedures: Allowance for Roof Inspector.
 - 2. Section 04810 - Unit Masonry Assemblies: Through-wall flashings in masonry.
 - 3. Section 06100 – Rough Carpentry: perma ply flashing
 - 4. Section 07613 – Sheet Metal Roofing

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM B32 - Standard Specification for Solder Metal.
 - 2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 3. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
 - 4. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.
- B. Copper Development Association Inc.:
 - 1. CDA - Copper in Architecture - Handbook.
- C. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA - Architectural Sheet Metal Manual.
- D. ANSI/SPRI ES-1: Wind Design Guide for edge systems used with low slope roof designs.

1.3 DESIGN REQUIREMENTS

- A. Sheet Metal Flashings: Conform to the following criteria of SMACNA "Architectural Sheet Metal Manual.", but not limited to
 - 1. Through-wall flashing/Counterflashing: SMACNA: Figures
 - a. 4-1 Through Wall Flashing
 - b. 4-2 Through Wall Flashing - Cavity
 - c. 4-4 Counter Flashing System
 - d. 4-5 Counter Flashing System
 - e. 4-8 Base and Counter Flashing System
 - f. 4-9 Counter Flashing Systems
 - g. 4-20 Sloping Roof Penetration Flashing

h. 4-22 Dormer Head/Sill Flashing For Frame Construction

- B. Reference Section 01330 - Submittal Procedures: Submittal procedures.
Shop Drawings: Indicate material profile, jointing pattern, jointing details fastening methods, flashings, terminations, and installation details for all flashing types.
- C. Samples:
 - 1. Submit two samples 6 inch minimum length of each component illustrating metal, fabrication shapes and finish color.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with State of South Carolina Work's standard.
- B. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

- A. Fabricator and Installer: Company specializing in sheet metal work with minimum five years documented experience.

1.6 PRE-INSTALLATION MEETINGS

- A. Section 01300 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Product Requirements: Product storage and handling requirements.
- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials causing discoloration or staining.

1.8 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate with Work of all sections for installing sheet metal roofing components.

1.9 SINGLE SOURCE CONTRACTOR

- A. **For Sections 07613, 07620, the project will require a single source roofing contractor. The single source contractor shall be responsible for all products and services and may use various suppliers and subcontractors for this work under their supervision.**

PART 2 PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM

- A. Manufacturers:
 - 1. Integris Metals, AlumaKlad
 - 2. Petersen
 - 3. B&B Sheet Metal
 - 4. Substitutions: Section 01600 - Product Requirements.
- B. Pre-Finished Aluminum Sheet: ASTM B209; alloy and temper as required for application and finish; 0.040 & .032 inch thick; plain finish shop pre-coated with fluoropolymer top coat; color shall be **white**.
- C. Lead: ASTM B749, 2.5 lb/sq ft inch thick.
- D. Stainless Steel: ASTM A240/240M; Type 304, dead soft fully annealed, 0.018 inch thick (26 gauge); smooth surface.

2.2 ACCESSORIES

- A. Fasteners: Stainless steel. Pancake head.
- B. Sealant: Type E butyl sealant specified in Section 07900.
- C. Sealant: Polyurethane type, NP-1 manufactured by Sonneborn.
- D. Solder: ASTM B32; type suitable for application and material being soldered.

2.3 FABRICATION

- A. Form sections shape indicated on Drawings, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of same material as sheet metal one gage heavier, interlocking with sheet.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Form material with standing seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- F. Tin edges of sheet to be soldered. Solder shop formed metal joints. After soldering, remove flux. Wipe and wash solder joints clean. Weather seal joints.
- G. Fabricate corners from one piece with minimum 18 inch long legs; seam or solder for rigidity, seal with sealant.
- H. Fabricate vertical faces with bottom edge formed outward 3/4 inch and hemmed to form drip or interlock with continuous cleat.

- I. Solder or seal metal joints.

2.4 FACTORY FINISHING

- A. Fluoropolymer Coating: Multiple coat as specified for sheet metal system, thermally cured, conforming to AAMA 2604.
- B. Washcoat: Finish concealed side of metal sheets with washcoat compatible with finish system, as recommended by finish system manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- C. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets to lines and levels indicated on Drawings. Seal top of reglets with sealant.

3.3 INSTALLATION

- A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- B. Apply Perma-Ply Self Adhering Flashings between metal flashings and substrate. Refer to project drawings.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal or solder metal joints watertight.
- E. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.
- F. Seal or solder metal joints watertight.

3.4 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements and 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.

- B. Inspection will involve surveillance of Work by third party inspector during installation to ascertain compliance with specified requirements.
- C. Owner will provide third party roofing inspections during the work. See Section 01200 Price and Payment Procedures: Allowances. Shepard & Associates, LLC, 3547 Dreher Shoals Road, Suite 4, Irmo, SC 29063 has been selected by the Owner to provide these inspections. Such inspections may be daily or periodic.
- D. Contractor Responsibilities: Unless otherwise indicated, provide quality control inspections with Contractor's own work force. Repair or replace non-conforming work.
- E. Associated Services: Co-operate with Owner's Inspectors and Agencies performing inspections, and similar quality control services, and provide reasonable auxiliary services as requested by such parties. Provide the following minimum assistance:
 - 1. Access to the work
 - 2. Incidental labor and materials to facilitate the inspections and testing as may be deemed appropriate.

3.5 SCHEDULE (but not limited to)

- A. Through-Wall Flashing in Masonry:
 - 1. Material: As defined in Section 04810 Unit Masonry Assemblies;
 - 2. 26 gauge stainless steel – Edge Strip/Drip Plate – See Section 04810.
- B. Metal drip edge at roof, through wall flashing, window head and sill flashing: 0.032 pre-finished aluminum
- C. Counterflashings at Roofing Terminations (over roofing base flashings) and step flashing/kick out flashing: 0.040 pre-finished aluminum.
- D. Roofing Penetration Flashings, for Pipes, Structural Steel, and Equipment Supports: 2.5 lb. lead flashing boots.

END OF SECTION 07620

SECTION 07720
ALUMINUM LADDER

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aluminum Ladder: to include ladder, handrail and mounting fasteners for the ladder in Mechanical Room to extend to the attic above auditorium.

1.2 SUBMITTALS

- A. Submit under provisions of Section 01330.
- B. Product Data: Provide data on products, physical dimensions, accessories, and anchorage.
- C. Operating and Maintenance Instructions: Include relevant instructions.
- D. Submit manufacturer's installation instructions.
- E. Include maintenance information on regular cleaning, stain removal, and touch-up.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Examine ladder when it arrives on site. Notify the carrier and manufacturer of any damage.
- B. Store ladder until installation under roof, if possible; or, if stored outside, under a tarp or suitable cover.

1.4 WARRANTY

- A. The unit carries a limited warranty of one year against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced no charge, freight excluded, upon inspection at manufacturer's plant with warrants same.

PART 2 PRODUCTS

2.1 ALUMINUM LADDER

- A. Manufacturer;
 - a. Precision Ladders
- B. Substitutions: As per Section 01600 - Material & Equipment.

2.2 MATERIALS

- A. Ladder
 - 1. Stringers (Siderails) shall be aluminum channel 5" x 2" x 3/16" (6005-T5).
 - 2. Treads shall be extruded aluminum (6005-T5) aluminum channel 5-3/16" x 2'-6".
 - 3. Mounting bracket.
 - a. Floor 2" x 3" x 1/4" aluminum angle.
 - b. Top 4 3/4" x 2" aluminum 5" angle.

- B. Handrail
 - 1. 1-1/4" schedule 40 aluminum pipe (6005-T5.)
 - 2. External aluminum fittings.
- C. Safety
 - 1. Deeply serrated aluminum channel treads (standard) both welded and bolted to stringer.
- D. Manufactured Units
 - 1. The ladder is a model SL, primed for field painting, tread checkered plate.
- E. Fabrication
 - 1. Ladder is completely fabricated ready for installation before shipment to the site.
 - 2. Handrail components are completely fabricated ready for field assembly to the ladder before shipment to the site.
- F. Finishes
 - 1. Mill finish on aluminum components.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that surfaces and internal wall blocking are ready to receive work and opening dimensions are as instructed by the manufacturer.

3.2 INSTALLATION

- A. Install per the manufacturer's installation instructions.

END OF SECTION 07720

SECTION 07840
FIRESTOPPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fireproof firestopping and fire safing materials and accessories.

1.2 RELATED SECTIONS

- A. Section 01039 - Coordination and Meetings: Cutting and patching.
- B. Section 09260 - Gypsum Board Systems: Gypsum wallboard fireproofing.
- C. Division 15: Mechanical: Mechanical work requiring firestopping.
- D. Division 16: Electrical: Electrical General Requirements: Electrical work requiring firestopping.

1.3 REFERENCES

- A. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM E119 - Method for Fire Tests of Building Construction and Materials.
- C. ASTM E814 - Test Method of Fire Tests of Through Penetration Firestops.
- D. Standard Building Code.

1.4 PERFORMANCE REQUIREMENTS

- A. Fireproofing Materials: ASTM E119 and ASTM E814 to achieve a fire rating as noted on Drawings unless specified otherwise. Provide materials and insulation identical with assemblies which have been tested and defined in publications by recognized rating authorities for fire resistance rating authorities for fire resistance rating indicated.
 - 1. Comply with the applicable design numbers of the "Fire Resistance Directory" by UL.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on product characteristics, performance and limitation criteria.
- C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified

requirements.

1.6 QUALITY ASSURANCE

- A Through Penetration Firestopping of Fire Rated Assemblies: ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 - 1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
 - 2. Floor and Roof Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 - a. Floor Penetrations Within Wall Cavities: T-Rating is not required.
- B. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.
 - 1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
 - 1. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.
- C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: E1966 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
- B. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.
- C. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- D. Perform Work in accordance with State of South Carolina standards.
- E. Maintain one (1) copy of each document on site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years experience.
- B. Applicator: Company specializing in performing the work of this Section with minimum three years experience approved by manufacturer.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable South Carolina Building Code for fire resistance ratings and surface burning characteristics.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when temperature of substrate material and ambient air is below 60 degrees F.
- B. Maintain this minimum temperature before, during, and for 3 days after installation of materials.
- C. Provide ventilation in areas to receive solvent cured materials.

1.10 SEQUENCING

- A. Sequence Work under the provisions of Section 01039.
- B. Sequence Work to permit firestopping materials to be installed after adjacent and surrounding work is complete.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Dow Corning Corporation.
- B. Substitutions: Under provisions of Section 01600, and A701 and Article 9 of Instruction to Bidders.

2.2 MATERIALS

- A. Compatibility: Before selection and purchase of each specified firestopping, investigate its compatibility with joint surfaces. Joint fillers, and other materials in joint system.
- B. Each Firestop System installation shall bear the same fire ratings as the partition penetrated.
- C. The following items D, E and F are principal items only. Contractor is to comply with U.L. requirements for any and all penetrations through rated construction.
- D. At un-insulated steel pipe, conduit or ducts provide one of the following:
 - 1. Fire Barrier CP25 N/S Caulk; 3M.
 - 2. Metal Caulk 835: Rector Seal.
 - 3. Firestop foam and Firestop sealant; Dow Corning corp.
- E. At insulation and un-insulated plastic pipe and insulated steel pipe, conduit or ducts, provide one the following:
 - 1. Fire barrier FS-195 with CP Caulk or MP Moldable Putty; 3M.
 - 2. Metal Caulk 950/880: Rector Seal.
 - 3. Fire stop wrap strip 2002; Dow Corning.
- F. Where fire rated partitions abut underside of steel decks, beams, or concrete decks and/or slabs, provide one of the following:
 - 1. Fire Stop Sealant; Dow Corning.
 - 2. Fire-SIL; Tremco.
 - 3. CS240 Firestop Sealant: Hilti Construction Chemicals.

2.3 ACCESSORIES

- A. Provide metal and/or wire mesh sleeves, retaining collars, backing materials including mineral wool and other components required for Firestop system used.
- B. Retainers: Compatible clips to support mineral fiber matting.
- C. Dam material: mineral fiberboard, removable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Section 01039.
- B. Verify that openings are ready to receive the work of this Section.

3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may effect bond of firestopping material, immediately before installation.
- B. Remove incompatible materials which affect bond.
- C. Install backing materials to arrest liquid material leakage.

3.3 APPLICATION

- A. Apply primer and materials in accordance with manufacturer's instructions.
- B. Apply firestopping material and intumescent wrap in sufficient thickness to achieve rating to uniform density and texture.
- C. Install material at walls or partition openings which contain penetrating sleeves, piping, ductwork, conduit and other items requiring firestopping.
- D. Remove dam material after firestopping material has cured.
- E. Where fire rated partitions abut underside of steel, firmly pack mineral wool (min 4 PLF density) into space between top of partition and underside of steel allowing 1/2" depth on each face of partition for fire resistive firestop. Provide materials and installation in conformance with assembly that has been tested and defined in publications by testing agency, if available.
- F. Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surface including rough textures. Use masking tape or other precautionary devices to prevent staining on adjoining surfaces, by either primer/sealer or

the sealant.

3.4 CLEANING

- A. Clean Work under provisions of Section 01500.
- B. Clean adjacent surfaces of firestopping materials and remove excess and spillage of compounds promptly as work progresses. Clean adjoining surfaces without damage to adjoining surfaces to eliminate evidence of spillage.

3.5 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION 07840

SECTION 07900
JOINT SEALERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Preparing sealant substrate surfaces.
- B. Sealant and backing.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete: Sealants used in conjunction with cast in place concrete.
- B. Section 04810 - Unit Masonry Systems: Sealants required in conjunction with masonry.
- C. Section 06200 - Finish Carpentry: Sealants used in conjunction with siding and trim.
- D. Section 07840 - Firestopping: Sealants used in conjunction with firestopping.
- E. Section 07620 - Sheet Metal Flashing and Trim: Sealants used in conjunction with metal flashings.
- F. Section 08112 - Standard Steel Frames: Sealants used in conjunction with door frames.

1.3 REFERENCES

- A. ANSI/ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
- B. ANSI/ASTM D1565 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Open-Cell Foam).
- C. ASTM C790 - Use of Latex Sealing Compounds.
- D. ASTM C804 - Use of Solvent-Release Type Sealants.
- E. ASTM C834 - Latex Sealing Compounds.
- F. FS TT-C-00598 - Caulking Compound, Oil and Resin Base Type.
- G. FS TT-S-001657 - Sealing Compound, Single Component, Butyl Rubber Based, solvent Release Type.
- H. FS TT-S-00227 - Sealing Compound: Elastomeric Type, Multi-Component.
- I. FS TT-S-00230 - Sealing Compound: Elastomeric Type, Single Component.

- J. FS TT-S-001543 - Sealing Compound, Silicone Rubber Base.
- K. SWI (Sealing and Waterproofers Institute) - Sealant and Caulking Guide Specification.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Products Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability. Color to match mortar color.
- C. Manufacturer's Installation Instructions: Submit special procedures, surface preparation, and perimeter conditions requiring special attention under provisions of 01330.
- D. Submit manufacturer's certificate under provisions of Section 01400 that products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years experience.
- B. Applicator: Company specializing in applying the work of this Section with minimum three years experience.
- C. Conform to Sealant and Waterproofers Institute requirements for materials and installation.
- D. Before selection and purchase of each specified sealant investigate its compatibility with joint surfaces, joint fillers, and other material in joint system. Provide any materials which are known to be fully compatible with ASTM installation conditions.
- E. Maintain one copy of each referenced document covering installation requirements on site.

1.6 FIELD SAMPLES

- A. Provide samples under provisions of Section 01330.
- B. Construct field sample panel, 1-1/2 feet long, illustrating sealant type, color, and tooled surface.
- C. Locate where directed.
- D. Accepted sample may not remain as part of the Work.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install solvent curing sealants in enclosed building spaces.

- B. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.
- C. Section 01600 - Product Requirements.
- D. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate work under provisions of Section 01100.
- B. Coordinate the work of this Section with all Sections referencing this Section.

1.9 WARRANTY

- A. Provide three year warranty under provisions of Section 01700.
- B. Warranty: Include coverage of installed sealants and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 SEALANTS

- A. Acrylic Latex (Type A): ASTM C920, Grade NS, Class 12-1/2, Use NT; single component, solvent curing, non-staining, non-bleeding, non-sagging; color as selected.
- B. Butyl Sealant (Type B): ASTM C920, single component, solvent release, non-skinning, non-sagging, black color.
- C. Polyurethane Sealant (Type C): ASTM C920, Type S, Grade NS, Class 25, Use T; multi-component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, self-leveling type; white color.
- D. Polyurethane Sealant (Type D): ASTM C920, Type M, Grade P, Class 25, Use T; multi-component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, self-leveling type; white color.
- E. Acetoxy Silicone Sealant (Type E): ASTM C920, Grade NS, Class 25, Use G; single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding; color.
- F. Polyurethane Sealant (Type F): Single component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging, self-leveling type; color as selected; Chem-Caulk 500 manufactured by Bostik.

Elongation Capability	25 percent
Service Temperature Range	-40 to 180 degrees F
Shore A Hardness Range	20 to 35

- G. At FRP Panels: Provide sealant compatible with manufacturer's recommendations.
- H. Security: Sealant high strength, pick resistant by Sika Corp.

2.2 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: ANSI/ASTM D1056; round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces and joint openings are ready to receive work.
- C. Verify joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

- A. Remove loose materials and foreign matter impairing adhesion of sealant.
- B. Clean and prime joints.
- C. Perform preparation in accordance with ASTM C804 for solvent release sealants.
- D. Protect elements surrounding Work of this section from damage or disfiguration.

3.3 INSTALLATION

- A. Perform installation in accordance with ASTM C804 for solvent release sealants.
- B. Measure joint dimensions and size materials to achieve required width/depth ratios.
- C. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.
- D. Install bond breaker where joint backing is not used.
- E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- H. Tool joints concave.

3.4 CLEANING

- A. Section 01700 - Execution Requirements: Final cleaning.
- B. Clean adjacent soiled surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01700 - Execution Requirements: Protecting installed construction.
- B. Protect sealants until cured.

3.6 SCHEDULE

<u>Location</u>	<u>Type</u>
Window perimeter, exterior, interior	F
Door Frame/Walls, exterior	C
Door Frame/Walls, interior	A
Under Thresholds	B
Ceramic Tile	E
Concrete Joints	D
Other exterior joints	C
Other interior joints	A
Fiber Cement Siding & Trim	E or C

END OF SECTION 07900

SECTION 08111
STANDARD STEEL DOORS AND FRAMES
Allowance

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Non-rated and fire rated steel doors and frames - KD "Knockdown" frames.
- B. **Allowances: Include under provisions of Section 01200 - Price and Payment Procedures.**
The General Contractor shall allow the sum of as indicated in Section 01200 for the furnishing and installation of sheet carpet. This sum does not include the overhead and profit of the General Contractor. The Architect reserves the right to assign a contract, or purchase order, to the General Contractor. The General Contractor **shall not issue a contract** on the allowance without the prior approval of the Architect.

1.2 RELATED SECTIONS

- A. Section 08211 – Wood Doors.
- B. Section 08712 - Door Hardware
- C. Section 08800 – Glazing: Glazing of Doors.
- D. Section 09900 – Painting: Field Painting of Door

1.3 REFERENCES

- A. ANSI A117.1 and ADA - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. ANSI/SDI-100 - Standard Steel Doors and Frames.
- C. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- D. ASTM E152 - Methods of Fire Tests of Door Assemblies.
- E. Door Hardware Institute (DHI) - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
- F. NFPA 80 - Fire Doors and Windows.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for louvers, and finish.

- B. Product Data: Indicate door configurations, location of cut-outs for hardware reinforcement.
- C. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ANSI A250.8.
- B. Fire Rated Door Construction: Conform to NFPA 252.
- C. Fire Rated Door Construction: Conform to one of the following:
 - 1. NFPA 252; with neutral pressure level at 40 inches maximum above sill at 5 minutes into test.
 - 2. UL 10C.
 - 3. 20-Minute Fire Rated Corridor Doors: Fire tested without hose stream test.
- D. Fire Rated Door Construction: Conform to UBC Standard 7-2.
- E. Fire Rated Stair Doors: Rate of rise of 450 degrees F across door thickness.
- F. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as indicated on Drawings.
- G. Smoke and Draft Control Doors: Tested in accordance with UL 1784.
 - 1. Air Leakage: Maximum 3.0 cfm/sf of door opening with 0.10 inch water gage pressure differential.
- H. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.
 - 1. Indicate temperature rise rating for stair doors.
 - 2. Attach smoke label to smoke and draft control doors.
- I. Surface Burning Characteristics:
 - 1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84, NFPA 25.
- J. Apply label from agency approved by authority having jurisdiction to identify each foam plastic insulation board.
- K. Perform Work in accordance with State of South Carolina standards.
- L. Maintain one (1) copy of each document on site.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect doors with resilient packaging sealed with heat shrunk plastic.

1.9 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.10 COORDINATION

- A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.11 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated frames and doors.

1.12 SINGLE SOURCE CONTRACTOR

- A. For Sections 08111 and 08212, the project will require a single source supplier. The single source supplier shall be responsible for all products and services and may use various suppliers for this work under their supervision.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS: DOOR AND FRAMES

- A. Amweld Building Products
- B. Curries Manufacturing, Inc.
- C. Steelcraft Manufacturing Company.
- D. Ceco Corporation.
- E. Republic Builders Products.

2.02 DOORS AND PANELS

- A. Exterior Doors: SDI-100(1985), Grade II, Model 1- Galvaneal 1-3\4" Level B.

2.03 DOOR CONSTRUCTION AND FRAME CONSTRUCTION

- A. Face: Steel sheet in accordance with ANSI/SDI-100.
- B. Core: Impregnated cardboard honeycomb.
- C. Interior and Exterior; 16 gauge thick material core thickness. To suit grade and model of door. Frames types as "knock down" frames to accomodate wall thickness. All frames to have rubber silencers with minimum three (3) anchors per jamb, six (6) per frame, welded and ground smooth, with 2 bottom spreaders all with 18 gauge floor anchors, unless otherwise noted.
- D. Full glass door with frame that is flush with door facing.

2.04 ACCESSORIES

- A. Primer: Zinc chromate type.
- B. Bituminous: Fibered asphalt emulsion.
- C. Rubber silencers: Resilient rubber.
- D. Removable Glazing Stops: Rolled steel channel shape, mitered corners.; prepared for countersink screws.

2.05 FABRICATION

- A. Fabricate doors with hardware reinforcement welded in place.
- B. Attach fire rated label to each door unit.
- C. Close top and bottom edge of exterior doors with flush end closure. Seal joints watertight.
- D. Standard reinforcement for hardware as per SDI-100 (1985).
- E. Astragal for double doors: Steel T shaped, specifically for double doors, as indicated.

2.06 FINISH

- A. Steel Sheet: A60 Galvannealed at exterior applications.
- B. Primer: Baked.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify substrate conditions.
- B. Verify that opening sizes and tolerances are acceptable.

3.02 INSTALLATION

- A. Install doors in accordance with ANSI/SDI-100 and DHI.
- B. Coordinate installation of glass and glazing.
- C. Install door, plumb and level.
- D. Coordinate installation of doors with installation of frames specified in Section 08112 and hardware specified in Section 08712.
- E. Touch-up factory finished doors.

F. Install a minimum of three (3) anchors per jamb (6 per frame).

3.03 ERECTION TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 ADJUSTING

A. Adjust door for smooth and balanced door movement.

END OF SECTION 08111

SECTION 08212
WOOD DOORS
Allowance

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flush wood doors; flush configuration; fire rated and non-rated, "Pre-Finished", to include fixed units DP1 and DP2 (materials only).

B. **Allowances: Include under provisions of Section 01200 - Price and Payment Procedures.**

The General Contractor shall allow the sum of as indicated in Section 01200 for the furnishing and installation of sheet carpet. This sum does not include the overhead and profit of the General Contractor. The Architect reserves the right to assign a contract, or purchase order, to the General Contractor. The General Contractor **shall not issue a contract** on the allowance without the prior approval of the Architect.

1.2 RELATED SECTIONS

A. Section 08115 - Standard Steel Frames: Steel door frames.

B. Section 08710 - Door Hardware.

C. Section 08800 - Glazing: Glazing for doors.

1.3 REFERENCES

A. ASTM E152 - Methods of Fire Tests of Door Assemblies.

B. ASTM E413 - Classification for Determination of Sound Transmission Class.

C. AWI - Quality Standards of the Architectural Woodwork Institute.

D. NFPA 80 - Fire Doors and Windows.

E. NFPA 252 - Standard Method of Fire Tests for Door Assemblies.

F. UL 10B - Fire Tests of Door Assemblies.

G. Warnock-Hersey - Certification Listings for fire doors.

1.4 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special blocking for hardware.

- C. Product Data: Indicate door core materials and construction; veneer species, type and characteristics; factory machining criteria, factory finishing criteria.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Quality Standard Section 1300, Custom Grade.
- B. Perform Work in accordance with State of South Carolina standards.
- C. Maintain one (1) copy of each document on site.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

- A. Fire Door Construction: Conform to UL 10B, ASTM E152, UL 10B.
- B. Installed Doors: Conform to NFPA 80 for fire rated class indicated on schedules.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Section 01600.
- B. Package, deliver and store doors in accordance with AWI Section 1300 and ANSI/AWMA Requirements.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges if stored more than one week. Break seal on-site to permit ventilation.

1.9 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings, instructed by manufacturer.

1.10 COORDINATION

- A. Coordinate work under provisions of Section 01300.
- B. Coordinate the work with door opening construction, door frame and door hardware installation.

1.11 WARRANTY

- A. Provide warranty under provisions of Section 01700 to the following term:
 - 1. Interior Doors: Manufacturer one (1) year.
- B. Provide for replacing to include cost of rehangng and refinishing at no cost to the owner. Wood doors exhibiting defects in materials or workmanship, including warp and delamination within minimum period of one (1) year from date of substantial completion of the work.

1.12 SINGLE SOURCE CONTRACTOR

- A. For Sections 08111 and 08212, the project will require a single source supplier. The single source supplier shall be responsible for all products and services and may use various suppliers for this work under their supervision.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Mohawk Flush Doors.
- B. Marshfield Doors
- C. Algoma Hardwoods, Inc.
- D. Substitutions under provisions of Section 01600 and A701 and Article 9 of Instructions to Bidders.

2.2 DOOR AND TRANSOM PANEL TYPES

- A. Flush Interior Doors: 1-3/4 inches thick; solid core construction LD 2, fire rated as indicated.

2.3 DOOR CONSTRUCTION

- A. Core (Solid, Non-Rated): AWI Section 1300, Particle Core LD 2 5 ply.
- B. Core (Solid, Fire Rated): AWI Section 1300, Type FD 1-1/2 5 ply.

2.4 FLUSH DOOR FACING

- A. Veneer Facing (Flush Interior Doors): AWI Rotary White Birch Species Prefinished Custom Grade Book Match with CE (compatible hardwood) edge. Finish transparent stain.

2.5 ADHESIVE

- A. Facing Adhesive Type II - Water resistant.

2.6 ACCESSORIES

- A. Glass stops: Wood, of same species wood as door facing at non-rated doors. Rolled steel type designed to conform to UL requirements at fire-rated doors; prepared for countersunk style tamperproof screws.

2.7 FABRICATION

- A. Fabricate non-rated doors in accordance with AWI Quality Standards requirements.
- B. Fabricate fire rated doors in accordance with AWI Quality Standards and to UL Warnock-Hersey 10B requirements. Attach fire rating label to door.
- C. Premachine doors for finish hardware.
- D. Provide flush doors with 1/2 inch thick edge strips of wood species to match door finish.
- E. Astragals for double doors: Provide T-shaped metal astragals in one piece to conform with UL requirements for rating indicated on Schedule.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify frame opening conditions under provisions of Section 01039.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions.
- B. Trim non-rated door width by cutting equally on both jamb edges.
- C. Trim door height by cutting top and bottom edges to a maximum of 3/4 inch (19 mm). Trim fire door height at bottom edge only, in accordance with fire rating requirements.
- D. Pilot drill screw and bolt holes. Use threaded through bolts for half surface hinges.
- E. Machine cut for hardware. Core for handsets and cylinders.
- F. Coordinate installation of doors with installation of frames specified in Section 08111 and hardware specified in Section 08712.

3.3 INSTALLATION TOLERANCES

- A. Conform to AWI requirements for fit and clearance tolerances.
- B. Conform to AWI Section 1300 requirements for maximum diagonal distortion.

- C. Maximum Diagonal Distortion (Warp): 1/16 inch measured with straight edge or taught string, corner to corner.

3.4 ADJUSTING

- A. Adjust work under provisions of Section 01700.
- B. Adjust door for smooth and balanced door movement.

END OF SECTION 08212

SECTION 08410

METAL-FRAMED STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

A.

1. Section includes aluminum-framed storefronts including aluminum and glass doors and frames including door hardware and glass infill panels and components for both interior and exterior wall applications. **Impact Rated System for exterior application.**
2. Coordinate all hardware, panic hardware and electric strike locations

B. Related Sections:

1. Section 04810 - Unit Masonry Systems.
2. Section 05120 - Structural Steel: Steel fabricated attachment members and framed openings
3. Section 05400 – Cold Formed Metal Framing
4. Section 05500 - Metal Fabrications: Steel fabricated attachment devices.
5. Section 07840- Firestopping: Fire stop at system junction with structure.
6. Section 07900 - Joint Sealers: Joint sealers other than those integral with storefront.
7. Section 08710 - Door Hardware: Mortised hardware reinforcement requirements affecting framing members; hardware items other than specified in this section.
8. Section 08800 - Glazing.
9. Section 09900 - Paints and Coatings: Field painting of interior surface of infill panel surfaces.

1.2 REFERENCES

A. Aluminum Association:

1. AA ADM 1 - Aluminum Design Manual.

B. American Architectural Manufacturers Association:

1. AAMA 501 - Methods of Test for Exterior Walls.
2. AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Glass Doors.
3. AAMA 503 - Voluntary Specification for Field Testing of Metal Storefronts. Curtain Wall and Sloped Glazing Systems.
4. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
5. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
6. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
7. AAMA 2604 - Voluntary specification, Performance Requirements and Test

Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.

8. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
9. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
10. AAMA MCWM-1 - Metal Curtain Wall Manual.
11. AAMA SFM-1 - Aluminum Store Front and Entrance Manual.

C. American Society of Civil Engineers:

1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

D. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
4. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
5. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
8. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
9. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
10. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
11. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference.

E. National Fenestration Rating Council Incorporated:

1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.

F. National Fire Protection Association:

1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

G. SSPC: The Society for Protective Coatings:

1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
2. SSPC Paint 25 - Red Iron Oxide, Zinc Oxide, Raw Linseed Oil, and Alkyd Primer.

H. Underwriters Laboratories Inc.:

1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 SYSTEM DESCRIPTION

- A. Aluminum-framed storefront system includes tubular aluminum sections with supplementary internal support framing, aluminum and glass entrances, shop fabricated, factory finished, glass and glazing, related flashings, anchorage and attachment devices.
- B. System Assembly: Site assembled.

1.4 PERFORMANCE REQUIREMENTS

- A. System Design: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall, including building corners.
 - 1. As calculated in accordance with applicable code, as tested in accordance with ASTM E330.
- B. Wind-Borne Debris Loads: Design and size glass located less than 60 feet above grade to withstand the following loads:
 - 1. Glass Within 30 feet of Grade: ASTM 1996; large missile impact test.
 - 2. Glass Within 30 feet of Grade: ASTM 1996; small missile impact test.
- C. Deflection: Limit mullion deflection to 1/175 for spans under 13'-6" and 1/240 plus 1/4 inch for spans over 13'-6"; flexure limit of glass 3/4 inch of span; with full recovery of glazing materials.
- D. System Assembly: Accommodate without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.
- E. Air Infiltration: Limit air leakage through assembly to 0.06 cfm/min/sq ft of wall area, measured at reference differential pressure across assembly of 1.57 psf as measured in accordance with AAMA 501.
- F. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
- G. Vapor Seal: Limit vapor seal with interior atmospheric pressure of 1 inch sp, 72 degrees F, 40 Percent RH without seal failure.
- H. Condensation Resistance Factor: CRF of not less than 45 when measured in accordance with AAMA 1503.
- I. Water Leakage: None, when measured in accordance with AAMA 501, ASTM E331 and ASTM E547 with test pressure difference of 20 percent of design pressure, with minimum differential of 2.86 lbf/sq ft and maximum of 12.00 lbf/sq ft.
- J. Thermal Transmittance of Assembly (Excluding Entrances): Maximum U Value of 0.69 Btu/sq ft per hour per deg F when measured in accordance with AAMA 1503.
- K. Expansion / Contraction: Provide for expansion and contraction within system

components caused by cycling temperature range of 170 degrees F over 12 hour period without causing detrimental effect to system components and anchorage.

- L. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.

1.5 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details to include entrance door hardware.
- C. Product Data: Submit component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, [door hardware,] and internal drainage details.
- D. Samples: Submit two samples 12 x 12 inches in size illustrating finished aluminum surface, glass units and glazing materials.
- E. Design Data: Indicate framing member structural and physical characteristics, calculations, and dimensional limitations.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with AAMA MCWM-1 - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.
- B. Surface Burning Characteristics:
 - 1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- C. Apply label from agency approved by authority having jurisdiction to identify each foam plastic insulation board.
- D. Perform Work in accordance with State of South Carolina standards.
- E. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing aluminum glazing systems with minimum three years documented experience.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01300 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01600 - Product Requirements: Product storage and handling requirements.
- B. Handle Products of this section in accordance with AAMA MCWM-1 - Curtain Wall Manual #10.
- C. Protect finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Section 01600 - Product Requirements.
- B. Do not install sealants nor glazing materials when ambient temperature is less than 40 degrees F during and 48 hours after installation.

1.11 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work with installation of firestopping, air barrier, and components or materials.

1.12 WARRANTY

- A. Section 01700 - Execution Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for glazed units.

PART 2 PRODUCTS

2.1 ALUMINUM-FRAMED STOREFRONTS

- A. Manufacturers:
 - 1. **Kawneer Co., Inc.** (basis of design, no substitutions)
 - a. For Door 100
 - b. For Interior applications
 - 2. **Dormakaba** for Door 111 (basis of design, no substitutions)
- B. Furnish materials in accordance with the State of South Carolina standards.
- C. Product Description: (three systems)
- D. **Entrance System (at exterior location for Doors 100):**
 - 1. Aluminum Entrances: **Series 350IR Entrances**, Entrance member profile: 3-1/2" vertical stile, 3-1/2" top rail, 6-1/2" bottom rail with 1" insulated glass.
 - 2. Hardware: Standard Intermediate Pivot (Rixson M-19) Door-O-Matic 1490 concealed vertical rod LCN 2030 concealed overhead/single acting closer with hold open CO-9 single acting pull
 - 3. Provide corner, junction, base, and miscellaneous shapes as defined on

drawings for a complete installation.

5. Hardware: Furnish manufacturer's standard hardware for types of doors and applications indicated, and as specified below:
6. Weather Stripping: Wool pile, continuous and replaceable.
7. Sill Sweep Strips.
8. Threshold: Extruded aluminum, one piece for each door opening, ribbed, non-slip surface.
9. Pivots: Offset type: top, intermediate, and bottom.
10. Panic Device: Rim with profile type to fit door stiles; push pad type.
11. Closer: Fully adjustable overhead, surface mount, modern style overhead closer.
12. Finish: Exposed hardware: Clear Anodized
13. Lock Cylinders and Pulls: Specified in Section 08710

E. Entrance System (at interior locations)

1. Aluminum Entrance System: **Tri-Fab 451**, 4-1/2" deep with 2" sight line, 1" insulated glass, center pane glass application, flush glazed, screw spline fabrication with door profile series 350. Member profile: 3-1/2" vertical stile, 3-1/2" top rail, 6-1/2" bottom rail with 1" insulated glass.
2. Hardware: Standard Intermediate Pivot (Rixson M-19)
Door-O-Matic 1490 concealed vertical rod (at Door 110A)
LCN 2030 concealed overhead/single acting closer with hold open CO-9 single acting pull
4. Provide corner, junction, base, and miscellaneous shapes as defined on drawings for a complete installation.
5. Hardware: Furnish manufacturer's standard hardware for types of doors and applications indicated, and as specified below:

F. Entrance System (at exterior location for Door 111):

1. Doorma ESA Series ESA 200
 - a. Large missile impact resistant B1 painting, fixed side lite automatic door.
 - b. Two sliding leaves and two fixed panels with emergency breakaway capability at sliding leaves only.
 - c. Size as per door schedule with clear opening of 64"
2. Hardware: Furnish manufacturer's standard hardware for types of doors and applications indicated, and as specified below:
3. Weather Stripping: Wool pile, continuous and replaceable.
4. Sill Sweep Strips.
5. Threshold: Extruded aluminum, one piece for each door opening, ribbed, non-slip surface.
6. Finish: Exposed hardware to be clear anodized
7. Lock Cylinders: Specified in Section 08710

2.2 COMPONENTS

- A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper for extruded structural members.

- B. Sheet Aluminum: ASTM B209, 5005 alloy, H15 or H34 temper.
- C. Sheet Steel: ASTM A653/A653M; galvanized to minimum G90.
- D. Steel Sections: ASTM A36/A36M; shaped to suit mullion sections, galvanized.
- E. Glass: Specified in Section 08800.
- F. Glazing Materials: As specified in Section 08800.
- G. Infill Panels:
 - 1. Insulated Panels: Manufacturer's standard insulated panel construction with aluminum outer and inner faces and special insulating core; 1 inch thick.
- H. Flashings: Minimum 0.032 inch thick aluminum to match mullion sections where exposed.
- I. Firestopping: Specified in Section 07840.
- J. Sealant and Backing Materials:
 - 1. Sealant Used Within System (Not Used for Glazing): Manufacturer's standard materials to achieve weather, moisture, and air infiltration requirements.
 - 2. Perimeter Sealant: Specified in Section 07900.
- K. Fasteners: Stainless steel.

2.3 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners and attachments to conceal from view.
- E. Reinforce interior horizontal head rail to receive blind track brackets and attachments.
- F. Prepare components with internal reinforcement for door hardware.
- G. Reinforce framing members for imposed loads.

2.4 SHOP FINISHING

- A. Color Anodized Aluminum Surfaces: AAMA 611, AA-M10C22A44 non-specular as fabricated mechanical finish, medium matte chemical finish, and Architectural Class I 0.7 mils **clear anodized**.
- B. Concealed Steel Items: Galvanized to ASTM A123/A123M; [minimum 2.0 oz/sq ft coating thickness; galvanize after fabrication. Primed with iron oxide paint.

- C. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.
- D. Shop and Touch-Up Primer for Steel Components: SSPC Paint 25 red oxide.
- E. Touch-Up Primer for Galvanized Steel Surfaces: SSPC Paint 20 zinc rich.
- F. Extent of Finish:
 - 1. Apply factory coating to surfaces exposed at completed assemblies.
 - 2. Apply finish to surfaces cut during fabrication so no natural aluminum is visible in completed assemblies, including joint edges.
 - 3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify dimensions, tolerances, and method of attachment with other Work.
- C. Verify wall openings and adjoining air and vapor seal materials are ready to receive Work of this Section.

3.2 INSTALLATION

- A. Install wall system in accordance with AAMA MCWM-1 - Window, Store Front and Entrance - Guide Specifications Manual.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent Work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent Work to form water tight dam.
- G. Coordinate attachment and seal of perimeter air and vapor retarder materials.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Install integral flashings and integral joint sealers.

- J. Set thresholds [in bed of mastic and] secure.
- K. Install hardware using templates provided. Refer to Section 08710 for installation requirements.
- L. Coordinate installation of glass with Section 08800 ; separate glass from metal surfaces.
- M. Coordinate installation of perimeter sealants with Section 07900.
- N. Install hardware using templates provided. Refer to Section 08710 for installation requirements. Coordinate all hardware applications with Section 08710 Hardware Supplier.

3.3 ERECTION TOLERANCES

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
- C. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements, 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspection to monitor quality of installation and glazing.
- C. Test to AAMA 502 or 503, ASTM E1105 and AAMA 501.

3.5 ADJUSTING

- A. Section 01700 - Execution Requirements: Testing, adjusting and balancing.
- B. Adjust operating hardware for smooth operation.

3.6 CLEANING

- A. Section 01700 - Execution Requirements: Final cleaning.
- B. Remove protective material from pre-finished aluminum surfaces.
- C. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- D. Remove excess sealant by method acceptable to sealant manufacturer.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01700 - Execution Requirements: Protecting installed construction.
- B. Protect finished Work from damage.

END OF SECTION 08410

SECTION 08525
EXTRUDED ALUMINUM CLAD WOOD WINDOWS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Clad Casement (sash profile) fixed picture complete with glazing, weather stripping, removable grilles and standard anchorages, trim, attachments, and accessories. All individual units will be provided as one unit, no field applied mulling allowed.

1.2 RELATED SECTIONS

- A. Section 01330 - Submittal Procedures
- B. Section 05400 – Cold Formed Metal Framing
- C. Section 06200 - Rough Carpentry
- D. Section 06400 - Finish Carpentry
- E. Section 07213 - Batt and Blanket Insulation
- F. Section 07900 - Joint Sealers
- G. Section 09900 – Paints and Coatings

1.3 REFERENCES

- A. ASTM E283-04' - Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
- B. ASTM E330-02' - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- C. ASTM E547-00' - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
- D. ASTM E1425-06' or AAMA 1801 - Certification of Acoustical Performance.
- E. ASTM F588-07' or AAMA 1302.5 - Standard for Forced-Entry Resistance.
- F. ASTM E 1996-04' - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Windborne Debris in Hurricanes.
- G. ASTM E 1886-04' - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
- H. ASTM E2190-08' - Standard Specification for Insulating Glass Unit Performance and Evaluation.
- I. American Architectural Manufacturers Association/Window and Door Manufacturers Association (AAMA/WDMA), American National Standards Institute/Window and Door Manufacturers Association (ANSI/WDMA), Canadian Standards Association (CSA).
- J. AAMA/WDMA/CSA 101/I.S.2/A440-05', 101/I.S.2/A440-08' - Standard / Specification for Windows, Doors and Skylights.
- K. WDMA I.S. 4-07'A Water Repellant Preservative Treatment for Millwork.
- L. National Fenestration Rating Council (NFRC)
 - 1. NFRC 100-2004' & 2010' - Determining Fenestration U-Factor.

2. NFRC 100-2004' & 2010' - Test Procedure for Thermal Transmittance of Fenestration.
 3. NFRC 200-2004' & 2010' - Determining Fenestration SHGC & Tv.
 4. ASTM E1423-06' - Determining Thermal Transmittance of Fenestration Systems.
 5. NFRC 500-2010' - Determining Fenestration Product Condensation Resistance.
- M. WDMA Hallmark Program
1. WDMA Hallmark Program Procedural Guide C.S.-1.
- N. Consumer Product Safety Commission (CPSC)
1. CPSC 16 CFR 1201 - Safety Glazing Standards.
 2. ANSI Z-97.1 - Safety Glazing Standards for Tempered Glass.

1.4 SYSTEM DESCRIPTION

- A. Minimum Design and Performance Requirements
1. The design pressure for windows is DP50 as tested in accordance with ASTM E330.
- B. Air, water, structural, and forced entry resistance shall be at levels which meet the specified design pressure as per AAMA/WDMA/CSA 101/I.S.2/A440-05', 101/I.S.2/A440-08'.

1.5 SUBMITTALS

- A. Shop Drawings: Submit shop drawings in accordance with Section 01330 Submittal Procedures
- B. Product Data: Submit catalog data in accordance with Section 01330 Submittal Procedures.
- C. Samples: Submit corner section in accordance with Section 01330 Submittal Procedures. Include glazing system, quality of construction, specified finish, and color.
- D. Installation Instructions.
- E. Quality Control Submittals:
- Certificates: Submit performance test results reported by independent laboratory or manufacturer's Statement of Qualification indicating compliance with specified performance and design requirements.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with the following:
- B. Clad windows: fabricate window assemblies in accordance with AAMA 101 for types of windows required.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing wood windows with minimum ten years documented experience.

1.8 MOCK-UP

- A. Window installation is to be part of the mock-up of the exterior building envelope. Reference Section 06200 – Rough Carpentry and Section 06400 – Finish Carpentry.
- B. When accepted mock-up will demonstrate minimum standard for the work. Mock-up may remain part of the work.
- C. The mock-up will aid in determining the color selections and compatibility with other material textures and colors.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver in original packaging, store in an upright position off the ground in a clean, dry area. Protect from weather and construction activities.
- B. Protect factory finish surfaces with wrapping and strippable coating. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and after installation of sealants.

1.11 WARRANTY

- A. Furnish twenty year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same.
- B. Warranty:
 - 1. Include coverage for degradation of color finish – Twenty (20) years
 - 2. Include coverage for delamination or separation of finish from window member – Ten (10) years

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

- A. Kolbe & Kolbe Millwork Co. Inc.: Ultra Series – Basis of Design
- B. Andersen: 'E' Series
- C. Marvin Window and Doors Wood Clad Product
- D. Loewen Windows Clad Window
- E. There will be no substitutions accepted.
- F. Description: Fixed beveled direct set factory assembled windows

2.2 MATERIALS

- A. Frame: Constructed of kiln-dried pine, with pine interior stops and mull casings on mulled units, water repellent, preservative treated in accordance with WDMA I.S. 4-07'A. Clad assembled frames have factory installed heavy vinyl nailing fins at head, side jambs and sill. Nailing fin at head has integral drip cap. Transom head drip cap to be field applied to frame.

1. Jamb thickness: 1-1/8 inch at the side jambs and 1 7/16" at head.
2. Basic jamb width: 4-9/16 inch
3. Standard overall jamb with extensions applied: 2-3/4 inch.
4. Sill thickness: 1-7/16 inch
5. Exterior: All frame parts are .050 inch (1.3mm) thick 6063 extruded aluminum alloy with accessory grooves, press fit and fastened onto the wood frame.
6. Corner Construction: Mitered corners use internal corner key and sealer.
7. Other wood species available: Pine
8. Prep for stool.

B. Surface Finish:

1. Exterior Finish – Aluminum
2. Standard Paint Colors: Exterior aluminum frame and sash components are to have a 70% fluoropolymer based coating in compliance with AAMA 2605-05 specifications. Color is to be Ultra Pure White.
3. Interior Finish - Wood:
 - a. The interior wood is to have a primer coat only.

2.3 GLAZING

A. Glass:

1. Impact rated glazing with LoE2-366, argon filled.
2. Standard IG or single glazed has standard design pressure of 50 psf (DP 50) (minimum).
3. All glass is select quality complying with FS-DD-G-451D.
4. IG complies with IGCC and ASTM E2190-08'.
5. Refer to Sheet A1.4 Window Schedule and Details, for all required locations for the use of tempered glass.

B. Glazing Methods:

1. Standard Performance operating units and fixed units have K-Glaze with 3/16 inch wide glazing tape and primary silicone on #1 surface along sight line paired with latex sealant on #4 surface at wood glazing bead.

C. Glass:

1. LoE³ 366
2. Protective film.
3. Glazing Bead: standard beveled.

2.4 ACCESSORIES AND TRIM

A. Installation Accessories:

1. Galvanized steel installation clips, all units with exterior casing be installed using installation jamb clips.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Before installation, verify that openings are plumb and square and of proper dimension. Report frame defects or unsuitable conditions to the General Contractor before proceeding. Confirm that all necessary framing has been provided at each opening.
- B. Acceptance: Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Install windows according to manufacturer's installation instructions, reviewed shop drawings and in accordance with Section 01600 – Execution.
- B. Install sealant and related backing materials at perimeter of assembly in accordance with Section 07900 – Joint Sealers.
- C. Install accessory items as required.
- D. Installation of window units shall be reviewed by the manufacturer's representative during an on-site meeting. The manufacturer's representative will be required to write a report stating their approval of the installation prior to installing any finish trim work.**

3.3 ADJUSTING AND CLEANING

- A. Adjust operable sash to work freely with hardware functioning properly. Re-adjust at completion of the project if directed.
- B. Remove visible labels.
- C. Leave windows in a job clean condition. Final cleaning of glass will be done in accordance with Section 01700 – Cleaning.

3.4 PROTECTION

- A. Cover windows, in accordance with Section 01700 – Protecting Installed Construction, during spray painting or other construction operations that might cause damage.

END OF SECTION 08525

SECTION 08710
DOOR HARDWARE
ALLOWANCE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes hardware for wood, steel, aluminum doors.
1. Provide door gaskets, including weatherstripping (except at aluminum doors) and seals, and thresholds.
- B. Related Sections:
1. Section 01200 – Price and Payment Procedures
 2. Section 06200 - Finish Carpentry: Wood door frames.
 3. Section 06410 - Custom Cabinets: Cabinet hardware.
 4. Section 08114 - Standard Steel Doors.
 5. Section 08115 - Standard Steel Frames: Silencers integral with steel frames.
 6. Section 08212 - Flush Wood Doors.
 7. Section 10440 - Interior Signage.
 8. Section 13710 - Intrusion Detection: Security system.
- C. **Allowances: Include under provisions of Section 01200 - Price and Payment Procedures.**
1. The General Contractor shall allow the sum of as indicated in Section 01200 for the furnishing of material. This sum does not include the overhead and profit of the General Contractor. The Architect reserves the right to assign a contract, or purchase order, to the General Contractor. The General Contractor **shall not issue a contract** on the allowance without the prior approval of the Architect. The installation of the hardware is part of base bid.

1.2 REFERENCE

- A. American National Standards Institute:
1. ANSI A156.1 - Butts and Hinges.
 2. ANSI A156.2 - Bored and Preassembled Locks and Latches.
 3. ANSI A156.3 - Exit Devices.
 4. ANSI A156.4 - Door Controls - Closures.
 5. ANSI A156.5 - Auxiliary Locks and Associated Products.
 6. ANSI A156.6 - Architectural Door Trim.
 7. ANSI A156.7 - Template Hinge Dimensions.
 8. ANSI A156.16 - Auxiliary Hardware.
 9. ANSI A156.18 - Materials and Finishes
- B. Builders Hardware Manufacturers Association:
1. BHMA Directory of Certified Products.
- C. National Fire Protection Association:
1. NFPA 80 - Standard for Fire Doors, Fire Windows.
- D. Underwriters Laboratories Inc.:

1. UL 10C - Fire Test.
2. UL 305 - Panic Hardware.
3. UL - Building Materials Directory.

E. Intertek Testing Services (Warnock Hersey Listed):

1. WH - Certification Listings.

1.3 PERFORMANCE REQUIREMENTS

A. Fire Rated Openings: Provide door hardware listed by UL or Intertek Testing Services (Warnock Hersey Listed), or other testing laboratory approved by applicable authorities.

1. Hardware: Tested in accordance with UL10C and UBC 7-2-1997.
2. ASTM 2074-00 Fire Test.

1.4 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Shop Drawings:

1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts.
2. Submit manufacturer's parts lists, and templates.
3. Submit all shop drawings and schedules together at one time.
4. Submit 6 copies of all required submittals

C. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

A. Section 01700 - Execution Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of installed cylinders and their master key code.

C. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

D. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with the following requirements:

1. ANSI A156 series.
2. NFPA 80.
3. UL 305.

B. Furnish hardware marked and listed in BHMA Directory of Certified Products.

C. Perform Work in accordance with Georgetown County, South Carolina standard.

- D. Maintain one (1) copy of each referenced document covering installation requirements on site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Hardware Supplier: Company specializing in supplying commercial and institutional door hardware with minimum five years documented experience, and an established distributor of the products being furnished.
- C. Hardware Installers shall provide a certificate of training from the manufactures of the following hardware products:
 - 1. Locksets.
 - 2. Closers.
 - 3. Exit Devices.
- D. Hardware Installers: Hardware trained personnel employed by the Hardware Supplier, trained hardware installer employed by the General Contractor, or trained independent hardware installer such as Wes Sparks, 843-222-4740.
- E. Hardware Supplier Personnel: The Supplier shall employ a certified Architectural Hardware Consultant (AHC) to assist in work of this section.
- F. Products Requiring Electrical Connection: Listed and classified by [Underwriters' Laboratories, Inc., testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01300 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum three weeks prior to commencing work of this section.
- C. Include suppliers of all related trades and all persons involved with installation of doors, frames, and hardware.
- D. Keying Conference: Conduct conference on-site to comply with requirements in Section 01300 for Project Meetings. Include the Owner's representative, Contractor, and hardware supplier. Incorporate keying conference decisions into final keying schedule . Submit four copies of the final keying schedule for final approval prior to ordering the keyed locks and cores.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Product Requirements: Product storage and handling requirements.
- B. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

1.10 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
 - 1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.
- C. Sequence installation to accommodate required utility connections.
- D. Coordinate Owner's keying requirements during course of Work.

1.11 WARRANTY

- A. Section 01700 - Execution Requirements: Product warranties and product bonds.
- B. Furnish five year minimum manufacturer warranty for locksets and exit devices. Furnish 10-year minimum manufacturer warranty for door closers. Furnish one-year manufacturer's warranty for balance of materials furnished.

1.12 MAINTENANCE MATERIALS

- A. Section 01700 - Execution Requirements: Maintenance materials.
- B. Furnish special wrenches and tools applicable for each different and for each special hardware component.
- C. Furnish maintenance tools and accessories supplied by hardware component manufacturer.

1.13 EXTRA MATERIALS

- A. Section 01700 - Execution Requirements: Spare parts and maintenance products.
- B. Furnish three extra keyed cores for each master keyed group.

PART 2 PRODUCTS

2.1 DOOR HARDWARE

- A. Manufacturers:
 - 1. Bommer Industries, Inc.
 - 2. Corbin-Russwin Locks, Closers and Exit Devices.
 - 3. Dorma Door Controls, Inc.
 - 4. Falcon Lock, Exit Device and Closers.
 - 5. Hager Companies.
 - 6. LCN Closers.
 - 7. Precision Hardware Mfg Co Inc.

8. Reese Industries.
9. Schlage Lock Co.
10. Stanley Hardware.
11. Von Duprin, Inc.

B. Hinge Manufacturers:

1. Ives Model 5BB1 x sized specified in Sets.
2. Bommer Model BB5000/BB5002.
3. Hager Model BB1279/BB1199.
4. Stanley Model FBB179/FBB191.

C. Lockset , Latch Set, and Cylinder Manufacturers:

1. Falcon Lock Model T series.
2. Corbin-Russwin Model CL3300 series.
3. Dorma Model CL800 series.

D. Exit Device Manufacturers:

1. Falcon Model 25/24 series.
2. Corbin-Russwin Model 5200 series.
3. Dorma Model 9300 series.

E. Closers Manufacturers:

1. Falcon Model SC81 / SC61 series.
2. Corbin-Russwin Model CL3210 series.
3. Dorma 8600 / 7300 series.

F. Manual Bolts,]Protection Plates, Gaskets, Thresholds, and Trim Manufacturers:

1. Ives Model 8400 series
2. NGP Model 896V Thresholds; Model 5050 Gasket.
3. Substitutions: Section 01600 - Product Requirements.

2.2 COMPONENTS

A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.

1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
 - a. Finish: Match hardware item being fastened.
4. Fire Ratings: Provide hardware with UL or Intertek Testing Services (Warnock Hersey Listed) listings for type of application involved.
5. Electrical Devices: Make provisions and coordinate requirements for electrical devices and connections for hardware.

- B. Hinges: ANSI A156.1, full mortise type , template type, ANSI A156.7, complying with following general requirements unless otherwise scheduled.
1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
 2. Number: Furnish minimum three hinges to 90 inches high, four hinges to 120 inches high for each door leaf.
 - a. Fire Rated Doors To 86 inches High: Minimum three hinges.
 3. Size and Weight: 4-1/2 inch heavy weight typical for 1-3/4 inch doors.
 - a. Doors Over 40 inches Wide: Extra heavy weight ball or oilite bearing hinges.
 - b. Doors 1-3/8 inch Thick: 3-1/2 inch size.
 - c. Doors 2 inch Thick: 5 inch extra heavy weight ball or oilite bearing.
 - d. Doors Over 48 inches Wide: 5 inch extra heavy weight ball or oilite bearing.
 4. Pins: Furnish nonferrous hinges with non-removable pins (NRP) at exterior and locked out-swinging doors, non-rising pins at interior doors.
 5. Tips: Flat button tips with matching plug Flush tips.
- C. Locksets: Furnish locksets compatible with specified cylinders. Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.
1. Bored (Cylindrical) Locksets: ANSI A156.2, Series 4000, Grade 1 unless otherwise indicated.
 2. Auxiliary Locksets: ANSI A156.5, Grade 1, bored dead locks, unless otherwise indicated.
- D. Latch Sets: Match locksets. Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.
1. Bored (Cylindrical) Latch Sets: ANSI A156.2, Series 4000, Grade 1 unless otherwise indicated.
- E. Exit Devices: ANSI A156.3, Grade 1 rim type, with push pad, unless otherwise indicated. Furnish standard roller strikes.
1. Types: Suitable for doors requiring exit devices.
- F. Cylinders: ANSI A156.5, Grade 1, 6-pin type, interchangeable core type cylinders at exterior doors and doors with exit device.
1. Keying: Keyed as directed by Owner. Key in groups as required and Master key.
 2. Include construction keyed temporary cores for all exterior doors. Temporary cores shall remain the property of the Hardware Supplier. The General Contractor shall replace the temporary cores with the keyed permanent cores at the completion of the project.
 3. Keys: Nickel silver. Stamp keys with "DO NOT DUPLICATE".
 4. Supply keys in the following minimum quantities:
 - a. 5 master keys.
 - b. 3 construction keys.
 - c. 2 control keys.
 - d. 2 change keys for each.

- G. Closers: ANSI A156.4 modern type with and without cover, surface mounted; full rack and pinion type with steel spring and non-freezing hydraulic fluid; closers required for fire rated doors unless otherwise indicated.
 - 1. Adjustability: Furnish controls for regulating closing, latching, speeds, and back checking.
 - 2. Arms: Type to suit individual condition; parallel-arm closers at reverse bevel doors and where doors swing full 180 degrees.
 - 3. Location: Mount closers on inside of exterior doors, room side of interior doors typical; mount on pull side of other doors.
 - 4. Operating Pressure: Maximum operating pressure as follows.
 - a. Interior Doors: Maximum 5 pounds.
 - b. Exterior Doors: Maximum [10] [8.5] pound.
 - c. Fire Rated Doors: As required for fire rating, maximum 15 pounds.

- H. Manual Bolts, Gaskets, Thresholds, and Trim: Furnish as indicated in Schedule, with accessories as required for complete operational door installations.
 - 1. Manual Bolts: ANSI A156.16 Grade 1 top bolt.
 - 2. Kickplates: ANSI A156.6, metal; height indicated in Schedule by 2 inch less than door width; minimum 0.050 inch thick stainless steel.
 - 3. Weatherstripping: Furnish continuous weatherstripping at top and sides of exterior doors.
 - 4. Fire Rated Gaskets: Furnish continuous fire rated gaskets at top and sides of fire rated doors.
 - 5. Thresholds: Maximum 1/2 inch height.
 - 6. Wall Stops: ANSI A156.1, Grade 1, 3 inch wall stop; convex pad wall stop.
 - 7. Floor Stops: ANSI A156.1 Grade 1 dome type; furnish with accessories as required for applications indicated.

2.3 ACCESSORIES

- A. Lock Trim: Furnish levers with rose as indicated in Schedule.

- B. Through Bolts: Verify the use of through bolts and grommet nuts on door faces in occupied areas.

- C. Key Cabinet:
 - 1. Cabinet Construction: Sheet steel construction, piano hinged door with wafer cylinder type lock manufactured by American, series 7122D.
 - 2. Cabinet Size: Size for Project keys plus sufficient room to allow for 10 percent growth.
 - 3. Furnish complete system with labels and index for key hook labeling. Finish: Powder coat enamel.

2.4 FINISHING

- A. Finishes: ANSI A156.18; furnish following finishes except where otherwise indicated in Schedule at end of section.
 - 1. Hinges:
 - a. BHMA 630 and 652, satin finish.
 - 2. Typical Interior Door Hardware:
 - a. BHMA 652, satin chromium plated steel.
 - b. BHMA 626, satin chromium plated brass or bronze.

- c. BHMA 630, satin finished stainless steel.
- 3. Closers: Finish appearance to match door hardware on same face of door.
- 4. Thresholds:
 - a. BHMA 628, satin aluminum, clear anodized.
- 5. Other Items: Furnish manufacturer's standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify doors and frames are ready to receive door hardware and dimensions are as indicated on shop drawings.
- C. Verify electric power is available to power operated devices and is of correct characteristics.

3.2 INSTALLATION

- A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.
- B. Mounting Heights From Finished Floor to Center Line of Hardware Item: Comply with manufacturer recommendations and applicable codes where not otherwise indicated.

3.3 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Architectural Hardware Consultant shall inspect installation and certify hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.4 ADJUSTING

- A. Section 01700 - Execution Requirements: Testing, adjusting, and balancing.
- B. Adjust hardware for smooth operation.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01700 - Execution Requirements: Protecting installed construction.
- B. Do not permit adjacent work to damage hardware or hardware finish.

3.6 SCHEDULES

A. To be determined

END OF SECTION 08710

SECTION 08800
GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glass and glazing for Sections referencing this Section for products and installation.

1.2 RELATED SECTIONS

- A. Section 06200 - Finish Carpentry.
- B. Section 07900 - Joint Sealers: Sealant and back-up material.
- C. Section 08410 – Metal Framed Storefront

1.3 REFERENCES

- A. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- B. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
- C. ASTM C1036 - Flat Glass.
- D. ASTM C1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
- E. ASTM E546 - Test Method For Frost Point of Sealed Insulating Glass Units.
- F. ASTM E576 - Test Method For Dew/Frost Point of Sealed Insulating Glass Units in Vertical Position.
- G. ASTM E773 - Test Method for Seal Durability of Sealed Insulating Glass Units.
- H. ASTM E774 - Sealed Insulating Glass Units.
- I. FGMA - Glazing Manual.
- J. FGMA - Sealant Manual.
- K. FS TT-C-00598 - Caulking Compound, Oil and Resin Base Type.
- L. FS TT-S-001657 - Sealing Compound, Single Component, Butyl Rubber Based, Solvent Release Type.
- M. FS TT-S-00227 - Sealing Compound, Rubber Base, Two Component.
- N. FS TT-S-00230 - Sealing Compounds, Synthetic-Rubber Base, Single Component, Chemically Curing.

- O. FS TT-S-01543 - Sealing Compound, Silicone Rubber Base.
- P. FS TT-G-410 - Glazing Compound, Sash (Metal) for Back Bedding and Face Glazing (Not for Channel or Stop Glazing).
- Q. Laminators Safety Glass Association - Standards Manual.
- R. SIGMA - Sealed Insulated Glass Manufacturers Association.

1.5 PERFORMANCE REQUIREMENTS

- A. Glass and glazing materials of this Section shall provide continuity of building enclosure vapor and air barrier:
 - 1. In conjunction with materials described in Section 07900 and Section 09260.
 - 2. To utilize the inner pane of multiple pane sealed units for the continuity of the air and vapor seal.
 - 3. Maintain continuous air and vapor barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.
- B. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass calculated in accordance with Standard Building Code.
- C. Limit glass deflection to flexure limit of glass with full recovery of glazing materials, whichever is less.

1.6 SUBMITTALS

- A. Submit under provisions of Section 01330.
- B. Product Data on Glass Types Specified: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Samples: Submit two samples, 12 x 12 inch in size, illustrating glass units, coloration and design.
- E. Samples: Submit 4 inch long bead of glazing sealant, color as selected.
- F. Manufacturer's Installation Instructions: Indicate special precautions required.
- G. Manufacturer's Certificate: Certify that sealed insulated glass, meet or exceed specified requirements.

1.8 QUALITY ASSURANCE

- A. Perform Work in accordance with FGMA Glazing Manual, FGMA Sealant Manual, SIGMA and Laminators Safety Glass Association - Standards Manual for glazing installation methods.

- B. Perform Work in accordance with State of South Carolina standards.
- C. Maintain one (1) copy of each document on site.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.10 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on Shop Drawings.

1.11 COORDINATION

- A. Coordinate Work under provisions of Section 01039.
- B. Coordinate the Work with glazing frames, wall openings, and perimeter air and vapor seal to adjacent Work.

1.12 WARRANTY

- A. Provide five year manufacturer's warranty under provisions of Section 01700.
- B. Warranty: Include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 PRODUCTS

2.1 FLAT GLASS MATERIALS

- A. Safety Glass (Type FG-B): ASTM C1048, Kind FT fully tempered with horizontal tempering Condition A uncoated, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select; conforming to ANSI Z97.1; 1/4 inch thick minimum.
- B. Non impact glazing is the typical glazing for the base bid.
- C. Hurricane Resistant Sealed Insulated Glass Units (Type HR-IG):
 - 1. Total unit thickness 1-5/16 inch.
 - 2. Double Pane Insulated Glass Units Type IG-DP: ASTM E774 Class A and E773; with glass elastomer edge seal; place reflective film within unit; purge interpane space with dry hermetic air.
 - a. Outer Pane: Glass Type: 1/4 inch heated strengthened with low "E" coating (PPG Solar Ban 70, SHGC 0.27 and U factor 0.286)
 - b. Spacer: 1/2 inch air space laminated.
 - c. Inboard Lite: 1/4 inch clear plate glass with laminated .100 liquid resin to 1/4 inch clear plate glass to form a 9/16 inch laminated glass.

2.3 GLAZING COMPOUNDS

- A. Butyl Sealant (Type GC-B): FS TT-S-001657; Shore A hardness of 10-20 white color; non-skinning.
- B. Acrylic Sealant (Type GC-C): Single Component, solvent curing, cured Shore A hardness of 15-25; non-bleeding; color as selected.

2.4 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene 80 - 90 Shore A durometer hardness, length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene 50 - 60 Shore A durometer hardness, minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 - 15 Shore A durometer hardness; coiled on release paper; black color.
- D. Glazing Splines: Resilient polyvinyl chloride extruded shape to suit glazing channel retaining slot; white color.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify prepared openings under provisions of Section 01039.
- B. Verify that openings for glazing are correctly sized and within tolerance.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.

3.3 EXTERIOR - WET/DRY METHOD (PERFORMED TAPE AND SEALANT)

- A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.
- B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

- D. Rest glazing on setting blocks and push against tape and heel bead of sealant] with sufficient pressure to attain full contact at perimeter of pane or glass unit.
- E. Install removable stops, with spacer strips inserted between glazing and applied stops, 1/4 inch. Place glazing tape on glazing pane or unit with tape flush with sight line.
- F. Fill gap between glazing and stop with 6C-A type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.
- G. Apply cap bead of GC-A type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.4 CLEANING

- A. Clean work under provisions of Section 01700.
- B. Remove glazing materials from finish surfaces.
- C. Remove labels after work is complete.
- D. Clean glass.

3.5 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. After installation, mark pane with an "X" by using removable plastic tape or paste.

3.6 SCHEDULE

- A. Type FG-B - at all interior wood doors and interior windows and interior storefront.
- B. Type HR-IG – at all exterior metal framed storefront units and doors and entry sliding units

END OF SECTION 08800

SECTION 08830
MIRROR GLASS

PART 1 GENERAL

1.1 SCOPE

- A. Perform all work required to complete the Mirror Glass indicated by the Contract Documents and furnish all supplementary items necessary for their proper installation.
- B. The requirements of Division 0 - "Bidding Requirements" and Division 1 "General Requirements" of this Project Manual shall apply to all Work required for this Section.

1.2 SUBMITTALS

- A. Shop Drawings:
 - 1. Submit manufacturer's literature and mark sufficiently to indicate compliance with these specifications. Show locations, methods of supporting, methods of anchoring and finishes.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with State of South Carolina standards.
- A. Maintain one (1) copy of each document on site.

1.4 WARRANTY

- A. Mirrors shall be warranted for a period of five (5) years against silver spoilage.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Mirror: Float glass, 1/4" thick, with silvering hermetically sealed by electrolytic copper plating, wiped (seamed) edges, without frames.
- B. Mounting Mastic: Palmer "Mirror Mastic", by Palmer Products Corporation, P.O. Box 7155, Louisville, Kentucky 40207. Phone: (502) 893-3668.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install mirrors in locations indicated.

- B. Exercise extreme caution to avoid scratching silvering on mirror back during installation. Mirrors which are scratched, cracked, chipped or in any manner damaged shall be removed and shall be replaced with new, undamaged mirrors, at no cost to the Owner.
- C. Install mirrors with mastic in exact accordance with mastic manufacturer's recommendations.

3.2 CLEANING

- A. Remove all manufacturer's temporary labels or marks of identification. Clean and polish to remove all oil, grease and foreign material. Leave mirrors in a clean, neat, and orderly condition acceptable to the Architect.

3.3 SCHEDULE

- A. At all Bathrooms as indicated on plans.

END OF SECTION 08830

SECTION 09260
GYPSUM BOARD SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal stud wall framing
- B. Acoustical insulation
- C. Gypsum board: Level 5 finish
- D. Taped and sanded joint treatment
- E. Reglets
- F. Removal of Existing Wallpaper

1.2 RELATED SECTIONS

- A. Section 06193- Plate Connected Wood Trusses.
- B. Section 06112 - Framing and Sheathing.
- C. Section 07213 - Batt Insulation: Thermal Insulation.
- D. Section 08112 - Standard Steel Frames.
- E. Section 09300 – Ceramic Wall Tile: installation of Cementitious Backer Board.
- F. Section 09900 - Painting: Surface finish.

1.3 REFERENCES

- A. ASTM C36 - Gypsum Wallboard.
- B. ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.
- C. ASTM C514 - Nails for the Application of Gypsum Wallboard.
- D. ASTM C630 - Water Resistant Gypsum Backing Board.
- E. ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
- F. ASTM C665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- G. ASTM C754 - Installation of Framing Members to Receive Screw Attached

Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.

- H. ASTM C840 - Application and Finishing of Gypsum Board.
- I. ASTM C1002 - Steel Drill Screws for the Application of Gypsum Board.
- J. ASTM E90 - Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- K. ASTM E119 - Fire Tests of Building Construction and Materials.
- L. GA-201 - Gypsum Board for Walls and Ceilings.
- M. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.
- N. GA-600 - Fire Resistance Design Manual.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01330.
- B. Product Data: Provide data on metal framing, gypsum board, joint tape.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C840, GA-201, GA-216 and GA-600.
- A. Perform Work in accordance with State of South Carolina standards.
- B. Maintain one (1) copy of each document on site.
- C. **Single Source Responsibility for the Metal Stud Framing Section 05400, Gypsum Board installation Section 09260 and Acoustical Ceiling Tile Section 09510**

1.6 QUALIFICATIONS

- A. Applicator: Company specializing in performing the work of this section with minimum ten (10) years experience. The specialized company cannot be the General Contractor without receiving prior approval from the Architect. Approval will require documented information of previous installations and previous purchasing of materials on a consistent basis for the duration required.

1.7 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated assemblies as follows:
 - 1. Fire Rated Partitions: Listed assembly by UL No. 306, one hour fire rated partition.

PART 2 PRODUCTS

2.1 MANUFACTURERS - GYPSUM BOARD SYSTEM

- A. U.S. Gypsum.
- B. Gold Bond. Building Products Division National Gypsum Co.
- C. Georgia - Pacific Corporation.

2.02 FRAMING MATERIALS

- A. Studs: ASTM A525, non-load bearing rolled steel, channel shaped, punched for utility access, as scheduled.
- B. Runners: Of same material and thickness as studs, bent leg retainer notched to receive studs. Ceiling Runners; with extended leg retainer.
- C. Furring and Bracing Members: Of same material as studs; thickness to suit purpose.
- D. Fasteners: Self drilling, self tapping screws.
- E. Sheet Metal Backing: 18 gage steel for reinforcement as required or as indicated on Structural Drawings, whichever is more stringent.
- F. Anchorage Devices: Power actuated, drilled expansion bolts.
- G. Acoustic Sealant: As specified in Section 09260.

2.3 GYPSUM BOARD MATERIALS

- A. Standard Gypsum Board: ASTM C36; 5/8 inch thick, maximum permissible length; ends square cut, tapered edges.
- B. Fire Rated Gypsum Board: ASTM C36; fire resistive type, UL rated; 5/8 inch thick, maximum permissible length; ends square cut, tapered edges.
- C. Moisture Resistant Gypsum Board: ASTM C630; 5/8 inch thick, maximum permissible length; ends square cut, tapered edges.
- D. Exterior Gypsum Board.

2.4 ACCESSORIES

- A. Acoustical Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced as indicated on drawings. Owens Corning, sound attention batt fiberglass 3-1/2" thickness, or to accommodate associated wall thickness.
- B. Acoustical Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.

- C. Corner Beads: Metal.
- D. Edge Trim: GA 201 and GA 216;
- E. Joint Materials: ASTM C475; GA 201 and GA 216; reinforcing tape, joint compound, adhesive, and water.
- F. Fasteners: ASTM C1002, Type GA-216.
- G. Reglets: Fry Reglet; as indicated on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Section 01039.
- B. Verify that site conditions are ready to receive work.
- C. **All the existing wallpaper shall be removed and all the existing Gypsum Board shall be prepared with primer, skim coats to receive a Level 5 finish as defined below.**

3.2 METAL STUD FRAMING INSTALLATION

- A. Align and secure top and bottom runners at 16 inches o.c..
- B. Place two beads of acoustic sealant between runners and substrate.
- C. Install studs vertically at 16 inches o.c. unless otherwise noted.
- D. Align stud web openings horizontally.
- E. Secure studs to tracks using fastener method. Do not weld.
- F. Stud splicing not permissible.
- G. Fabricate corners using a minimum of three studs.
- H. Double stud at wall openings, door and window jambs, not more than 2 inches (50 mm) from each side of openings.
- I. Brace stud framing system rigid.
- J. Coordinate erection of studs with requirements of door frames, window frames, and install supports and attachments.
- K. Coordinate installation of wood bucks, anchors, and wood blocking with electrical, mechanical work and fire extinguishers to be placed within or behind stud framing.
- L. Blocking: Secure wood blocking to studs. Secure steel channels to studs.

Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware to meet ADA, ANSI 1117.1 (86) requirements for supportive devices and height for handicapped.

- M. Refer to drawings for indication of partitions extending to finished ceiling only and for partitions extending through the ceiling to the structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
- N. Coordinate placement of insulation in stud spaces made inaccessible after stud framing erection.

3.3 INSTALLATION TOLERANCES

- A. Maximum Variation From True Position: 1/8 inch.
- B. Maximum Variation of any Member from Plane: 1/8 inch.
- C. Maximum Variation From Plumb: 1/8 inch.

3.4 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with GA-201, GA-216, GA-214 and GA-600 and manufacturer's instructions. All new and existing walls shall be prepared to receive a **Level 5** finish. No marks or ridges. Entire surface covered with skim coat of compound which shall completely cover the paper and ready to for drywall primer before applying finish painting.
 - 1. **Level 5** – All appropriately prepared gypsum board surfaces shall have one coat of drywall primer applied to yield a properly painted surface. Two separate coats of topcoat material shall be applied over the drywall primer to yield a properly painted surface. Paint shall be applied to the mil film thickness and application conditions specified by the paint manufacturer. Note that this level is recommended where the best paint finish is required, such as under critical lighting conditions or when paints that have a glossy surface are used.
- B. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing unless conflicting with UL assembly requirements.
- C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.
- D. Use screws when fastening gypsum board to metal furring or framing.
- E. Treat cut edges and holes in moisture resistant gypsum board with sealant.
- F. Place corner beads at external corners as indicated. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.
- G. Install sound insulation where indicated, prior to gypsum board.
- H. Where sound insulation is installed in partitions. Seal construction at perimeters, openings and penetrations with a continuous bead of acoustical sealant including a bead at both faces of partitions.

3.05 JOINT TREATMENT

- A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
- B. Feather coats onto adjoining surfaces so that camber is maximum $1/32$.
- C. Erect in accordance with manufacturer's instructions.

3.06 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness:
 $1/8$ inch in 10 feet in any direction.

END OF SECTION 09260

SECTION 09510
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes suspended metal grid ceiling system and perimeter trim; acoustic tile.
- B. Related Sections:
 - 1. Section 01700 - Execution Requirements: Execution requirements for placement of special anchors or inserts for suspension system specified by this section.
 - 2. Section 07213 - Batt Insulation.
 - 3. Section 07900 - Joint Sealers.
 - 4. Section 08310 - Access Doors and Panels: Access panels.
 - 5. Section 15550 - Fire Protection: Sprinkler heads in ceiling system.
 - 6. Section 15850 - Air Outlets and Inlets: Air diffusion devices in ceiling system.
 - 7. Section 16500 - Light Fixtures and Accessories: Light fixtures in ceiling system.
 - 8. Section 16702 - Fire Alarm: Fire alarm components in ceiling system.
 - 9. Division 16 - Speakers in ceiling system.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 - 2. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - 3. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 5. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 6. ASTM E580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.
 - 7. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.
- B. Ceilings and Interior Systems Construction Association:
 - 1. CISCA - Acoustical Ceilings: Use and Practice.
- C. Intertek Testing Services (Warnock Hersey Listed):
 - 1. WH - Certification Listings.
- D. National Fire Protection Association:
 - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

2. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

- E. Underwriters Laboratories Inc.:
1. UL - Fire Resistance Directory.
 2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 PERFORMANCE REQUIREMENTS

- A. Suspension System: Rigidly secure acoustic ceiling system according to Seismic Design Category D.
- B. The ceilings shall be installed according to Seismic Design Category D.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system and indicate seismic conditions. Indicate method of suspension where interference exists.
- C. Coordination Drawings: Reflected ceiling plans, drawing to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Ceiling suspension system members.
 2. Method of attaching hangers to building structure.
 - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 4. Minimum Drawing Scale: 1/8 inch = 1 foot.
- D. Product Data: Submit data on metal grid system components and acoustic units.
- E. Samples: Submit two full size samples illustrating material and finish of acoustic units and parabolic louver.
- F. Samples: Submit two samples each, 6 inches long, of suspension system main runner, cross runner, and perimeter molding.
- G. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.5 QUALITY ASSURANCE

- A. Conform to CISCA requirements. Comply with Guidelines for Seismic Restraints of Direct Hung Suspended Ceiling Assemblies Seismic Zone 3 and Zone 4 and Seismic Design Category D or E. Provide all perimeter tees with hanger wires attached in accordance with guidelines.

- B. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
 - 2. Suspension System: Obtain each type through one source from the same manufacturer.
 - a. Panels, grid and wall moldings to be supplied by same manufacturer to maximize warranty.
- C. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- D. Perform Work in accordance with State of South Carolina standards.
- E. Maintain one copy of each document on site.
- F. **Single Source Responsibility for the Metal Stud Framing Section 05400, Gypsum Board installation and finishing Section 09260 and Acoustical Ceiling Tile Section 09510.**

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum 5 years documented experience approved by manufacturer.
- C. Provide seismic design of suspended ceiling under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of South Carolina.

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01300 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01600 - Product Requirements.
- B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustic unit installation.

1.9 SEQUENCING

- A. Section 01100 - Summary: Requirements for sequencing.
- B. Sequence Work to ensure acoustic ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

- C. Install acoustic units after interior wet work is dry and panels have reached room temperature and a stabilized moisture content.

1.10 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.11 EXTRA MATERIALS

- A. Section 01700 - Execution Requirements: Spare parts and maintenance products.
- B. Furnish 225 sq. ft. of attic stock tile to Owner.

PART 2 PRODUCTS

2.1 SUSPENDED ACOUSTICAL CEILINGS

- A. Manufacturers:
 - 1. USG Interiors.
 - 2. Substitutions: Section 01600 - Product Requirements: Requests must include certification that products are classified as formaldehyde free or low formaldehyde according to standards set by ASHRAE, ANSI and CHPS .

2.2 COMPONENTS

- A. All acoustic tile panels to conform with ASTM E1264, conforming to the following:
 - 1. ACT 1 - Astro ClimaPlus #8223
 - a. Size: 24 in. x 24 in.
 - b. Thickness: 5/8 inch
 - c. Composition: Mineral, Class A
 - d. Light Reflectance (LR): Not less than .86
 - e. Noise Reduction Coefficient (NRC) Range: Not less than .55
 - f. CAC Minimum: 35
 - g. EDGE: SLT, Shadowline Tapered
 - h. Surface Color: White
 - i. Surface Finish: Fine Texture - Non-Perforated
 - j. Recycle Content: Minimum 62%
 - k. Grid: USG Donn DX 26 HD Grid - 15/16 inch with MS 274 2" Shadow moulding
- B. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273 and evaluated according to ASTM D3274. Provide 30-year written warranty against growth of mold and mildew.
- C. Grid

1. Non-Fire Rated Grid: ASTM C635, heavy duty, exposed T/one direction; components die cut and interlocking.
2. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
3. Exposed Grid Surface Width: 15/16 inch.
4. Grid Finish: White
5. Accessories: Stabilizers bars, clips, splices, perimeter moldings, and hold down clips required for suspended grid system.
6. Support Channels and Hangers: Galvanized steel; size and type to suite application, seismic requirements, and ceiling system flatness requirement specified.

2.3 ACCESSORIES

- A. Acoustic Batt Insulation: Specified in Section 07213.
- B. Acoustic Sealant For Perimeter Moldings: Specified in Section 07900.
- C. Touch-up Paint: Type and color to match acoustic and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify layout of hangers will not interfere with other work.

3.2 INSTALLATION

- A. Lay-In Grid Suspension System:
 1. Install suspension system in accordance with ASTM C635, ASTM C636 and as supplemented in this section.
 2. Install system in accordance with Seismic Design Category D.
 3. Install system capable of supporting imposed loads to deflection of 1/360 maximum.
 4. Locate system on room axis according to reflected plan.
 5. Install after major above ceiling work is complete. Coordinate location of hangers with other work.
 6. Install hanger clips during steel deck erection. Install additional hangers and inserts as required.
 7. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
 8. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers and related carrying channels to span extra distance.
 9. Do not support components on main runners or cross runners when weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
 10. Do not eccentrically load system, or produce rotation of runners.

11. Perimeter Molding: Donn MS 274 Shadow Molding.
 - a. Install edge molding at intersection of ceiling and vertical surfaces into bed of acoustic sealant.
 - b. Use longest practical lengths.
 - c. Miter and rivet corners.
 - d. Install at junctions with other interruptions.
 12. Form expansion joints to accommodate plus or minus 1inch movement. Maintain visual closure.
- B. Suspend ceiling hangers from building's structural members and as follows:
1. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 2. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 3. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hangers inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 4. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 5. Do not attach hangers to steel deck tabs.
 6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 7. Space hangers not more than 48 inches oc along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 8. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Where area of ceiling exceeds 2500 square feet provide seismic separation joints as indicated, or if not indicated, as directed by Architect.
- E. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Install USG Shadow Molding in accordance with manufacturer's written recommendations with all accessories necessary to comply with ICC Report ESR-1308.

2. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 3. Screw attach moldings to substrate at intervals not more than 16 inches oc and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 4. Do not use exposed fasteners, including pop rivets, on moldings and trim
- F. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- G. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
- H. Acoustic Units:
1. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
 2. Lay directional patterned units one way with pattern parallel to longest room axis. Fit border trim neatly against abutting surfaces.
 3. Install units after above ceiling work is complete.
 4. Install acoustic units level, in uniform plane, and free from twist, warp, and dents.
 5. Cutting Acoustic Units:
 - a. Cut to fit irregular grid and perimeter edge trim.
 - b. Cut bevel edges to field cut units.
 - c. Double cut and field paint exposed edges of tegular units.
 6. Where bullnose concrete block corners or round obstructions occur, install preformed closures to match perimeter molding.
 7. Lay acoustic insulation for distance of 48 inches on both sides of acoustic partitions as indicated on Drawings.

3.3 ERECTION TOLERANCES

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.4 SCHEDULES

- A. See Room Finish Schedule.

END OF SECTION 09510

SECTION 09651

RESILIENT TILE FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Resilient tile flooring and accessories.

1.1 RELATED SECTIONS

- A. Section 03300 - Cast in Place Concrete: Concrete substrate.
- B. Section 06100 - Rough Carpentry: Plywood subflooring and underlayment.
- C. Section 09650 – Resilient Flooring
- D. Section 09686 – Sheet Carpet

1.2 REFERENCES

- A. American Association of Textile Chemists and Colorists, AATCC 134 - Electrostatic Propensity of Carpets.
- B. ASTM International (ASTM):
 1. ASTM C 1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
 2. ASTM D 2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
 3. ASTM D 3884 - Standard Guide for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method), Abrasion Wheels- H18 with 1000grams load.
 4. ASTM E 492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine.
 5. ASTM E 662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 6. ASTM E 648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 7. ASTM E 989 - Standard Classification for Determination of Impact Insulation Class (IIC).
 8. ASTM F 137 - Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus.
 9. ASTM F 386 - Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces.
 10. ASTM F 925 - Standard Test Method for Resistance to Chemicals of Resilient Flooring.
 11. ASTM F 970 - Standard Test Method for Static Load Limit.
 12. ASTM F 1514 - Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change.
 13. ASTM F 1515 - Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change.
 14. ASTM F 1700 - Standard Specification for Solid Vinyl Floor Tile.

15. ASTM F 1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
16. ASTM F 1914 - Standard Test Methods for Short-Term Indentation and Residual Indentation of Resilient Floor Covering.
17. ASTM F 2055 - Standard Test Method for Size and Squareness of Resilient Floor Tile by Dial Gage Method.
18. ASTM F 2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
19. ASTM F 2199 - Standard Test Method for Determining Dimensional Stability of Resilient Floor Tile after Exposure to Heat.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide detailed data on each product to be used including but not limited to the following information as applicable:
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
 4. Maintenance recommendations.
- C. Selection Samples: For each finish product specified, two sets of each type, colors and finish of resilient flooring and accessory required, indicating full range of color and pattern variation.
- D. Verification Samples: For each finish product specified, two sets of each type, colors and finish of resilient flooring and accessory required, indicating color and pattern of actual product, including variations, as proof of application compliance.
- E. Closeout Submittals: Submit three copies of the following:
 1. Maintenance and operation data includes - methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
 2. Documentation of warranty specified herein.
- F. Flame Spread Certification: Submit manufacturer's certification that resilient flooring furnished for areas indicated to comply with required flame spread rating has been tested and meets or exceeds indicated or required standard.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum two years experience and completed at least three projects of similar magnitude, material and complexity. Upon request, provide project references including contact names and telephone numbers for three projects.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 1. Finish areas designated by Architect.
 2. Do not proceed with remaining work until workmanship, color, sheen and finished appearance are approved by Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Flooring material and adhesive shall be acclimated to the installation area for a minimum of 48 hours prior to installation.
- C. Store cartons of tile products flat and squarely on top of one another, not on edge.
- D. Store tubes of feature strips and borders in a horizontal position. Storage in a vertical or inclined position causes uneven weight distribution, which will spaghetti the ends of the feature strips. Store all tubes laying flat.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements/Conditions: In accordance with manufacturer's recommendations. Areas to receive flooring shall be clean, fully enclosed, weather tight with the permanent HVAC set at a uniform temperature of at least 65 degrees F (18 degrees C) and less than 85 degrees (30 degrees C) 48 hours prior to and during and for not less than 48 hours after installation. The flooring material shall be conditioned in the same manner prior to installation.
- B. Close spaces to traffic during resilient flooring installation and for a period of time after installation as recommended in writing by the manufacturer.
- C. Install resilient flooring materials and accessories after other finishing operations, including painting, have been completed.
- D. Where demountable partitions and other items are indicated for installation on top of sheet resilient flooring material, install flooring material before these items are to be installed.
- E. Concrete substrates should not exceed 82 percent RH and/or 6 lbs. X 24 hrs. X 1000 sf. moisture vapor emissions rate tested in accordance to ASTM F 2170 and ASTM F 1869.
- F. Store tubes of feature strips and borders in a horizontal position. Storage in a vertical or inclined position causes uneven weight distributions, which will spaghetti the ends of the feature strips. Store all tubes laying flat.

1.7 WARRANTY

- A. Warranty Period: Manufacturer's standard warranty against manufacturing defects and wearing for flooring and as follows:
 1. 10 year commercial warranty.

1.8 EXTRA MATERIALS

- A. Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 closeout submittals requirements.
 1. Quantity: Furnish quantity of flooring units equal to 2 percent of amount installed.
Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer:

1. Mohawk Select Step Luxury Vinyl Tile, which is located at: 160 S. Industrial Blvd, Calhoun, GA 30701; Toll Free Tel: 888-740-6936; Web: www.mohawkgroup.com

OR FloorFolio "Ombre" Collection

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 RESILIENT TILE FLOORING (LVT)

Resilient Tile Flooring: Mohawk Select Step Luxury Vinyl Tile (Basis of Design)

1. Dimensions: 48 inches by 6 inches
2. Material Compliance: ASTM F 1700, BS EN 649, BSEN 654.
 - a. Reaction to Fire: ASTM E 662, ASTM E 648.
 - b. Slip Resistance: ASTM C 1028, R9 classification.
3. Antimicrobial Properties: AATCC Method 174, Part 174.
4. Wear Layer Thickness: 20 mil (0.5 mm).
5. Tile Thickness: 3 mm.
6. Edge: Non-beveled edge.
7. Item Number and Name:
 - a. TBD from standard colors

2.3 ACCESSORIES

A. Manufacturer's Floor Care Kit with cleaning and maintenance products in quantities appropriate to size and scope of resilient flooring application are available but not required.

B. Adhesive: Manufacturer's recommended adhesive as follows.

1. Manufacturer's Epoxy adhesive.
 - a. Provide manufacturer's recommended concrete floor sealer for high moisture applications.
2. Manufacturer's 332 acrylic "wet set" adhesive.
 - a. Provide manufacturer's recommended concrete floor sealer for high moisture applications.
3. Manufacturer's pressure sensitive adhesive.
 - a. Provide manufacturer's recommended concrete floor sealer for high moisture applications.

C. Portland based cementitious base leveler. Gypsum based not acceptable.

D. Manufacturer approved substrate board

2.4 Rubber Base : 4" rubber base by Johnsonite or equal as per finish schedule

PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect floor to be installed immediately upon arriving at job site; perform a moisture test.

- B. Do not begin installation until substrates have been properly prepared.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. The installation of the resilient flooring shall not begin until the work of all other trades has been completed, particularly wet and overhead trades.
- E. Areas to receive flooring shall be adequately lighted during all phases of the installation process.
- F. Final direction of floor pattern to be approved by Architect.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Using Portland based cementitious base leveler fill and cover all seams, nail heads, voids, cracks, and expansion joints. Achieve smooth, even, firmly attached substrate for best finish results. Gypsum based underlayment not acceptable with Vinyl Flooring unless it is first properly prepared.
 - 1. Encapsulate the gypsum with a premium latex primer/sealer.
 - 2. Float with a Portland cement compound using a latex additive (as recommended by the manufacturer) instead of water.
 - 3. Once substrate levelness is achieved continue with the next step.
- C. Apply concrete floor sealer to substrate in accordance with manufacturer's recommendations.
- D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- E. Concrete Substrates: The Contractor shall verify to the Owner and installer a minimum of 30 days prior to the scheduled resilient flooring installation the following substrate conditions. All substrate testing shall be documented and submitted to the Architect and Owner before commencement of the flooring installation.
 - 1. Verify that substrates are dry, free of debris, and that all curing compounds, sealers, and hardeners have properly cured.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

3.3 INSTALLING RESILIENT TILES AND PLANKS

- A. General:
 - 1. Permanent HVAC system shall be turned on and set to a minimum of 65 degrees F (20 degrees C) for a minimum of 48 hours prior to, during and 48 hours after installation. After the installations, the maximum temperature should not exceed 125 degrees F (37 degrees C).

2. All products must be allowed to acclimate at least 24 to 48 hours before installation. This means product must be placed in the same room as the install that is taking place and removed from its factory packaging.
 3. Material shall be visually inspected prior to installation.
 4. Ensure that all recommendations for sub-floor and jobsite conditions are met prior to beginning the installation. Once the installation is started, Contractor and installer have accepted those conditions.
 5. Install in accordance with manufacturer's installation instructions for each product type and application specified.
- B. Layout and Installation:
1. In order to achieve a random natural wood look, take planks and cut nominal lengths to be used on the first course; example: 10 inches, 40 inches, 15 inches, 25 inches, 8 inches. At the end of the first course, all cut planks remaining should be used on the next course. Position planks so the end seams are no closer than the width of the plank being installed. Maintain this approach to staggering the planks throughout the entire installation.
 2. Center tiles or planks in rooms and hallways so borders are not less than half a tile or plank when possible.
 3. Cut edges shall always be installed against a wall.
 4. Install using tile and plank installation techniques recommended by manufacturer.
 5. Install tiles, planks, borders and feature strips in locations and configurations indicated on the Drawings.
- C. Adhesive Application:
1. Any spread glue has to be covered with material and rolled within the recommended time frame described on the adhesive container.
 2. If troweled adhesive skims over, scrape up and reapply.
 3. Install in accordance with adhesive manufacturer's recommendations.
 4. Refer to manufacturer's literature for selection criteria for trowel size, type.
 5. Using proper trowel size, apply adhesive in accordance with label on adhesive.
 6. Spread a 4 inch wide band of adhesive around the perimeter of the area designated as an extreme condition area.
 7. An additional 4 inch band should be spread at approximately 10 foot (3 m) intervals.
 8. For transitional areas, from loose lay to another floor covering of a different height, a 4 inch band of adhesive should be spread across the length of the transition.

3.4 CLEANING

- A. Wipe off any adhesive on floor as installation proceeds. Wait 48 hours before applying the cleaning and maintenance products.
- B. Prior to installation of permanent fixtures or furniture, remove all dirt, debris, or residual adhesive and clean the floor. If desired, a protective coating may be applied at this time. Specific products and instructions are available from the manufacturer.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 MAINTENANCE

- A. Comply with manufacturers instructions for proper cleaning and maintenance of the products.

3.7 SCHEDULE

- A. Refer to the Room Finish Schedule on the architectural drawings.

END OF SECTION

SECTION 09900
PAINTS AND COATINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and field application of paints, stains, varnishes, and other coatings.
- B. Paint and stain all surfaces that are primed for painting. Do not paint any surfaces that are factory primed unless noted otherwise.
- C. Related Sections:
 - 1. Section 04810 - Unit Masonry Assemblies
 - 2. Section 05500 - Metal Fabrications: Shop primed items.
 - 3. Section 05510 - Metal Stairs and Ladders: Shop primed items.
 - 4. Section 08111 - Standard Steel Doors and Frames
 - 5. Section 08310 - Access Panels and Doors
 - 6. Section 09260 - Gypsum Wallboard Assemblies
 - 7. Section 09720 - Wall Covering: Primer and sealer under wall covering.
 - 8. Section 15075 - Identification for Plumbing Piping and Equipment.
 - 9. Section 15076 - Identification for HVAC Piping and Equipment.
 - 10. Section 16075 - Identification for Electrical Systems.
 - 11. Section 16076 - Identification for Communications Systems.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM D16 - Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
 - 2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
 - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. National Fire Protection Association:
 - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- C. Painting and Decorating Contractors of America:
 - 1. PDCA - Architectural Painting Specification Manual.
- D. SSPC: The Society for Protective Coatings:
 - 1. SSPC - Steel Structures Painting Manual.
- E. Underwriters Laboratories Inc.:
 - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on finishing products. Samples:
 - 1. Submit color charts for selection by architect for review not less than four weeks before painting is scheduled to start.
- C. Manufacturer's Installation Instructions: Submit special surface preparation procedures, substrate conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01700 - Execution Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.6 QUALITY ASSURANCE

- A. Surface Burning Characteristics:
 - 1. Fire Retardant Finishes: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- B. Perform Work in accordance with State of South Carolina standards.
- C. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.
- B. Applicator: Company specializing in performing work of this section with minimum ten years documented experience and approved by manufacturer.

1.8 MOCKUP/FIELD SAMPLES

- A. Section 01400 - Quality Requirements: Mock-up and Field Sample requirements.
- B. Construct field sample on actual walls as directed by architect, 6 feet long by 6 feet wide, illustrating coating color, texture, and finish. Repaint field sample until all colors are selected. Provide a field sample for each color selected by the architect. Provide finish lighting conditions where sample is to be painted. Ample time to review the samples shall be incorporated.
- C. Locate where directed by Architect/Engineer.

D. Incorporate accepted mockup as part of Work.

1.9 PRE-INSTALLATION MEETINGS

A. Section 01300 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section. **Do not proceed with remaining work until Architect approves of the mark-up samples.**

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 01600 - Product Requirements: Product storage and handling requirements.

B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

C. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Product Requirements.

B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.

C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish and Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 ft candle measured mid-height at substrate surface.

1.12 SEQUENCING

A. Section 01100 - Summary: Work sequence.

B. Sequence application to the following:

1. Do not apply finish coats until paintable sealant is applied.
2. Back prime wood trim before installation of trim.

1.13 WARRANTY

A. Section 01700 - Execution Requirements: Product warranties and product bonds.

- B. Furnish five year manufacturer warranty for paints and coatings.

1.14 EXTRA MATERIALS

- A. Section 01700 - Execution Requirements: Spare parts and maintenance products.
- B. Supply 1 gallon of each color, type, and surface texture; store where directed.
- C. Label each container with color, type, texture, room locations, in addition to manufacturer's label.

PART 2 PRODUCTS

2.1 PAINTS AND COATINGS

- A. Manufacturers: Paint, Transparent Finishes, Stain, Primer Sealers, Block Filler, Field Catalyzed Coatings.
 - 1. Sherman Williams (basis for design)
 - 2. Devoe Paint Co.
 - 3. Duron Inc.
 - 4. The Glidden Co.
 - 5. PPG Architectural Finishes
 - 6. Substitutions: Section 01600 - Product Requirements

2.2 COMPONENTS

- A. Coatings: Ready mixed, except field catalyzed coatings. Prepare coatings:
 - 1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
 - 2. For good flow and brushing properties.
 - 3. Capable of drying or curing free of streaks or sags.
 - 4. Exterior: GC-03
 - 5. Clear Wood Finishes: SCAQMD Rule 113
 - 6. Interior: Maximum Volatile Organic Compound Content in accordance with GS-11 with a maximum of 50 g/L for flat paints and coatings and 150 g/L for non-flat paints and coatings.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality.
- C. Patching Materials: Latex filler.
- D. Fastener Head Cover Materials: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.

- B. Verify surfaces and substrate conditions are ready to receive Work as instructed by product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report conditions capable of affecting proper application.
- D. Test shop applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Plaster and Gypsum Wallboard: 12 percent.
 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
 5. Concrete Floors: 8 percent.

3.2 PREPARATION

- A. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- B. Surfaces: Correct defects and clean surfaces capable of affecting work of this section.
- C. Marks: Seal with shellac those which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- F. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.
- G. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- H. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- I. Copper Surfaces Scheduled for Paint Finish: Remove contamination by steam, high pressure water, or solvent washing. Apply vinyl etch primer immediately following cleaning.
- J. Copper Surfaces Scheduled for Natural Oxidized Finish: Remove contamination by applying oxidizing solution of copper acetate and ammonium chloride in acetic acid. Rub on repeatedly for required effect. Once attained, rinse surfaces with clear water and allow to dry.
- K. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.

- L. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- M. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- N. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- O. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by power tool wire brushing or sandblasting; clean by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- P. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items including shop primed items.
- Q. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
- R. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.
- S. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior paintable caulking compound after prime coat has been applied.
- T. Exterior Wood Scheduled to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior caulking compound after sealer has been applied.
- U. Wood Doors Scheduled for Painting: Seal wood door top and bottom edge surfaces with clear sealer.
- V. Metal Doors Scheduled for Painting: Prime metal door top and bottom edge surfaces.

3.3 EXISTING WORK

- A. Extend existing paint and coatings installations using materials and methods compatible with existing installations and as specified.

3.4 APPLICATION

- A. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- B. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.
- C. Sand wood and metal surfaces lightly between coats to achieve required finish.
- D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- E. Where clear finishes are required, tint fillers to match wood. Work fillers into grain before set. Wipe excess from surface.
- F. Prime concealed surfaces of interior and exterior woodwork with primer paint.
- G. Prime concealed surfaces of interior wood surfaces scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with thinner.
- H. Finishing Mechanical And Electrical Equipment:
 - 1. Refer to Division 15 and Division 16 for schedule of color coding and identification banding of equipment, duct work, piping, and conduit.
 - 2. Paint shop primed equipment.
 - 3. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
 - 4. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are shop finished.
 - 5. Paint interior surfaces of air ducts visible through grilles and louvers with one coat of flat black paint to visible surfaces. Paint dampers exposed behind louvers, grilles, to match face panels.
 - 6. Paint exposed conduit and electrical equipment occurring in finished areas.
 - 7. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
 - 8. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
 - 9. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.5 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements and 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.

3.6 CLEANING

- A. Section 01700 - Execution Requirements: Final cleaning.

- B. Collect waste material which may constitute fire hazard, place in closed metal containers, and remove daily from site.

3.7 SCHEDULE - SHOP PRIMED ITEMS FOR SITE FINISHING

- A. Metal Fabrications (Section 05500): Exposed surfaces of lintels, elevator pit ladders.
- B. Metal Stairs (Section 05510): Exposed surfaces of stringers exposed vertical risers.

3.8 SCHEDULE - EXTERIOR SURFACES

- A. Pavement Markings: See Division Two
- B. Steel - Unprimed:
 - 1. One coat of Procryll primer.
 - 2. Two coats of alkyd enamel, semi-gloss.
- C. Steel - Shop Primed:
 - 1. Touch-up with Procryll primer.
 - 2. Two coats of alkyd enamel, semi-gloss.
- D. Steel - Galvanized:
 - 1. One coat All Surface latex Primer A41 Series.
 - 2. Two coats of alkyd semi-gloss.
- E. Steel – Existing Railings, post and ornamental work
 - 1. One coat of Procryll primer.
 - 2. Two coats of alkyd enamel, semi-gloss.
- F. Fiber Cementitious Siding & Trim – Brush Applied Only – No spray application allowed
 - 1. Unprimed: Prime with first coat 100% acrylic primer Loxon A24W300. Prime all cut edges in accordance with manufacturer’s recommendations
 - 2. Topcoat: Two coats of Exterior Super Paint A80 series flat.
 - a. Trim Color will differ from siding color

3.9 SCHEDULE - INTERIOR SURFACES

- A. Steel - Unprimed:
 - 1. Touch-up with Procryll primer.
 - 2. Two coats of alkyd enamel, semi-gloss.
- B. Steel - Primed:
 - 1. Touch-up with Procryll primer.
 - 2. Two coats of alkyd enamel, semi-gloss.
- C. Steel - Galvanized:
 - 1. One coat All Surface latex Primer A41 Series.
 - 2. Two coats of alkyd semi-gloss.

- D. Gypsum Board Walls:
 - 1. One coat of SW Preprite primer 200 B28200 Series.
 - 2. Two coats of SW Cashmere Low Lustre D17 Series

- E. Gypsum Board Ceilings:
 - 1. One coat of SW Preprite primer 200 Series B28200.
 - 2. Two coats of SW Promar 400 Series B30W400 Flat.

- F. Interior wood trim
 - 1. One coat of SW Preprite primer 200 B28200 Series.
 - 2. Two coats of SW Cashmere Low Lustre D17 Series

- G. Interior Wood Siding
 - 1. Two coats of Penetrol by Flood

3.10 SCHEDULE – COLORS

- 1. See Finish Schedule on the Drawings for rooms and spaces scheduled to receive paint and coatings.

- 2. A color schedule showing colors selected will be prepared after the Contract has been awarded. The Contractor is to allow for multiple selection of paint in multiple rooms. A maximum of five different wall colors is anticipated.

END OF SECTION 09900

SECTION 10170
TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes solid plastic toilet compartments and urinal screens.
- B. Related Sections:
 - 1. Section 05500 - Metal Fabrications: Concealed steel support members.
 - 2. Section 06114 - Wood Blocking: Concealed wood framing and blocking for compartment support.
 - 3. Section 10800 - Toilet, Bath, and Laundry Accessories.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall and floor supports, door swings.
- C. Product Data: Submit data on panel construction, hardware, and accessories.
- D. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.

1.4 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with placement of support framing and anchors in wall.

PART 2 PRODUCTS

2.1 SOLID PLASTIC TOILET COMPARTMENTS

- A. Manufacturers:
 - 1. Bobrick
 - 2. Atlanta Sunbelt Products

3. Columbia Partitions
4. Lambaton/Universal
5. Substitutions: Section 01600 - Product Requirements.

B. Product Description: Floor mounted overhead braced.

2.2 COMPONENTS

A. Toilet Compartments: Solid molded plastic panels, doors, and pilasters, floor-mounted headrail-braced.

1. Color: Single color as selected.

B. Door and Panel Dimensions:

1. Thickness: 1 inch
2. Door Width: 24 inch
3. Accessible Door Width: 36 inch, out-swinging.
4. Height: 58 inch
5. Thickness of Pilasters: 1-1/4 inch.

C. Urinal Screens: Wall mounted with two panel brackets, and floor-to-ceiling vertical upright consisting of tubular headrail stock and sockets anchored to floor and ceiling.

2.3 ACCESSORIES

A. Pilaster Shoe: Formed chromed steel with satin finish, ASTM A666 Type 304 stainless steel with No. 4 finish, 3 inch high, concealing floor fastenings. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Hollow stainless steel tube, 1 x 1-5/8 inch size, with cast socket wall brackets.

C. Brackets: Stainless steel color as selected.

D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.

1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.

E. Hardware: Stainless steel:

1. Pivot hinges, gravity type, adjustable for door close positioning; two for each door.
2. Nylon bearings.
3. Thumb turn door latch.
4. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
5. Coat hook with rubber bumper; one for each compartment, mounted on door panel.
6. Furnish door pull for out-swinging doors.
7. Furnish metal heat sink at bottom of doors and partitions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify field measurements are as indicated on shop drawings.
- C. Verify correct spacing of and between plumbing fixtures.
- D. Verify correct location of built-in framing, anchorage, and bracing.

3.2 INSTALLATION

- A. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- B. Attach panel brackets securely to walls using anchor devices.
- C. Attach panels and pilasters to brackets.
- D. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.3 ERECTION TOLERANCES

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Maximum Variation From Indicated Position: 1/4 inch.
- C. Maximum Variation From Plumb: 1/8 inch.

3.4 ADJUSTING

- A. Section 01700 - Execution Requirements: Testing, adjusting, and balancing.
- B. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- C. Adjust hinges to position doors in full closed position when unlatched. Return out-swinging doors to closed position.
- D. Adjust adjacent components for consistency of line or plane.

END OF SECTION 10170

SECTION 10523
FIRE EXTINGUISHERS AND CABINETS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes fire extinguishers; fire blankets; fire extinguisher cabinets; and brackets for wall mounting.
- B. Related Sections:
 - 1. Section 06114 - Wood Blocking and Curbing: Wood blocking and shims.
 - 2. Section 09900 - Paints and Coatings: Field applied paint finish.
 - 3. Division 15: Mechanical: - Standpipes and Hoses: Cabinet enclosure for extinguishers.

1.2 REFERENCES

- A. National Fire Protection Association:
 - 1. NFPA 10 - Standard for Portable Fire Extinguishers.
- B. Underwriters Laboratories Inc.:
 - 1. UL - Fire Protection Equipment Directory.

1.3 PERFORMANCE REQUIREMENTS

- A. Conform to NFPA 10 and applicable code.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.
- C. Provide fire extinguisher cabinets classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements, location, and fire ratings.
- C. Product Data: Submit extinguisher operational features, color and finish, and anchorage details.
- D. Manufacturer's Installation Instructions: Submit special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with State of South Carolina standards.
- B. Maintain one copy of each document on site.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01700 - Execution Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit test, refill or recharge schedules and re-certification requirements.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01600 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install extinguishers when ambient temperature is capable of freezing extinguisher ingredients.

PART 2 PRODUCTS

2.1 FIRE EXTINGUISHERS

- A. Manufacturers:
 - 1. JL Industries
 - 2. Larsen's Manufacturing Co.
 - 3. Potter Roemer
 - 4. Substitutions: Section 01600 - Product Requirements.
- B. Furnish materials in accordance with State of South Carolina standards.
- C. Water Type: UM Series, Water Mist, WM 2-1/2 to be installed with standard bracket #864.
- D. Dry Chemical Type: Cast steel tank, with pressure gage; Class B: C, Size 10. Model MP 10.
- E. Extinguisher Finish: Stainless steel, satin chrome finish.

2.2 FIRE EXTINGUISHER CABINETS

- A. Manufacturers:
 - 1. Larsens Model 24096R-Semi Recessed.
 - 2. Substitutions: Section 01600 - Product Requirements.
- B. Configuration: Semi-recessed type, sized to accommodate accessories.
- C. Trim Type: Flat returned to wall surface, with 4 inch projection.

- D. Door: 0.016 inch thick, reinforced for flatness and rigidity; latch, full glass access.
- E. Door Glazing: Glass, clear, 1/8 inch thick tempered.
- F. Cabinet Mounting Hardware: Appropriate to cabinet.
- G. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim.
- H. Pre-drill for anchors.
- I. Hinge doors for 180 degree opening with continuous piano hinge. Furnish nylon catch.
- J. Weld, fill, and grind components smooth.
- K. Glaze doors with resilient channel gasket glazing.
- L. Finishing Cabinet Exterior Trim and Door: Satin chrome color as selected.

2.3 ACCESSORIES

- A. Fire Blanket: Fire retardant treated wool.
- B. Extinguisher Brackets: Formed steel, chromed finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

- A. Install cabinets plumb and level in wall openings, maximum 48 inches from finished floor to top of extinguisher handle.
- B. Install wall brackets, maximum 48 inches from finished floor to top of extinguisher handle.
- C. Secure rigidly in place.
- D. Place extinguishers and accessories in cabinets on wall brackets.
- E. Position cabinet signage as required by authorities having jurisdiction.

3.3 SCHEDULES

- A. Quantity as indicated on floor plan, final location to be determined in field with Architect and local Fire Marshall.

END OF SECTION 10523

SECTION 10800
TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes toilet accessories; custodial accessories.
- B. Related Sections:
 - 1. Section 06114-Wood Blocking: In-wall framing and plates for support of accessories.
 - 2. Section 08830 - Mirrors: Other mirrors.
 - 3. Section 09300 - Tile: Ceramic washroom accessories.
 - 4. Section 10170 - Toilet Compartments.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 3. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - 4. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 5. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 6. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
 - 7. ASTM C1036 - Standard Specification for Flat Glass.
- B. Federal Specification Unit:
 - 1. FS A-A-3002 - Mirrors, Glass.

1.3 DESIGN REQUIREMENTS

- A. Designs grab bars, and attachments to resist minimum 250 lb concentrated load applied at any point in any direction, forces as required by applicable code.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, attachment methods.

- C. Manufacturer's Installation Instructions: Submit special procedures, and conditions requiring special attention.

1.5 QUALITY ASSURANCE

- A. Flame Resistant Fabric: Passes when tested in accordance with NFPA 701, Test 1 or Test 2.
- B. Perform Work in accordance with State of South Carolina standards.
- C. Maintain one copy of each document on site.

1.6 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work with placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.1 TOILET AND BATH ACCESSORIES

- A. Manufacturers:
 - 1. A & J Washroom Accessories
 - 2. American Specialties, Inc.
 - 3. Bobrick Washroom Accessories
 - 4. Bradley Corp.
 - 5. Substitutions: Section 01600 - Product Requirements.

2.2 COMPONENTS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
 - 1. Grind welded joints smooth.
 - 2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- B. Keys: Furnish Four keys for each accessory to Owner; master key.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269, stainless steel.
- E. Galvanized Sheet Steel: ASTM A653, G90 Z180 Hot-Dip zinc coating.
- F. Mirror Glass: Float glass, Type I, Class 1, Quality q2 (ASTM C 1036), with silvering, copper coating, and suitable protective organic coating to copper backing in accordance with FS A-A-3002.

- G. Adhesive: Two component epoxy type, waterproof.
- H. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof.
- I. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 TOILET ROOM ACCESSORIES

- A. See Schedule on drawings. The Owner will provide the toilet paper and paper towel dispensers.

2.4 FACTORY FINISHING

- A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.
- B. Galvanizing for Items Other than Sheet: ASTM A123/A123M; minimum 2.0 oz/sq ft coating thickness]; galvanize after fabrication.
- C. Galvanizing for Nuts, Bolts and Washers: ASTM A153/A153M.
- D. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.
- E. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify exact location of accessories for installation.
- C. Verify field measurements are as indicated on product data and instructed by manufacturer.
- D. See Section 06114 for installation of blocking, reinforcing plates and concealed anchors in walls and ceilings.

3.2 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

- A. Install plumb and level, securely and rigidly anchored to substrate.

- B. Mounting Heights and Locations: As required by accessibility regulations ANSI 111.7 ADA A6 and as indicated on Drawings.

3.4 SCHEDULES: See Accessory List on Plans.

END OF SECTION 10800

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<u>SECTION#</u>		<u>NAME</u>
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SECTION 15010

MECHANICAL GENERAL PROVISIONS

PART 1: GENERAL

1.1 SCOPE:

a. Applicable requirements of the General Conditions, Supplementary General Conditions, and Special Conditions bound at the front of these specifications shall govern work under this heading.

b. The Contractor shall coordinate the work and equipment of this Division with the work and equipment specified elsewhere in order to assure a complete and satisfactory installation. Work such as excavation, backfill, concrete, flashing, wiring, etc., which is required by the work of this section shall be performed in accordance with the requirements of the applicable section of the specifications.

c. It is the intention of these specifications and drawings to call for finished work, tested and ready for operation. Whenever the word "provide" is used, it shall mean "furnish and install complete and ready for use".

d. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

e. This Contractor is referred to the General and Special Conditions of the Contract which shall form a part and be included in this section of the specification and shall be binding on this Contractor.

f. Some items of equipment are specified in the singular; however, the Contractor shall provide and install the number of items or equipment as indicated on the drawings, and as required for complete systems.

1.2 DEFINITION:

a. The word "Contractor" as used in this section of the specification refers to the HVAC and Plumbing unless specifically noted otherwise. The word "provide" means furnish, fabricated, complete, install, erect, including labor and incidental materials necessary to complete in place and ready for operation or use the item referred to or described herein and/or shown or referred to on the Contract Drawings.

1.3 CONTRACTOR'S QUALIFICATIONS:

a. It is assumed that the Contractor has had sufficient general knowledge and experience to anticipate the needs of a construction of this nature. The Contractor shall furnish all items required to complete the construction in accordance with reasonable interpretation of the intent of the Drawings and Specifications. Any minor items required by code, law or regulations shall be provided whether or not specified or specifically shown where it is a part of a major item of equipment, or of the control system specified or shown on the plans.

2.1 MATERIALS AND WORKMANSHIP:

a. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces.

Where no specific kind or quality of material is given, a first-class standard article as approved by the Architect shall be furnished.

b. The Contractor shall furnish the services of an experienced superintendent, who shall be constantly in charge of the installation of the work, together with all skilled workmen, fitters, metal workers, helpers and labor required to unload, transfer, erect, connect-up, adjust, start, operate and test each system.

c. Unless otherwise specifically indicated on the plans or specifications, all equipment and material shall be installed with the approval of the Architect in accordance with the recommendations of the manufacturer. This shall include the performance of such tests as the manufacturer recommends.

d. All work must be done by first-class and experienced mechanics properly supervised and it is understood that the Architect has the right to stop any work that is not being properly done and has the right to demand that any workman deemed incompetent by the Architect be removed from the job and a competent workman substituted therefor.

2.2 EQUIPMENT APPLICATION AND PERFORMANCE:

a. The Contractor and/or Equipment Supplier shall be responsible to see that equipment supplied is correct for the intended application and will perform within the limits of capacity, noise, life expectancy, pressure drop and space limitations intended for that equipment as shown on the plans or described in the specifications. The shop drawings shall show the capacity and operating characteristics of the equipment.

2.3 EQUIPMENT DEVIATIONS:

a. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical, or architectural layout, all such redesign, and all new drawings and detailing required therefor, shall be prepared by the Sub-contractor at his own expense and submitted for approval by the Architect.

b. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, the Contractor shall furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

2.4 MOTORS:

a. Motors shall be built in accordance with the latest standards of NEMA and as specified. Motors shall be tested in accordance with standards of A.S.A. C40 and conform thereto for installation resistance and dielectric strength. Each motor shall be provided with conduit terminal box, adequate starting and protective equipment as specified or required. The capacity shall be sufficient to operate associate driven devices under all conditions of operation and load and without overload, and at least shall be the horsepower indicated or specified. Each motor shall be selected for quiet operation. Motors 1 HP or more shall have a minimum acceptable nominal full load efficiency not less than the minimum as stated in the energy code.

2.5 DRIVES:

- a. Machinery drives shall be provided for all power driven equipment specified in this section.
- b. Drives shall be V-belt and shall be selected to overcome the starting inertia of the equipment without slippage, but in no case shall be less than 150% of the full motor load. Drives 1/2 HP and smaller may be provided with single belts. Drives 3/4 HP and larger shall be provided with the number of belts necessary to transmit the required power with 95% minimum efficiency.
- c. Where adjustable type sheaves are indicated they shall be selected such that the schedule speed of the driven equipment is at the midpoint in the adjustment range of the sheave.
- d. Where fixed type sheaves are indicated the Contractor shall include in his price changing sheave sizes once during the balancing period to achieve proper air quantities.
- e. Sheaves shall be machined cast iron of the same manufacturer as the belt provided. Shop drawings shall be submitted of each drive which shall include actual transmission capacity of each drive.

2.6 FOUNDATIONS,SUPPORTS,PIERS,ATTACHMENTS:

- a. This Contractor shall furnish and install all necessary foundations, supports, pads, bases and piers required for all air conditioning equipment, piping and for all other equipment furnished under this contract, and shall submit drawings to the Architect for approval before purchase, fabrication or construction of same.
- b. Construction of foundations, supports, pads, bases, and piers where mounted on the floor, shall be of the same materials and same quality of finish as the adjacent and surrounding flooring material.
- c. All equipment, unless otherwise shown, shall be securely attached to the building structure in an approved manner. Seismic restraint shall be provided in accordance with the International Building Code.

2.7 VIBRATIONISOLATION:

- a. All work shall operate under all conditions of loads without any sound or vibration which is objectionable in the opinion of the Architect.

If requested, the Contractor shall record sound power level readings in all areas adjacent to mechanical rooms, over, under or beside, after all equipment is fully operational and all wall and ceiling systems are completed. Sound level readings shall not exceed NC levels as recommended in Table 2, Chapter 43 of 1995 ASHRAE Applications Handbook.

- b. The readings are to be tabulated in the Maintenance and Operating Instruction Booklets.
- c. Sound or vibration conditions in excess of listed quantities shall be corrected in an approved manner by the Contractor at his expense.
- d. Unless otherwise noted mechanical equipment over one horsepower shall be isolated from the structure with resilient vibration and noise isolators supplied by one manufacturer to the Mechanical Contractor. Where isolator type and required deflection are not shown, equipment shall be isolated in accordance with the 1995 ASHRAE Applications Handbook, Chapter 43, Table 42. Submittals shall include complete design for the equipment bases, a tabulation of the design data for the isolators, including lateral stiffness, O.D., free operating and solid height of the spring isolators, free and operating height of the neoprene or fiberglass isolators. Selection of isolators for proper loading to obtain desired efficiency shall be the responsibility of the manufacturer of isolating units to suit the equipment being supplied on the job and shall be fully guaranteed by this supplier. All vibration isolation equipment complete with thorough selection data shall be submitted. Units shall be Vibration Eliminator Company, Mason, Peabody, or approved equal.
- e. Flexible duct connections shall be provided at inlet and outlet of all fans or cabinets containing fans and shall be constructed such as to allow a minimum movement of 2 inches in any direction and will not restrict normal movement of any equipment.

2.8 DRAINS AND VENTS:

a. In addition to the drains and vents indicated on the plans and piping details, the Contractor shall install additional drains and vents as required to remove all water and air from the piping systems.

2.9 MOTOR STARTERS AND DISCONNECTS:

a. Individual motor controllers complete with auxiliary contacts, control transformers, push buttons, selector switches and remote push button stations not specifically specified to be furnished with the equipment shall be provided under this section. Motor controllers shall comply with NEMA Standards and be complete with proper size heaters and auxiliary contacts and shall be in NEMA enclosures as required. Unless otherwise noted, push button stations shall be oil-tight heavy duty type. Controllers shall be manual, magnetic, or combination type with disconnect switch or circuit breaker as indicated on the drawings or where required by the NEC. Controllers shall include motor overcurrent protection in each phase conductor. Each motor controller shall be provided with phenolic nameplate, black with 1/4" high letters and white border, indicating equipment served, attached using counter sunk screws.

b. The Electrical Contractor shall furnish and install all disconnecting switches unless otherwise indicated or specified. Where disconnecting

switches are indicated to be furnished under this Section, they shall be General Electric, Type TH in NEMA 1 enclosures, with voltage and amperage rating appropriate to the application. Unless otherwise noted, fuses shall be Buss "Fusetrons", or approved equal. Unfused motor disconnecting switches shall be Type TH in NEMA 1 or 4 applicable enclosures. Similar and equivalent equipment as manufactured by I.T.E., Square D, or Westinghouse is equally acceptable. Switches used as service switches shall bear such U.L. Label and nameplate on switch shall so indicate.

2.10 PAINTING:

a. Paint material shall be selected from the products listed below and, insofar as practical, products of only one manufacturer shall be used. Contractor shall submit to the Architect the listed manufacturer he proposes to use in the work. Should the Contractor desire to use products of a manufacturer not listed below, or products made by a listed manufacturer but not scheduled herein, Contractor shall submit complete technical information on the proposed products to the Architect for approval. Only products approved by the Architect shall be used.

1. Rust Inhibitive Primer:

- a. Devoe: Ready-Mixed Red No. 20.
- b. Duron: Deluxe Red Primer.
- c. Glidden: Rustmaster Tank and Structure Primer.
- d. Pittsburgh: Inhibitive Red Primer.

2. Galvanized Metal Primer:

- a. Devoe: Devoe Zinc Dust Primer.
- b. Duron: Duron Deluxe Galvanized Metal Primer
- c. Glidden: Rustmaster Galvanized Iron Metal Primer.
- d. Pittsburgh: Speedhigh Galvanized Steel Primer.

PART 3: EXECUTION

3.1 DUTIES OF CONTRACTOR:

a. Contractor shall furnish and install all materials called for in these Specifications and accompanying drawings, and must furnish the apparatus complete in every respect. Anything called for in the specifications and not shown on the drawings or shown on the drawings and not called for in the specifications, must be furnished by the Contractor.

b. Contractor is responsible for familiarizing himself with the details of the construction of the building. Work under these specifications installed improperly or which requires changing due to improper reading or interpretation of building plans shall be corrected and changed as directed by the Architect without additional cost to the Owner.

c. The Contractor shall follow drawings in laying out work and check drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom or space condition appear inadequate, Architect shall be notified before proceeding with installation.

d. The plans are diagrammatic and are not intended to show each and every fitting, valve, pipe, pipe hanger, or a complete detail of all the work to be done; but are for the purpose of illustrating the type of system, showing pipe sizes, etc., and special conditions considered necessary for the experienced mechanic to take off his materials and lay out his work. This Contractor shall be responsible for taking such measurements as may be necessary at the job and adapting his work to local conditions.

e. Conditions sometimes occur which require certain changes in drawings and specifications. In the event that such changes in drawings and specifications are necessary, the same are to be made by the Contractor without expense to the Owner, providing such changes do not require furnishing more materials, or performing more labor than the true intent of the drawings and specifications demands. It is understood that while the drawings are to be followed as closely as circumstances will permit, the Contractor is held responsible for the installation of the system according to the true intent and meaning of the drawings. Anything not entirely clear in the drawings and specification will be fully explained if application is made to the Architect. Should, however, conditions arise where in the judgment of the Contractor certain changes will be advisable, the Contractor will communicate with the Architect and secure his approval of these changes before going ahead with the work.

f. The right to make any responsible change in location of apparatus, equipment, routing of piping up to the time of roughing in, is reserved by the Architect without involving any additional expense to the Owner.

g. It shall be the duty of the Contractors to visit the job site and familiarize themselves with job conditions. No extras will be allowed because of additional work necessitated by, or changes in plans required because of evident job conditions, that are not indicated on the drawings.

h. Contractor shall determine the schedule of work as laid down by the General Contractor and must schedule his work to maintain the building construction schedule so as not to interfere with or hold up any other Contractors.

i. Contractor shall leave the premises in a clean and orderly manner upon completion of the work, and shall remove from the premises all debris that has accumulated during the progress of the work.

3.2 CODES, RULES, PERMITS AND FEES:

a. The Contractor shall give all necessary notices, obtain all permits and pay all sales taxes, fees and other costs, including utility connections or extensions, in connection with his work; file all necessary plans prepare all documents and obtain all necessary approvals of all authorities having jurisdiction. Obtain all required certificates of inspection for his work and deliver same to the Architect before request for acceptance and final payment of the work.

b. The Contractor shall include in his work, without extra cost to the Owner, any labor, materials, service, apparatus, drawings, in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on drawings and/or specified.

c. All materials furnished and all work installed shall comply with the National Fire Codes of the National Fire Protection Association, and with the requirements of all governmental departments having jurisdiction.

d. All materials and equipment for the electrical portion of the mechanical system shall bear the approval label, and shall be listed by the Underwriters' Laboratories, Inc..

e. All work shall be done in accordance with the IBC Code, and requirements of governmental agencies having jurisdiction.

3.3 COOPERATION WITH OTHER TRADES:

a. This Contractor shall give full cooperation to other trades and shall furnish any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

b. Where the work of the Contractor will be installed in close proximity to, or may interfere with the work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Architect, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than 3/8" = 1'-0", clearly showing how his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordination with other trades, or so as to cause any interference with work of other trades, he shall make the necessary changes in his work to correct the condition without extra charge.

c. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

3.4 RECORD DRAWINGS:

a. The Contractor shall furnish drawings showing dimensioned location and depths of all exterior piping and structures, and shall indicate any and all changes in location of piping, ductwork, equipment or valves from that shown on the Contract Drawings. The drawings shall consist of clean, legible sepia prints of the Contract Drawings, available from the Architect on which the Contractor shall mark all notes, dimensions, sizes and information required. The sepias shall be kept for this purpose only. Before final inspection the Contractor shall submit to the Architect eight (8) sets of black line prints of the sepias.

3.5 SURVEYS AND MEASUREMENTS:

a. This Contractor shall base all measurements, both horizontal and vertical, from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.

b. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the Architect through the General Contractor, and shall not proceed with his work until he

has received instructions from the Architect.

3.6 SAFETY REQUIREMENTS:

a. All systems shall be installed so as to be safe operating and all moving parts shall be covered where subject to human contact. All rough edges of equipment and materials shall be made smooth.

b. All safety controls shall be checked under the supervision of the Architect's representative and eight (8) copies of test data showing setting and performance of safety controls shall be submitted to the Architect. All pressure vessels shall be ASME stamped and shall have stamped relief valves. Water heaters shall be provided with ASME stamped T & P relief valve.

3.7 SHOP DRAWINGS:

a. Contractor shall submit within ten (10) days after award of contract eight (8) copies of a complete list of all manufacturers to be used on the job. No substitutions will be allowed after this date except in extenuating circumstances as determined by the Architect.

b. Submission of a manufacturer's name or equipment number on this list shall not be considered as equipment approved by the Architect.

c. The Contractor shall submit for approval eight (8) sets of detailed shop drawings of all equipment and all material required to complete the project, and no materials or equipment may be delivered to the job site or installed until the Contractor has in his possession the approved shop drawings for the particular material or equipment. The shop drawings shall be complete as described herein. The Contractor shall furnish the number of copies required by the General and Special Conditions of the Contract, but in no case less than eight (8) copies.

d. Prior to delivery of any material to the job site, and sufficiently in advance of requirements to allow the Architect ample time for checking, submit for approval detailed, dimensioned drawings or cuts, showing construction, size, arrangement, operating clearances, performance, characteristics and capacity. Each item of equipment proposed shall be standard catalog product of an established manufacturer and of equal quality, finish, performance, and durability to that specified.

e. Samples, drawings, specifications, catalogs, submitted for approval, shall be properly labeled indicating specific service for which material or equipment is to be used, Section and Article number of specification governing, Contractor's Name and Name of Job.

f. Catalogs, pamphlets, or other documents submitted to describe items on which approval is being requested, shall be specific and identification in catalog, pamphlet, etc. of item submitted shall be clearly marked. Data of a general nature will not be accepted. Data shall include eight (8) copies of computation sheets indicating how unit capacity was determined where ratings are at other than standard conditions. No payment for any equipment or labor will be allowed until all major pieces of equipment specified have been submitted to the Architect for approval.

g. Static pressure drops across fittings, dampers, heaters, attenuators, etc. shall not exceed minimum ASHRAE Standards when not specified.

h. The submittal of shop drawings shall be with the Contractor stamp affixed, this shall assure the Engineer that they are being submitted in accordance with Sub-Paragraph 4.13.4 in AIA Document A201. This stamp indicates that the Contractor, by approving and submitting shop drawings, represents that he has determined and verified all field measurements and quantities, field construction criteria, material, catalog material, and similar data that he has reviewed and coordinated information in the shop drawings with the requirements of the work and the Contract Documents. It, also, indicates that any deviation from the Contract Documents has been shown on the submittal and clearly defines the deviations from the specifications.

j. Approval rendered on shop drawings shall not be considered as a guarantee of quantities, measurements, or building conditions. Where drawings are approved, said approval does not mean that drawings have been checked in detail: said approval does not in any way relieve the Contractor from his responsibilities or necessity of furnishing material or performing work as required by the contract drawings and specifications.

k. Failure of the Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of Contract time, and no claim for extension by reason of default will be allowed.

l. All shop drawings and submittals are to be in the office of the Architect within 30 days after the Contracts have been awarded. Contractor shall be financially responsible for any price increase of shop drawing items from the time these drawings are issued until they are returned to the Contractor for purchase of items.

m. Contractor shall keep on the job at all times copies of all approved shop drawings.

3.8 OBSERVATION:

a. The project will be observed periodically as construction progresses. The Contractor will be responsible for notifying the Architect at least 72 hours in advance when any work to be covered up is ready for inspection. No work will be covered up until after observation has been completed on such items as piping and insulation, etc..

3.9 ACCESSIBILITY:

a. Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of his work. He shall cooperate with the General Contractor and all other Contractors whose work is in the same space, and shall advise the General Contractor of his requirements. Such spaces and clearances shall; however, be kept to the minimum size required.

b. The Contractor shall locate all equipment which must be serviced, operated, or maintained in fully accessible positions. Equipment shall include but not be limited to valves, traps, cleanouts, motors, controllers, switch-gear, and drain points. If required for better accessibility, furnish access

doors for this purpose. Minor deviations from drawings may be made to allow for better accessibility and any change shall be submitted for approval.

c. The Contractor shall provide the General Contractor with exact locations of access panels for each concealed valve, control damper or other device requiring service. Access panels shall be provided and installed by the General Contractor and as specified in the Architectural sections of the specifications. Locations of these panels shall be submitted in sufficient time to be installed in the normal course of work.

3.10 CONCEALED PIPE:

a. In general, all pipe in finished spaces shall be run concealed in floors, walls, partitions and above ceilings.

b. Concealment of pipe and covering of same shall not be done until authorized by the Architect, after proper tests have been made. This applies to all interior work and exterior work.

3.11 CUTTING AND PATCHING:

a. This Contractor shall provide all cutting and patching necessary to install the work specified in this section.

b. No structural members shall be cut without the approval of the Architect and all such cutting shall be done in a manner directed by him.

c. This Contractor shall arrange for proper openings in building to admit his equipment. If it becomes necessary to cut any portion of building to admit his equipment, portions cut must be restored to their former condition by this Contractor through agreeable arrangement with the General Contractor.

3.12 SLEEVES AND PLATES:

a. Sleeves shall be provided for all mechanical piping passing through concrete floor slabs and concrete, masonry, tile and gypsum wall construction.

b. Where pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Where sleeves pass insulated pipes, the sleeves shall be large enough to pass the pipe and insulation. Check floor and wall construction finishes to determine proper length of sleeves for various locations; make actual lengths to suit the following:

1. Terminate sleeves flush with walls, partitions and ceiling.

c. Sleeves shall be constructed of schedule 40 black steel pipe unless otherwise indicated on the drawings.

d. Where piping penetrates fire rated floors or walls, penetrations shall be sealed with a U.L. approved fire stopping system. System shall be as manufactured and detailed by 3M Company or approved equal.

e. Escutcheon plates shall be provided for all exposed pipes and all exposed conduit passing through walls, floors and ceilings. Plates shall be

nickel plated, of the split ring type, of size to match the pipe or conduit. Where plates are provided for pipes passing through sleeves which extend above the floor surface, provide deep recessed plates to conceal the pipe sleeves.

3.13 SCAFFOLDING, RIGGING, HOISTING:

a. This Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

3.14 ELECTRICAL CONNECTIONS:

a. The Electrical Contractor shall furnish and install all wiring except:
(1) temperature control wiring; (2) equipment control wiring and (3) interlock wiring. The Electrical Contractor shall receive from the Mechanical Contractor and mount all individually mounted motor starters and provide all power wiring to the motor terminals unless otherwise indicated. The Electrical Contractor will provide branch circuit protection and disconnects unless otherwise indicated or specified. The Mechanical Contractor shall provide all other control and protective devices, and perform all control and interlock wiring required for the operation of the equipment. Power wiring, from nearest panel, for control components (dampers, panels, etc.) shall be provided by the Mechanical Contractor unless specifically called for by Division 16.

b. After all circuits are energized and complete, the Electrical Contractor shall be responsible for all power wiring, and all control wiring shall be the responsibility of this Contractor. Motors and equipment shall be provided for current characteristics as shown on the drawings.

c. It shall be the responsibility of this Contractor to check with the Electrical Contractor on service outlets provided for this Contractor, to determine that the switches and wiring provided are of adequate size to meet Code requirements for this Contractor's equipment. Any discrepancy shall be brought to the attention of the Architect before work is installed. Otherwise, any cost for changes shall be at the expense of this Contractor, and in any case electrical cost increase due to equipment substitution of different electrical characteristics shall be this Contractor's expense.

3.15 PIPE WORK:

a. All pipe work shown on the drawings and/or specifications or implied herein and required for a complete and operating system shall be done by experienced mechanics in a neat and workmanlike manner and subject to the approval of the Architect.

b. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories which may be required and it shall be the responsibility of the Contractor to furnish and install all materials and equipment required for the operating systems.

c. The piping shall be installed as shown on the plans with strict conformity to the sizes listed and due provisions for expansion and contraction.

3.16 LUBRICATION:

a. All bearing, except those specifically requiring oil lubrication, shall be pressure lubricated. All lubrication points shall be readily accessible, away from locations dangerous to workmen. In areas where lubrication points are not readily accessible Contractor shall provide extended lubrication tubes to positions where lubrication can be easily accomplished. Pressure grease lubrication fittings shall be "Zerk-Hydraulic" type as made by the Stewart-Warner Corporation, or approved equal, for each type of grease required.

b. The Contractor shall furnish lubrication charts or schedules for each piece of equipment or machinery. The charts or schedules shall designate each point of lubrication. Eight (8) copies of charts and schedules shall be submitted to the Architect prior to final inspection and approved copies of each schedule and chart shall be framed by the Contractor in metal frames with glass front and installed in the Equipment Room.

3.17 PROTECTION:

a. The Contractor shall protect all work and material from damage, and shall be liable for all damage during construction.

b. The Contractor shall be responsible for work and equipment until all construction is finally inspected, tested and accepted. He shall protect work against theft, injury or damage; and shall carefully store material and equipment received on site which is not immediately installed. He shall close open ends of work including pipe, duct, or equipment with temporary covers or plugs during storage and construction to prevent entry of obstructing materials or dust and debris.

c. Provide a protective covering of not less than 0.004" thick vinyl sheeting (or a similar approved material) to be used in covering all items of equipment, immediately after the equipment has been set in place, (or if in a place of storage within the building under construction) to prevent the accumulation of dirt, sand, cement, plaster, paint or other foreign materials from collecting on the equipment and/or fouling working parts.

3.18 CLEANING:

a. Clean from all exposed insulation and metal surfaces grease, debris or other foreign material.

b. Chrome plated fittings, fixtures, piping and trim shall be polished upon completion.

3.19 LABELS AND INSTRUCTIONS:

a. Label all switches and controls furnished under this Section with engraved bakelite permanent labels to indicate the function of each and the apparatus serviced.

b. Post in the Equipment Room framed under glass the following:

1. Lubrication instructions listing all equipment which requires lubrication, the type of lubricant to be used and the frequency of lubrication.

2. Photostatic copy of wiring diagram of temperature controls.
3. Step-by-step operating instruction for each piece of equipment with control sequence description.
 - c. All units shall be marked with unit numbers in three inch high letters with unit designated numbers.
 - d. A tabulation shall be made of each panel number and circuit number serving each air conditioning unit, fan or other device with electrical service. This list shall be prepared and be ready to turn over to inspectors prior to calling for final inspection.

3.20 EQUIPMENT SERVICEABILITY:

- a. All equipment shall be serviceable. All equipment shall be installed so that it can be removed. All equipment in or connected to piping systems shall have valves to isolate this equipment from the piping system. This includes, but not necessarily limited to control valves, water heaters, sensors, switches, pumps, traps and strainers. Unions (screwed or flanged) shall be provided so that all equipment is removable.
- b. Equipment installed in walls, ceilings or floors shall be accessible for service or removal without cutting walls, etc..
- c. Equipment requiring periodic service shall be installed to allow clearance for service and have removable panels, access doors, etc. through which the service is to be performed.
- d. Elevated equipment shall have service platforms.

3.21 ACCEPTANCE OF EQUIPMENT:

- a. In the event that the Architect considers it impractical, because of unsuitable test conditions, or some other factors, to execute simultaneous final acceptance of all equipment portions of the installation may be certified by the Architect for final acceptance when that portion of the system is complete and ready for operation.
- b. Contractor shall make all necessary tests, trial operation balancing and balance tests, etc., as may be required as directed by the engineer to prove that all work under these plans and specification is in complete serviceable condition and will function as intended.
- c. Upon completion of all work the system shall be tested to determine if any excess noise or vibration is apparent during operation of the system. If any such objections are detected in the system or noisy equipment found, the Contractor shall be responsible for correcting same. Ducts, plenums and casings shall be cleaned of all debris and blown free of all particles of rubbish and dust before installing outlet faces. Equipment shall be wiped clean with all traces of oil, dust, dirt and paint spots removed. Temporary filters shall be provided for all fans that are operated during construction and after all construction dirt has been removed from the building, new filters shall be installed. Bearings shall be lubricated as recommended by the

equipment manufacturer. All control valves and equipments shall be adjusted to setting indicated. Fans shall be adjusted to the speed indicated by the manufacturer to meet specified conditions.

3.22 GUARANTEE:

a. The Contractor shall guarantee the complete mechanical system against defect due to faulty materials, faulty workmanship or failure due to negligence of the Contractor. This guarantee will exclude normal wear and tear, maintenance lubrication, replacement of expendable components, or abuse. The guarantee period shall begin on the date of the final acceptance and shall continue for a period of 12 months during which time the Contractor shall make good such defective workmanship and materials and any damage resulting there- from, within a reasonable time of notice given by the Owner.

b. The period of Guarantee for equipment driven by electrical motors, etc., shall be 12 months from the date of acceptance. Refrigeration compressors shall have a five (5) year warranty.

3.23 OPERATING AND MAINTENANCE INSTRUCTIONS:

a. Submit 5 sets of complete operating and maintenance instructions.

b. Bind each set in plain black vinyl-covered, hard back, 3-ring binder. Individual paper shall be Boorum and Pease Reinforced Ring Book Sheet, No. S-212-101 or equivalent.

c. Organize material in the following format:

1. Section I:

- (a) Name of Project
- (b) Address
- (c) Owner's Name
- (d) General Contractor's Name and Address
- (e) Mechanical or Plumbing Contractor's Name and Address
- (f) Control Subcontractor's Name and Address (Mechanical Only)
- (g) Warranty Dates

2. Section II:

- (a) Major Equipment List (name, manufacturer, serial no., H.P. and voltage)(include all equipment with motors)
- (b) Control Sequence Description (Mechanical Only)
- (c) Routine Maintenance Instructions in Step-by-Step form
- (d) Lubrication Charts and Schedules
- (e) Valve Schedules
- (f) Test and Balance Reports (Mechanical Only)
- (g) Sound Power Level Readings (Where Required)

3. Section III:

- (a) Operating and Maintenance Instructions by Manufacturer
- (b) Shop Drawings (Major Requirement)
- (c) Wiring Diagrams

(d) Control Drawings (Mechanical Only)

3.25 PAINTING:

- a. Painting shall be performed as detailed in Division 9.
- b. All surfaces to receive paint shall be dry and clean.
- c. Before priming, all surfaces shall be thoroughly cleaned of all dirt, oil, grease, rust, scale and other foreign matter. Cleaning shall be done with sandpaper, steel scraper, or wire brush where appropriate and necessary. Metallic surfaces which have been soldered shall be cleaned with benzol and all other metal surfaces washed with benzine.
- d. Mixing shall be in galvanized iron pans. Paint shall be mixed in full compliance with manufacturer's directions. Thinning shall be done only in full compliance with manufacturer's directions.
- e. Workmanship shall be highest quality, free from brush marks, laps, streaks, sags, unfinished patches, or other blemishes. Edges where paint joins other material or colors shall be sharp and clean without overlapping. Paint shall be brushed or sprayed on in strict compliance with manufacturer's directions and shall work evenly and be allowed to dry at least 48 hours before subsequent coating. Paint shall not be applied in damp or rainy weather or until surface has thoroughly dried. Contractor shall furnish and lay drop- cloths in all areas where painting is done as necessary to protect work of other trades. Varnish and enamel shall not be applied when temperature in the area is less than 60 degrees Fahrenheit nor paint when under 50 degrees Fahrenheit. Prior to final acceptance, Contractor shall touch up or restore any damaged finish. All insulation materials shall be provided with a paint suitable jacket.
- f. The following materials and equipment require painting as noted:
 1. All concealed piping, sheet metal, hangers and accessories except galvanized sheet metal or piping and tar coated cast iron piping:
 - (a) One coat rust-inhibitive primer except where exterior insulation is provided.
 2. All exposed, exterior and interior, piping, sheet metal, hangers and accessories, air handling units, etc. except galvanized sheet metal or piping and tar coated cast iron piping:
 - (a) One coat rust-inhibitive primer except where exterior insulation is provided.
 3. All concealed galvanized sheet metal, piping and accessories.
 - (a) One coat galvanized metal primer on threaded portions of piping and any damaged galvanized surfaces.
 4. All exposed, exterior and interior galvanized sheet metal, piping and accessories.

(a) One coat galvanized metal primer except where exterior insulation is provided.

5. All tar coated cast iron piping, and accessories.

(a) Two coats tar coat paint on any damaged surfaces.

6. All exposed, exterior and interior, insulation equipment.

(a) Two coats exterior glass enamel over paint suitable insulation

jacket.

g. All piping in Equipment Rooms shall be painted (color shown below) and identified by stenciling with letters minimum 1/2" high in a contrasting color. Piping outside Equipment Rooms shall be stenciled. Stenciling shall occur at each change of direction and every 20 feet. Arrows should be placed adjacent to letters signifying direction of flow.

1. Standard piping color codes:

(a) Hot Water - Dark Yellow (Gold)

(b) Cold Water - Dark Green

(c) Drains - Natural with Walls

(d) Electrical - Natural with Walls

SECTION 15030

VIBRATION AND SEISMIC CONTROL

PART 1: GENERAL

1.1 SCOPE:

a. All vibration isolation and seismic control materials specified herein shall be provided by a single manufacturer to assure single responsibility for their proper performance. Installation of all vibration and seismic control materials specified herein shall be accomplished following the manufacturer's written instructions.

b. The Contractor shall furnish a complete set of shop drawings and other necessary information, of all mechanical equipment to receive vibration isolation and seismic devices, to the vibration isolation and seismic control materials manufacturer. The information to be furnished shall include operating weight of the equipment to be isolated, distribution of weight to support points and dynamic characteristics along with any internal isolation systems to be analyzed. The Contractor shall also furnish a complete layout of piping and ductwork to be isolated, including vertical risers, showing size or weight and support points of the piping and ductwork system, to the vibration isolation and seismic control materials manufacturer, for selection and layout of mountings.

c. The vibration and seismic control materials manufacturer shall use the above listed information to design a complete system of vibration and seismic mounts in accordance with the contract documents along with the 2018 International Building Code Chapter 16, SMACNA "Seismic Restraint Manual", and ASHRAE 2019, Chapters 49 and 56. The vibration and seismic control materials Contractor shall analyze all "multiple degree of freedom" systems, and provide properly designed isolation systems avoiding all resonance frequencies. To accomplish this, the vibration and seismic control materials supplier shall employ an Engineer registered in the State of North Carolina to design all isolation and restraint systems and prepare a complete set of calculations and shop drawing submittals with his professional Engineer's seal certifying that the design meets all requirements of these contract documents. A seismic design "errors and omissions" insurance certificate must accompany submittals from the vibration and seismic Engineer. Manufacturer's product liability insurance certificates are not acceptable.

d. The vibration and seismic control Engineer or his designated representative shall inspect the project upon completion of the applicable work and provide written certification that the installation is in compliance with the approved shop drawing submittals. This certification shall also bear the professional Engineer's seal and shall become part of the contract closeout documents. All seals shall be signed and dated appropriately.

e. Vibration and seismic control systems shall be provided by Vibration Mounting and Controls, Mason Industries, Consolidated Kinetics, or prior approved equal.

PART 2: PRODUCTS AND EXECUTION

2.1 VIBRATION ISOLATION:

a. All mechanical equipment shall receive external vibration isolation. Internal component isolation of equipment shall not be considered equivalent, but shall be considered when analyzing systems with multiple degrees of freedom.

b. Vibration isolators shall be selected based upon known operating weight distributions and dynamic characteristics of the isolated equipment, with the quantity and location as required by the component drawing. Isolator type shall be tabulated for each isolated piece of equipment. Complete calculations of vibration analysis shall be included with submittals, including but not limited to fundamental and harmonic frequencies.

c. Isolators shall have either known non-deflected heights of spring element or calibration markings so that, after adjustment, when carrying their load, the deflection under load can be verified to determine if the load is within the proper range of the isolator and if the correct degree of vibration isolation is being provided.

d. Isolators shall function in the linear portion of the load versus deflection curve. Theoretical vertical natural frequency shall not differ from the design objectives by more than $\pm 10\%$.

e. Spring mounts shall have seismic housings as required by Paragraph 2.2.

f. Isolation of equipment shall be as follows:

1. Suspended equipment shall be isolated from the building structure by means of noise and vibration isolators. Units shall be supported with spring and neoprene type isolators, springs to be as described above. Isolators shall be VMC Series RSH.

2. Mechanical equipment as noted shall be mounted on a rigid structural steel base. The equipment including the base shall be mounted on or suspended from vibration isolators as applicable. Base shall be VMC Type WFB.

3. Floor mounted equipment as noted shall be provided with a noise and vibration isolated structural steel concrete slab inertia base mounted on isolators. Spring mounts shall be recessed at corners. Inertia base shall be VMC Type MPF or WPF as applicable.

2.2 SEISMIC CONTROL:

a. All mechanical equipment, piping, ductwork, etc. shall be provided with seismic restraints in accordance with the 2018 International Building Code, 2018 International Mechanical Code, and SMACNA Seismic Restraint Manual, Latest Edition requirements, as a minimum.

1. All equipment isolated or not, shall be bolted to the structure to allow for seismic acceleration with no failure or displacement. All connections shall be positive bolted type; no friction clamps of any kind are allowed.

2. Provide cable and connection sets for suspended equipment at each of four comers secured to the building structure.

3 Floor mounted equipment shall be provided with seismically housed springs or springs with seismic snubbers as determined by the equipment to be isolated.

SECTION 15180

TESTING, ADJUSTING, AND BALANCING

PART 1: GENERAL

1.1 SCOPE:

- a. The provisions of Section 15010 apply to all the work in this Section.
- b. Work shall be performed by technicians competent in the trade of testing and balancing environmental systems and shall be done in an organized manner utilizing appropriate test and balance forms.
- c. All systems shall be balanced to within +/- 10% of the specified value.

1.2 SUBMITTALS: Submit the following in accordance with Section 15010:

- a. Manufacturer's cut sheets for all equipment to be used.
- b. Sample balancing charts and forms.
- c. Completed final balancing data.

PART 2: PRODUCTS

2.1 INSTRUMENTATION:

a. Instruments for use in the test and balancing procedures shall be of first quality and be accurately calibrated at the time of use. The following list is provided to indicate the instruments expected, however, other instruments as necessary to properly perform the work will be provided and subject to approval of the Architect.

1. Inclined manometer calibrated in no less than .006-inch divisions.
2. Combination inclined and vertical manometer (0 to 10 inch is generally the most useful).
3. Pitot Tubes. (Usually and 18 and 48 inch tube covers most balance requirements.
4. Tachometer. This instrument should be of the high quality self-timing type.
5. Clamp-on ampere meter with voltage scales.
6. Deflecting vane anemometer.
7. Rotating vane anemometer.
8. Thermal type (hot wire) anemometer.
9. Hook gage.

10. Dial and glass stem thermometers.

11. Sling psychrometer.

b. The accuracy of calibration of the field instruments used is of the utmost importance. All field instruments used in the balance should have been calibrated at least within the previous three months. Naturally, any suspect instruments should be checked more frequently.

PART 3: EXECUTION

3.1 SYSTEM START-UP:

a. Starting date for mechanical system shall be scheduled well in advance of expected completion date and shall be established a minimum of two weeks prior to acceptance date. The system shall be in full operation with all equipment functional prior to acceptance date.

b. Performance readings shall be taken and recorded on all air and water distribution devices and the system shall be balanced out prior to acceptance. Balancing of the system shall be accomplished with duct dampers and only minor adjustments made with grille dampers. Record and submit results in table form along side of scheduled quantities.

c. All controls shall be calibrated by qualified personnel prior to acceptance date. Thermostats shall be in close calibration with one another and shall operate their respective units without interference from adjacent units.

d. All units shall be checked out thoroughly and the information recorded on each machine which shall include, but not be limited to information listed below. Check sheets shall be included in Operating and Maintenance instructional Manual.

1. Reciprocating Compressor:

- (a) Check General Condition
- (b) Check Sight Glass
- (c) Check Moisture Indicator
- (d) Check Oil Level
- (e) Read Oil Pressure
- (f) Read Head Pressure
- (g) Read Suction Pressure
- (h) Read Ambient Air
- (i) Read Motor Volts Each Phase
- (j) Read Motor Amps Each Phase
- (k) Lubricate Motor Bearing
- (l) Oil Safety Device Op.
- (m) Capacity Control Op.
- (n) Crankcase Heater Op.
- (o) Check Pressure Switch Op.
- (p) Check Superheat: Suction Temperature, Suction Pressure

2. Coils (Each):

- (a) Unit Number and Location
- (b) Manufacturer and Model No.
- (c) Return Air, Supply Air and Outside Air Temperature
- (d) Discharge Temperature, Cooling or Heating
- (e) Air Flow CFM, Entering and Leaving Static Pressure

3. Fans and Miscellaneous:

- (a) Unit No. and Use
- (b) Manufacturer and Model
- (c) Motor Nameplate Data
- (d) Motor Amps and Volts
- (e) Entering and Leaving Static Pressure
- (f) Fan RPM
- (g) Damper Operation

e. Contractor shall have in his possession a copy of a letter from the responsible Control Representative stating that the controls have been installed according to the plans; that the control sequence has been checked and that all controls have been calibrated.

f. Each unit shall be marked with 3" high letters in accordance with mechanical plan designation. Each panel and breaker number for all equipment shall be marked. Each control device shall be labeled.

g. Replace fan sheaves as necessary to produce design air volume.

SECTION 15250

INSULATION

PART 1: GENERAL

1.1 DESCRIPTION:

- a. This section of specifications and related drawings describe requirements pertaining to insulation.
- b. Provide all insulation in conjunction with equipment, piping and ductwork furnished under this division.
- c. The provisions of Section 15010 apply to all the work in this section.

1.2 QUALITY ASSURANCE:

- a. Products of the manufacturers listed under MATERIALS will be acceptable for use for the specific functions noted. Adhesives, sealers, vapor barriers, and coatings shall be compatible with the materials to which they are applied, and shall not corrode, soften or otherwise attack such material in either the wet or dry state.
- b. Materials shall be applied subject to their temperature limits. Any methods of application of insulating materials or finishes not specified in detail herein shall be in accordance with the particular manufacturer's published recommendations.
- c. Insulation shall be applied by experienced workers regularly employed for this type of work.

1.3 SUBMITTALS: Submit the following in accordance with Section 15010:

- a. Catalog cuts.
- b. Materials ratings.
- c. Insulation instructions.

1.4 RATING:

- a. Insulation and accessories such as adhesives, mastics, cements, tape and jackets, unless specifically expected, shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 50. Materials that are factory applied shall be tested individually. No fugitive or corrosive treatments shall be employed to impart flame resistance.
- b. Flame spread and smoke developed ratings shall be determined by Method of Test of Surface Burning Characteristics of Building Materials, NFPA No. 255, ASTM E-84, UL 723.
- c. Products of their shipping cartons shall bear a label indicating that flame and smoke ratings do not exceed above requirements.

d. Treatment of jackets or facings to impart flame and smoke safety shall be permanent. The use of water-soluble treatment is prohibited.

e. Certify in writing, prior to installation, that products to be used will meet RATING criteria.

PART 2: PRODUCTS

2.1 PIPE INSULATION:

a. Materials shall be heavy density fiberglass with an all-service jacket composed of an outer layer of vinyl, fiberglass scrim cloth, aluminum foil, and kraft paper, in that order, from outside to inside of pipe covering.

1. Domestic cold water supply and hot water supply and return.

2. Refrigerant Suction Piping - flexible foamed elastomeric plastic tubing with a density of 6 lbs./CF, K of 0.27 @ 70 degrees F., self-extinguishing, and a water vapor transmission of less than 0.05 perm in., flame spread rating 25 or less, smoke developed rating of 50 or less (ASTM E84-75).

b. Thicknesses:

1. Domestic cold water supply, - all pipe sizes 1".

2. Domestic hot water supply and return: Pipe size 2-1/2" and larger - 1-1/2", Pipe size 2" and smaller - 1".

2.3 DUCT INSULATION:

a. Materials. Insulation shall be Owens-Corning as specified hereinafter or products of Certain-Teed/St. Gobain or Manville. Adhesives shall be as manufactured by 3-M Foster or Insulation Manufacturer. Insulation shall have composite (insulation, jacket and adhesive) fire and smoke hazard rating as tested by ASTM E-84, not exceeding Flame Spread -25 and Smoke Developed -50.

PART 3: EXECUTION

3.1 PIPE INSULATION:

a. Application:

1. Insulation and surfaces to be insulated shall be clean and dry when insulation is installed and during the application of any finish.

b. Refrigerant Piping.

1. End joint strips and overlap seams shall be adhered with a vapor barrier mastic. Valves, fittings, and flanges shall be insulated with strips of pipe insulation, and finished with tape and vapor barrier mastic. Seal off vapor barrier to pipe at all fittings, hangers, and every 20 feet on straight runs.

c. Drain Pipe Insulation:

1. 1/2" Armaflex type insulation for all interior runs.

c. Fiberglass Insulation:

1. All fiberglass pipe covering shall be furnished with self-seal lap and 3" wide butt joint strips. The release paper is pulled from adhesive edge, pipe covering closed tightly around pipe and self-seal lap rubbed hard in place with the blunt edge of an insulation knife. This procedure applies to longitudinal as well as circumferential joints. Under no circumstances will staples be allowed. Care shall be taken to keep jacket clean, as it is the finish on all exposed work. All adjoining insulation sections shall be firmly butted together before butt joint strip is applied, and all cold water service lines shall have vapor seal mastic thoroughly coated to pipe at butt joints every 21' and at all fittings. All insulation outside shall be protected with aluminum weather-proof jacketing with lap-seal, and factory attached moisture barrier. The aluminum shall be .016 gauge (3303-H14 alloy) of embossed pattern. It shall be applied with a 2" circumferential and 1-1/2" longitudinal lap and be secured with aluminum bands 3/8" wide 8" o.c.. All elbows shall be covered with the same .016 aluminum with factory applied moisture barrier. All fittings, valve bodies, unions, and flanges shall be finished as follows:

(a) Apply molded or segmental insulation to fittings equal in thickness to the insulation on adjoining pipe and wire in place with 2#14 copper wires.

(b) Apply a skim coat of insulating cement to the insulated fitting, if needed, to produce a smooth surface. After cement is dry, apply Owens-Corning Fiberglass Fitting Mastic, Type C, UL labeled.

(c) Wrap the fitting with fiberglass reinforcing cloth overlapping the preceding layer by 1 to 2". Also, overlap mastic and cloth by 2" on adjoining sections of pipe insulation.

(d) Apply a second coat of mastic over cloth, working it well into mesh of cloth and smooth the surface. Mastic to be applied at the rate of 40 square feet per gallon. All flanges and fittings on hot and cold lines in utility tunnels shall be insulated according to above. Omit insulation on flanges and unions over 60 degrees F. If painting is required, no sizing is necessary. To maintain the non-combustibility of the system only Glidden acrylic latex paint (#5370) is to be used.

3.2 DUCT INSULATION:

a. All vapor barriers and joints shall be sealed to prevent condensation. Clean and dry all ductwork before installing insulation. All weld joints shall be wire brushed and give one (1) coat of red primer before insulating. Staples will not be permitted in insulation.

b. Lined Duct:

1. Ductwork within five feet of the unit connection shall be lined with anti-microbial Owens-Corning Aeroflex Vapor-Seal Duct Insulation, 1-1/2 pcf, 1" thick, or equal by Certain-Teed/St. Gobain or Johns Mansville.

2. Duct liner and adhesive shall meet requirements of NFPA 90A and shall have UL fire hazard classification not to exceed the following: flame spread -25; fuel contributed -50; smoke generated -50. There will be no erosion of duct liner material at velocities up to 4000 fpm. Duct liner shall be applied to the sheet metal with 100% coverage of adhesive. The duct liner shall be cut to assure corner joints with no gaps. On horizontal runs, tops of ducts over 12" in width and sides of 16" in height shall be additionally secured with mechanical fasteners. On spans less than 30" fasteners are to be placed at midpoints. On vertical runs, fasteners shall be placed on a maximum of 15" centers on all width dimensions over 12". Fasteners shall be flush with the liner surface. All exposed edges and leading edges of all transverse and longitudinal joints of the liner shall be coated with a fire resistant adhesive. The exposed mechanical fasteners shall be coated with a fire resistant adhesive. The upstream end must be continuously adhered to for a 6" width.

c. Wrapped Duct:

1. All supply, return and outside air ducts unless noted otherwise on plans shall be insulated by wrapping with 2" thick, minimum installed "R" value = 6.0, fiberglass with vapor barrier jacket with joints overlapped a minimum of two inches. Insulation shall be adhered to duct with non-combustible insulation bonding adhesive applied in 4" strips, 8" on center. All joints shall be secured with flare door staples on 3" centers through all laps over duct tape.

SECTION 15410

BASIC MATERIALS AND METHODS (PLUMBING)

PART 1: GENERAL

1.1 DESCRIPTION:

- a. The provisions of Section 15010 apply to all the work in this Section.
- b. This section of specifications and related drawings describe requirements pertaining to basic materials and methods.

1.2 SUBMITTALS: Submit the following in accordance with Section 15010:

- a. Manufacturer's cuts.
- b. Certified capacity ratings.
- c. Installation instructions.
- d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 PIPE SPECIALTIES:

- a. Pipe specialty equipment shall be provided on all piping on all piping system as specified or as required by code.
- b. Provide dielectric unions on the inlet and outlet connection to water heaters storage tanks and at all places where dissimilar metals join in piping and plumbing systems. Use dielectric unions as manufactured by Watts Regulator Inc., Zurn/Wilkins, Victaulic or equal.
- c. Vacuum breaker shall be provided on each hose outlet. This includes hose bibbs, service sinks, wall hydrants, etc.
- d. A system of pulsation absorbers shall be provided. The system shall be selected in accordance with PDI Standard W-201. Absorbers shall be by JOSAM, ZURN, SMITH or approved equal.
- e. Valves and Accessories:
 - 1. Provide valves as indicated and required as scheduled below. Figure numbers are provided to indicate type and quality. Insofar as possible, all valves shall be by a single manufacturer as specified or approved equal.

<u>MANUFACTURER</u>	<u>GATES 125#</u>	<u>GLOBES 150#</u>	<u>CHECK 125#</u>
NIBCO	T134	T235-Y	T413-B

CRANE	428-UB	7	37
STOCKHAM	B-105	B-22	B-319

f. SOLDER ENDS, SCREWED BONNET GATES, UNION BONNET GLOBES, (Globes with Teflon disc):

<u>MANUFACTURER</u>	<u>GATES 125#</u>	<u>GLOBES 150#</u>	<u>CHECK 125#</u>
NIBCO	S111	S235-Y	S413-B
CRANE	428-UB	-	1342
STOCKHAM	B-109	B-24	B-309

g. Hose end gate valves, 3/4 - 2" shall be JENKINS NO. 372, CRANE 451, POWELL 503 or approved equal.

h. Wall hydrants shall be cast brass non-freeze, heavy duty with polished chrome face, brass operating parts, adjustment locknut, renewable nylon seat, 3/4" standard hose outlet, locking cover.

i. Ball valves shall be Cast Red Bronze with Two Piece Body, Grinnell Figure No. 3700 or approved equal. When installed in insulated piping furnish Extended Tee Handle. All isolation valves installed above ceilings shall be ball valves.

2.2 HANGERS AND SUPPORTS:

a. Pipe supports shall be provided for all piping. Pipe support components shall conform to accepted standards.

1. Hangers shall adequately support the piping system. On horizontal, hangers shall be located near or at changes in piping direction and concentrated loads. They shall provide vertical adjustment to maintain pitch required for proper drainage. They shall allow for expansion and contraction of the piping.

(a) Horizontal lines of copper tubing shall be supported as below:

<u>Nominal Tubing Size</u>	<u>Rod Diameter</u>	<u>Maximum Spacing</u>
Up to 1 inch	3/8 inch	6 feet
1-1/4" and 1-1/2"	3/8 inch	8 feet
2 inches	3/8 inch	9 feet
2-1/2 inches	1/2 inch	9 feet
3 and 4 inches	1/2 inch	10 feet

(b) Horizontal cast iron soil pipe shall be supported with one hanger for each pipe length and at fittings as required for proper support with hanger located close to hub or joint.

2. Devices for attaching pipe supports to building structure shall be provided as required and shall be as herein specified.

(a) Hangers shall be as manufactured by Grinnell for wood construction. Equals by other manufacturers will be accepted.

3. Intermediate attachments shall be hanger rods of size herein before specified and with vibration control devices as specified in the separate section of the Division. Rods may be continuous threaded or threaded each end as required. No chain, wire or perforated strap hangers shall be used.

4. Pipe attachments and spring hangers shall be as specified in individual section of this Division of the specifications.

2.3 ESCUTCHEON PLATES:

a. Pipes entering finished or occupied areas shall be provided with polished chrome plated escutcheon plates, held in place with set screws. Escutcheon plates shall be Grinnell Figure 20 or approved equal.

PART 3: EXECUTION

3.1 GENERAL:

a. All products shall be installed as per the manufacturer's instructions.

3.2 CLEANING UP:

a. Cleaning up is the responsibility of the Contractor. During construction, the site shall be kept neat so as not to be a safety hazard. Upon completion of the work, all surplus construction materials and debris shall be removed from the property.

3.3 PIPE TEST:

a. All new soil, waste, drainage and vent piping shall be tested before fixtures are installed by capping or plugging the openings, and filling the entire system with water to a minimum height of 10 feet above grade or the highest fixture opening of the section being tested, and allowing it to stand thus filled for a period of four hours.

b. All water supply piping shall be tested before fixtures or faucets are connected by capping or plugging the opening and applying a hydrostatic test pressure of 150 psig.

c. Pipe found defective during tests shall be replaced at no additional cost to the Owner. Pipe joints found defective during tests shall be taken apart and remade.

d. The Contractor shall notify the Architect 72 hours before tests are to be made. Concealed work shall remain uncovered until specified tests are completed. All tests shall be conducted in the presence of the Architect or his representative. Repairs to defects disclosed by the test shall be made with new materials. Caulking of screwed joints, cracks or holes will not be permitted. Test shall be repeated until system is proven tight.

SECTION 15420

DOMESTIC WATER SUPPLY PIPING

PART 1: GENERAL

1.1 SCOPE:

- a. The provisions of Section 15010 and 15250 apply to all the work in this Section.
- b. Contractor shall furnish and install domestic water systems as shown on the plans complete in all respects.
- c. Connect to water main and provide supply lines to all fixtures and equipment requiring water service.

1.2 SUBMITTALS: Submit the following in accordance with Section 15010:

- a. Manufacturer's cuts.

PART 2: PRODUCTS

2.1 WATER PIPING AND FITTINGS:

a. Water Piping:

1. All water piping shall be hard drawn copper tubing ASTM B 88 Type "L" above grade, Type "K" below grade. Fittings for copper tubing shall be ANSI B16.18 or B16.22 solder joint fittings. Ends of pipe shall be reamed, pipe and fittings cleaned. Use only 95-5 (95% tin and 5% antimony) solder with non-corrosive flux on 1-1/4" and smaller and on 1-1/2" and larger use silver solder (Minimum 12% Silver), with a melting point greater than 1000°F. Submit solder for approval.

PART 3: EXECUTION

3.1 INSTALLATION:

a. Piping shall be installed so as to be free floating. 125 pound copper sweat pattern unions shall be provided in the piping as indicated on the drawings. Provide dielectric insulating unions where copper connects to ferrous piping. Use brass nipples or copper adapters at connections to fixtures.

b. Provide isolation valves for each individual riser and toilet group as required to service system.

c. Runouts:

1. Runouts to fixtures shall be held in place in the wall with copper straps at the fixture stop to prevent pipe movement at this point.

2. Runouts to urinal and water closet flush valves in stud walls shall have a piece of 1/2" copper flattened and soldered to the runout and

fastened to studs with 1/4" bolts with nuts and flat washers (two bolts each end).

d. Unions:

1. Unions shall be installed at each piece of equipment.

3.2 STERILIZATION OF WATER PIPING:

a. Sterilization of water piping shall be in accordance with AWWA Specification 0601. After the pressure tests have been made, the system shall be flushed with water. The chlorinating material shall be liquid chlorine- water mixture calcium hypochlorite, sodium hypochlorite, or chlorinated lime- water mixture. The solution shall have not less than 50 PPM available chlorine. The disinfecting solution shall be allowed to remain in the system for a minimum period of 24 hours. After disinfection, the system shall be flushed with clean water until residual chlorine content is not greater than .02 PPM. After the system is flushed, water samples shall be taken and tested at the Contractor's expense by an independent testing lab and reports shall be furnished to the engineer's for approval. If the water is found unsafe for human consumption, the disinfection procedure shall be repeated.

3.3 TESTING OF WATER PIPING:

a. All water supply piping shall be testing before fixtures or faucets are connected by capping or plugging the openings and applying a hydrostatic test pressure of 150 psig. Pressure shall hold constant (exception for temperature variation) for a period of 24 hours or as directed by the Engineer.

SECTION 15440

SOIL, WASTE, VENT AND DRAIN PIPING

PART 1: GENERAL

1.1 SCOPE:

- a. The provisions of Section 15010 apply to all the work in this Section.
- b. All fixtures and equipment specified as requiring waste shall be connected to the sewer system. The sewer system shall be extended as shown on the drawings.

1.2 SUBMITTALS: Submit the following in accordance with Section 15010:

- a. Manufacturer's cuts.
- b. Installation instructions.

PART 2: PRODUCTS

2.1 SOIL, WASTE, VENT AND DRAIN PIPING:

- a. Soil, waste, vent and drain piping shall be schedule 40 DWV PVC. Pipe and fittings shall comply with the standards referenced in the Standard Building Code.

2.2 SPECIALTIES:

- a. Cleanout Plugs: Cleanouts shall be of the same size as the pipe except that cleanout plugs larger than 4" will not be required. Cleanouts shall consist of long sweep fittings to an easily accessible place.
- b. Traps: Each fixture and piece of equipment including floor drains and hub drains, requiring connections to the drainage system shall be equipped with a trap placed as near to the fixture as possible. No fixtures shall be double trapped. Traps for floor drains and hub drains shall be deep seal "P" traps. All other traps shall be supplied under the "Fixture Paragraph".
- c. Floor Flanges: Floor flanges shall be provided for connection of all floor outlet water closets. The joint between the closet trap and the floor flange shall be made tight with red or black rubber as made by Grinnell fixture setting gasket.
- d. Flashing: Vent pipes shall be flashed and made watertight at the roof. Flashing shall extend not less than 8" from the vent pipes in all directions. Minimum vent through the roof shall be 2" size.
- e. Floor Drains: Floor drains shall be sized as indicated on the drawings, and shall be Josam or equal. See plans for model number and size. Drains by Zurn or Wade will be acceptable.

PART 3: EXECUTION

3.1 PIPE INSTALLATION:

a. Horizontal drain and waste piping with the building shall be given a grade of 1/8" per foot below ground and 1/8" per foot above ceilings unless otherwise indicated on the drawings. Piping 3" and smaller shall have minimum grade of 1/4" per foot. Main vertical soil and waste stacks shall be extended full size to the roof line and 12" above as vents, unless otherwise indicated on the drawings. Reduction of the size of drainage piping in the direction of flow is prohibited. Vent or tap tees will not be permitted on waste lines.

3.2 JOINTS:

a. Joints for PVC pipe shall be solvent cement in accordance with the manufacturer's instructions.

3.3 CLEANOUTS:

a. Cleanouts shall be installed where shown on the drawings but in no case shall they be more than 50 feet apart in piping 3" and under and 75 feet apart in piping 4" and larger.

3.4 PIPE TEST:

a. All new soil, waste, drainage and vent piping shall be tested before fixtures are installed by capping or plugging the openings, except for the highest opening, and filling the entire system with water. If the system is tested in sections the minimum acceptable head shall be 10 ft. of water column. In testing successive sections, at least the upper 10 ft. of the preceding section shall be tested so that no joint or pipe within the building (except the uppermost 10 ft. of the system) shall have been submitted to a test of less than 10 ft. head of water. The water column shall be allowed to stand thus filled for a period of four hours.

b. Pipe found defective during test shall be replaced at no additional cost to the Owner. Pipe joints found defective during tests shall be taken apart and remade.

SECTION 15450

PLUMBING FIXTURES AND EQUIPMENT

PART 1: GENERAL

1.1 DESCRIPTION:

- a. The provisions of Section 15010 apply to all work in this Section.
- b. The Contractor shall furnish and install all plumbing fixtures complete with all equipment, fittings, trimmings and supports as specified.

1.2 SUBMITTALS: Submit the following in accordance with Section 15010:

- a. Manufacturer's cuts.
- b. Certified capacity ratings.
- c. Installation instructions.
- d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 FIXTURES:

- a. All fixtures shall be Grade "A". The name or trademark of the manufacturer shall be printed or pressed on all water closets and lavatories and a label, which cannot be removed without destroying it, containing the manufacturer's name and trademark and the quality of the fixtures, shall be affixed to all fixtures.
- b. Exposed metal parts of fixtures shall be chromium plated. Where fixtures are to be hung from the wall, the fixture or fixture hanger shall be supported by concealed 3" steel washers and through bolts. Furnish traps and supply fittings with stops for all fixtures.
- c. All faucets and supply fittings shall be of the same manufacturer as the fixture except as noted otherwise. All exposed supply and waste piping shall be chrome plated. Supply piping serving flush valves shall be equipped with chrome plated pipe cover.
- d. Fixtures shall be white or stainless steel as indicated on drawings.
- e. Direct connections between domestic water system and sanitary waste system will not be permitted.
- f. All enameled cast iron fixtures shall be Acid Resisting (AR) and shall bear manufacturer's symbol signifying AR materials.
- g. All flush valves shall be quiet acting, non-hold open feature and shall have sweat solder adaptor kit. Escutcheon shall be chrome plated brass with set screws.

h. Threaded adapters serving lavatory supply piping shall be concealed in walls. Runouts to fixture shall be chrome plated brass pipe.

i. All exposed waste piping serving fixtures, except service sinks, shall be 17 gauge chrome plated brass pipe with cast brass P-trap. Under Counters will be considered exposed areas.

j. Cut-Off Stops: All fixtures shall have individual loose key cut-off stops on cold and/or hot water lines except as specified hereinafter or indicated on the drawings.

k. Provide appropriate wall hangers for all wall-hung fixtures.

2.2 ELECTRIC WATER HEATER:

a. Type. The water heaters shall be electric with automatic controls

b. Capacity. The storage capacity and recovery capacity shall be shown on the drawings.

c. Tank. Tank shall be heavy gauge steel with inner lining of glass. Tank shall have insulation completely around tank, top and bottom. There shall be a hose thread drain valve at bottom of tank and any pipe nipples used in water connections shall have interior surface to match interior surface of tank. Dielectric unions shall be used to connect glass coated galvanized pipe nipples to cover water pipe. Unit shall be constructed in accordance with ASME Code Section VIII and shall bear the appropriate symbol and be listed with the National Board as required.

d. Jacket. The water heater shall have a jacket of cold rolled steel with white baked on enamel finish. Jacket shall have provisions for access to all controls and heating elements.

e. Relief Valve. The heater shall be equipped with an ASME approved T & P relief valve pipe to drain.

f. Mounting. The water heater shall be set dead level in both directions.

g. Cleaning. The water heater shall be cleaned and all construction dirt removed at the completion of the project.

h. Insulation shall meet requirements of latest ASHRAE Standard.

i. Units with a storage capacity of 120 gallons or more shall be constructed and stamped pursuant to the ASME Code, Section IV, or Section VIII, Division 1, as applicable.

PART 3: EXECUTION

3.1 GENERAL:

a. Install all fixtures as per manufacturer's requirements and local codes.

3.2 CAULKING:

- a. Fixtures, fittings and accessories shall be caulked at floor and wall perimeter and behind flanges and fittings in a fashion that the wall openings are sealed, but no sealant is exposed.
- b. Caulking shall be silicone rubber.
- c. Install ALL caulking per manufacturers instructions.

SECTION 15620

PIPING (HVAC)

PART 1: GENERAL

1.1 SCOPE:

- a. The provisions of Section 15010 apply to all work in this Section.
- b. Furnish and install all refrigerant and condensate drain piping as shall be required in order to provide a complete and satisfactory system.

PART 2: PRODUCTS

2.1 REFRIGERANT PIPING:

- a. All refrigerant piping shall be Type "K" hard drawn copper or "ACR" tubing with wrought copper sweat fittings. All joints are to be made with hard solder such as "Sil-Fos" or "Silver Solder."
- b. All joints in refrigeration pipe work shall be soldered with the use of nitrogen gas. Refrigerant piping shall be tested, evacuated, charged with nitrogen and completely dried before charging with freon.
- c. All refrigerant piping underground shall be encased in plastic or PVC conduit.
- d. Refrigerant piping shall include best grade brass refrigerant fittings, consisting of expansion valve, solenoid valve, sight glass with moisture indicator, filter dryer, check valves and/or specialties as may be recommended or required by the manufacturer or as shown on the drawings.

2.4 DRAIN PIPING:

- a. All drain lines shall be Type "L" hard drawn copper.

PART 3: EXECUTION

3.1 PIPE AND PIPE FITTINGS:

- a. Provide all piping and connections to all items of equipment as shown and/or required to fully complete the system indicated, including drains and other connections. The drawings show the arrangement desired and the Contractor shall follow the drawings as accurately as possible. If conflict should arise, the Contractor shall verify all measurements on the job and cut pipe unless specifically noted for expansion loops. All piping shall be reamed or filed and cleaned to remove burrs and other obstructions.
- b. The Contractor shall be responsible for installing all piping work in a neat workmanlike manner. This shall be interpreted to mean that all piping shall be neatly aligned, installed and supported in equally spaced parallel runs using trapeze hangers where applicable, install square, true and plumb with walls, equipment or other related surfaces using standard fittings. Any pipe work installed in a disorderly or unworkmanlike manner as adjudged by the

3.3 BLOWING-OUT SYSTEM:

a. All piping and equipment shall be thoroughly blown-out under pressure and clean of all foreign matter wasting condensate through temporary connections so long as necessary to thoroughly clean before system is placed in operation. Use every precaution to prevent pipe compound, scale, dirt, welding and other objectionable matter getting into piping system and equipment.

3.4 HANGERS:

a. All piping shall be supported on not less than 10' centers and within 30" of each change of direction except that piping 1-1/4" size and smaller shall be supported on 8'-0" centers.

b. All piping shall be hung by means of split type wrought iron hanger rings similar to Grinnell Figure 104 except as otherwise noted. Copper piping not insulated shall be hung from copper plated hangers similar to Figure CT-97.

All insulated piping shall be hung by means of clevis type hangers sized to fit outside of insulation, Grinnell Figure 260.

c. Pipe hangers shall be supported by means of iron hanger rods from the building construction or from structural steel members, and in an approved manner. Where required, piping shall be hung from angle iron slips or suitable brackets attached to sides of masonry construction.

d. All insulated piping shall be provided with insulating protection sheet metal saddles. These shall be 20 gauge galvanized iron. Saddles shall be of a length equal to two times the outside diameter of the insulation and shall extend to above the center line of the pipe.

e. Spring type isolators and wood blocking under insulation jacket shall be provided at large piping subject to vibrations as indicated in the plans and details. Contractor shall provide spring isolator submittal indicating construction, spacing, loading and efficiency.

f. Where piping passes through masonry construction, steel pipe sleeves shall be provided, sized to allow at least 1/2" clearance around pipe or insulation where pipe is insulated. Sleeves shall be flush with finished walls and extend 1/2" above finish floors. A watertight seal shall be provided between floor and sleeve and space between pipe and sleeve shall be caulked with lead wool.

SECTION 15665

SPLIT SYSTEM HEAT PUMP

PART 1: GENERAL

1.1 SCOPE:

- a. The provisions of Section 15010 apply to all the work in this Section.
- b. Furnish and install split system heat pump as required to provide a complete and satisfactory job.

1.2 SUBMITTALS: Submit the following in accordance with Section 15010:

- a. Manufacturer's cuts.
- b. Certified capacity ratings.
- c. Installation instructions.
- d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 SPLIT SYSTEM HEAT PUMP:

- a. Furnish and install an air-to-air electric heat pump (outdoor unit) in combination with a direct expansion fan-coil heat pump (indoor unit) in the location and manner shown on the plans.
- b. Coils shall be constructed with aluminum plate fins mechanically bonded to non-ferrous tubing with all joints brazed.
- c. Outdoor unit shall contain hermetically sealed compressor with automatically reversible oil pump, internal and external motor protection. Outdoor fan shall be propeller type, arranged for vertical discharge, and direct driven by a factory lubricated motor.
- d. Indoor unit shall operate properly in either vertical upflow or horizontal position with or without ductwork. Unit may be installed vertically or horizontally with electric resistance heater and shall contain refrigerant metering device and indoor fan relay. Fan shall be centrifugal type, direct driven.
- e. Controls and protective devices shall include a high pressurestat, 2 low pressurestats, crankcase heater, suction line accumulator and pressure relief device. Motor compressor shall have both thermal and current sensitive overload devices. Outdoor unit wiring shall incorporate a positive acting timer to prevent compressor short cycling if power is interrupted. Device shall prevent compressor from restarting for a five minute period. An automatic defrost control shall be included to accomplish defrosting (only if required) every 90 minutes for a period of not more than 10 minutes. A 24 volt transformer shall be factory installed and wired on outdoor units for external control circuit.

- f. Provide low ambient to 10°F.

PART 3: EXECUTION

3.1 INSTALLATION:

- a. Fan coil and heat pump shall be installed in accordance with the manufacturer's recommendations.
- b. Fan coil and heat pump shall be installed in fully accessible locations.

SECTION 15723

EXHAUST FANS

PART 1: GENERAL

1.1 SCOPE:

- a. Furnish and install ceiling fans as shown or required to provide a complete and satisfactory job.
- b. The provisions of Section 15010 apply to all the work in this Section.

1.2 SUBMITTALS: Submit the following in accordance with Section 15010:

- a. Manufacturer's Cuts.
- b. Certified Capacity Ratings.
- c. Installation Instructions.
- d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 CEILING EXHAUST FANS - DIRECT DRIVE:

- a. Type: The fan shall have a forward curved centrifugal wheel.
- b. Housing: The fan housing shall be constructed of heavy gauge galvanized steel. The housing interior shall be acoustically lined with ½" thick insulation. The discharge outlet shall be adaptable for horizontal or vertical mounting.
- c. Motor: The motor shall be mounted on resilient elastic grommets.
- d. Control: The fan shall be controlled as shown on the plans.

PART 3: EXECUTION

3.1 INSTALLATION:

- a. Fan shall be installed in accordance with the manufacturers recommendations.
- b. Fan shall be installed in fully accessible locations.

SECTION 15810

AIR DISTRIBUTION

PART 1: GENERAL

1.1 SCOPE:

- a. Furnish and install all sheet metal work shown or called for including ductwork and connections to fans and equipment.
- b. Ductwork shall be provided and installed as shown on the drawings. All details of ductwork are not indicated, and necessary bends, offsets and transformation must be furnished whether shown or not.
- c. The provisions of Section 15010 apply to all the work in this Section.

1.2 SUBMITTALS: Submit the following in accordance with Section 15010:

- a. Manufacturer's cuts.
- b. Certified capacity ratings.
- c. Installation instructions.

1.3 RELATED DOCUMENTS:

- a. Section 15250 - Insulation.

PART 2: PRODUCTS

2.1 GENERAL:

a. All ductwork, plenums and casings shall be constructed of sheet metal, as herein specified. All sheet metal construction shall conform to the pressure classification shown on the contract drawings, or herein specified and shall be in accordance with the construction and installation details in Chapter 16 of the 1992 ASHRAE Systems and Equipment Handbook or the appropriate SMACNA Standards.

b. Duct sizes on drawings represent gross sheet metal dimensions. Allowance has been made, where applicable, for duct liner.

2.2 LOW PRESSURE DUCTWORK:

a. Low pressure ductwork shall be constructed of zinc coated sheet steel and shall conform to the 1st Edition of SMACNA HVAC Duct Construction Standards -Metal and Flexible, 1985, as follows:

1. Rectangular Duct:

- (a) 1" w.g. pressure class - Table 1-4.

2. Round Duct:

- (a) 2" w.g. pressure class - Table 3-2.

2.3 GENERAL EXHAUST DUCTWORK:

a. Unless otherwise noted, all exhaust ductwork shall be constructed the same as specified for low pressure ductwork.

2.4 FLEXIBLE DUCTWORK:

a. Flexible air duct for connections between medium pressure duct and terminals units and between low pressure duct to diffusers shall be equal to Thermaflex M-KE. Duct shall be listed by Underwriter's Laboratories under UL

181 standards as Class 1 flexible air duct material and shall comply with NFPA Standards 90A and 90B. Duct shall be rated to operate at pressures up to 6"

w.g. for sizes 10" and 4" w.g. for sizes 12" and above. Maximum length of flexible air duct shall be 6 feet.

b. Duct shall be a factory fabricated assembly composed of a polymeric liner duct bonded permanently to a coated spring steel wire helix and supporting a fiberglass insulating blanket. Outer vapor barrier shall be of fiberglass reinforced film laminate. Connections shall be made with Thermaflex, or equal, duct straps.

2.5 FIRE DAMPERS:

a. Furnish and install, at locations shown on plans, or where required by code, fire dampers constructed and tested in accordance with UL Safety Standard

555. Each fire damper shall have 1-1/2 hour fire protection rating. In addition each fire damper shall include a 212°F fusible link, and shall include a UL label in accordance with established UL labeling procedures. Damper manufacturer's literature submitted for approval prior to installation shall include comprehensive performance data developed from testing in accordance with AMCA Standard 500 and shall illustrate pressure drops for all sizes of dampers required at all anticipated airflow rates. Fire dampers shall be equipped for vertical or horizontal installation as required by the location shown. Fire dampers required by the location shown. Fire dampers shall be installed in wall and floor openings utilizing steel sleeves, angles, other materials and practices required to provide an installation equivalent to that utilized by the manufacturer when dampers were tested at UL. Installation shall be in accordance with the damper manufacturer's instructions. Fire dampers shall be style "A", "B" or "C" as required.

2.6 ACCESS DOORS:

a. Ventifabrics, Krueger or Duro-Dyne, (Min. 12" x 10" - use 16" x 12" where size permits) insulated doors shall be provided for fire dampers, control dampers, smoke dampers, smoke detectors, and other locations where shown. Door shall be minimum 24 gauge galvanized, double construction with 1" insulation complete collar mounting frame, steel butt hinges, felt gaskets, fasteners and handles.

2.7 INSTRUMENT TEST HOLES:

a. Ventlock No. 699 with gasket. Provide a minimum of one in each zone supply duct.

2.8 TURNING VANES:

a. Turning vanes and Deflector Controls, Barber-Colman, Carnes Corporation, Kruger or Titus in length up to 18"; Aero-Dyne Duro-Dyne, or Airsan double thickness about 24" in length, installed in rails.

2.9 FLEXIBLE CONNECTIONS:

a. Flexible duct connections shall be provided where ductwork connects to equipment; ventifabrics or Duro-Dyne 28 ounce minimum waterproof and fire retardant woven glass fabric double coated with neoprene, approved by UL. Maximum length of flexible connections shall be 10 inches.

2.10 MANUAL AND MOTOR OPERATED DAMPERS:

a. American Warming and Ventilating Company Type DAA-P-50, opposed blade, constructed with 15 gauge steel blades. Manual dampers shall be provided with Ventlock No. 637 hand operated locking quadrants located outside of ducts. Locking quadrants shall be elevated 1-1/2" for insulation. Manual dampers 18" x 10" or smaller may be single blade type construction of 16 gauge galvanized sheet metal. Dampers of Ruskin, Krueger, Louvers and Dampers, or Advanced Air, Inc. will be acceptable.

2.11 SPLITTER DAMPERS:

a. Install where shown and at duct splits; provide with Ventlock No. 690 self-locking device; constructed of 16 gauge galvanized steel with hemmed leading edge and reinforced at hinged side.

2.12 GRILLES, REGISTERS AND DIFFUSERS:

a. Grilles, registers and diffusers shall be of the type, size and design as shown on the drawings and/or as specified below. Grilles within the same room or areas shall be of the same type and style to provide architectural uniformity.

b. Each supply, return and exhaust device shall be of the proper design as indicated to handle quantities of air within the space with maximum diffusion and without objectionable air movement or noise level.

c. Each supply outlet and register shall have a volume damper control operable from the front of the device with removable key. Where indicated on the drawings, all side wall registers shall be equipped with deflectors.

PART 3: EXECUTION

3.1 DUCTWORK:

a. All ductwork shall be provided in a neat workmanlike manner. The ducts shall be properly braced and reinforced. All slip joints shall be made in the direction of flow. All ducts shall be true to the dimension indicated and shall be straight and smooth on the inside with neatly finished airtight joints. The ducts shall be securely anchored into the building construction in an approved manner and shall be completely free from vibration under all

conditions of operation.
balanced.

All supply, return fresh-air and exhaust systems shall be completely

b. No duct transformation shall be of a ratio less than four to one and where possible, shall be of a ratio of six to one. No less than three vertical splitters shall be provided where these ratios cannot be met. No elbow shall have a throat center line radius of less than one and one-half times the duct width at the turn. All turns of less than this amount in rectangular duct shall be provided with duct turning vanes of standard design. Splitters or multi-blade volume dampers, where indicated, shall be provided in all branch.

c. Turning vanes shall be provided at all tees and square elbows. Turning vanes shall be factory fabricated and designed in accordance with the SMACNA or ASHRAE Guide for formed vanes. The first set of turning vanes on the leaving side of fans shall be of the acoustical type to aid in the elimination of unit noise with the exception of room fan coil units.

d. Splitter dampers and volume extractors shall be provided in all low velocity ductwork for proper air distribution. Each damper shall be provided, lubricated bearings at both ends of the shafts, adjustments quadrant, and locking devices and shall be constructed of galvanized iron or steel sheet one gauge heavier than the duct in which they are installed. Access doors shall be located at all splitter dampers.

e. Handholes of not less than 6" x 6" shall be provided at all points where access is required. Manholes of not less than 18" x 24" shall be provided at all points where it is necessary to clean or remove parts of equipment. All access doors and handholes shall be rubber gasketed insulated type with frame and latches.

f. Install access doors at each fire damper, and smoke detector.

g. All ductwork must be sealed in accordance with Seal Class C as defined in SMACNA HVAC Duct Construction Standards - Metal and Flexible, 1985.

3.2 DUCT HANGERS AND SUPPORTS:

a. Duct hangers and supports shall conform to those shown in Tables 4-1 and 4-2 of SMACNA HVAC Ductwork 1985, 1st Edition.

3.3 WALL PENETRATIONS:

a. Where ducts pass through non-rated walls and is exposed to view the duct shall be finished with suitable metal collar.

b. Where fire dampers are shown or required, dampers shall be installed per manufacturer's UL listing.

3.4 CLEANING DUCT SYSTEMS:

a. Before fan systems are put in operation, vacuum clean inside of air units, plenums and apparatus housing. Filters are to be installed before moving air through duct systems.

SECTION 15815

LOUVERS

PART 1: GENERAL

1.1 DESCRIPTION:

a. Work Included: Provide exterior metal louvers where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.2 QUALITY ASSURANCE:

a. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS:

- a. Submit materials list of items proposed to be provided under this Section.
- b. Submit manufacturer's specifications and other data needed to prove compliance with the specified requirements.
- c. Submit Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
- d. Submit samples of the proposed products, showing profiles, joining, and finish.
- e. Submit manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

PART 2: PRODUCTS

2.1 METAL LOUVERS:

a. Provide metal louvers in the arrangements and dimensions shown on the drawings. Louver color shall be selected by the Architect.

PART 3: EXECUTION

3.1 SURFACE CONDITIONS:

a. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION:

a. Coordinate as required with other trades to assure proper and adequate provisions in the work of those trades for interface with the work of this Section.

b. Install the work of this Section in strict accordance with the approved Shop Drawings and the recommendations of the manufacturers as approved by the Architect, anchoring all components firmly into position in true alignment with a tolerance of one in 1000 vertically and horizontally. Use concealed stainless steel fasteners.

c. Coordinate installation of these fixed louvers with any operable louvers provided in the mechanical section. The entire louvered opening shall be caulked and sealed at the edges to minimize water penetration.

SECTION 15862

SPLIT SYSTEM AC UNIT (DUCTLESS)

PART 1: GENERAL

1.1 SCOPE:

- a. The provisions of Section 15010 apply to all the work in this Section.
- b. Furnish and install split system AC units required to provide a complete and satisfactory job.

1.2 SUBMITTALS: Submit the following in accordance with Section 15010:

- a. Manufacturer's cuts.
- b. Certified capacity ratings.
- c. Installation instructions.
- d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 SPLIT SYSTEM AC UNIT (DUCTLESS):

a. Furnish and install an air cooled condensing unit/direct expansion fan coil combination. The outdoor section shall be factory assembled, having direct drive fans with horizontal air discharge, reciprocating compressor, refrigerant coil fan motor(s) prewired control panel and a holding charge of R-410a refrigerant. The indoor fan coil unit shall have horizontal discharge and will include refrigerant coil, fan and motor, condensate pan with drain, thermal expansion valve, prewired control panel and remote thermostat control.

b. Refrigerant coils shall be of nonferrous construction with mechanically bonded, smooth plate fins. All tube joints shall be brazed with phoscopper or silver alloy. Coils shall be pressure tested at the factory.

c. Unit shall be furnished with direct drive, propeller type fans arranged for horizontal discharge. Condenser fan motors shall have inherent protection, and shall be of the permanently lubricated type resiliently mounted for quiet operation. Each fan shall have a safety guard.

d. Evaporator fan section shall have forward curved blade, double inlet fans mounted on a solid shaft. Fan shall be statically and dynamically balanced and shall run on permanently lubricated bearings.

e. Cabinets shall be made of galvanized steel, bonderized and finished with baked enamel.

f. Compressor shall be serviceable hermetic type. It shall be mounted so as to avoid vibration. It shall be equipped with high and low pressure protection.

g. System Control. The system shall utilize a microprocessor controller with diagnostic capability, located in the indoor unit. Wall mounted remote control with operation indicator lamps to be used for temperature control, airflow selection rate (including automatic airflow rate change according to room temperature), motorized air vane operation, economy operation selection feature, and on/off switching.

h. Room Air Dampers. Indoor unit shall have motorized air vanes which sweep air from front to back of room by modulating the horizontal air vanes in the vertical plane. Air vanes can be set in a fixed position by a switch on the remote control. Horizontal discharge shall be manually adjusted to desired direction by setting vertical vanes located behind the horizontal motorized air vanes.

i. Return Air shall be filtered by means of easily removable, washable filters. The filters shall be accessible without tools or exposure to hazardous electrical or moving parts. Provision shall be made to have a filtered outdoor air duct connection to provide fresh air to the unit.

j. Manufacturer shall have been established in the United States for a period of 5 years and shall have parts and service organizations located not more than 100 miles from the site.

PART 3: EXECUTION

3.1 INSTALLATION:

a. Fan coil and heat pump shall be installed in accordance with the manufacturer's recommendations.

b. Fan coil and heat pump shall be installed in fully accessible locations.

SECTION 15900

AUTOMATIC TEMPERATURE CONTROLS

PART 1: GENERAL

1.1 SCOPE:

- a. The provisions of section 15010 apply to all work in this section.
- b. This specification defines the minimum equipment and performance requirements for a direct digital control building control system.
- c. The scope of work is extension of an existing Siemens – Landis Division building automation system as installed by Control Management, Inc.. The existing system shall be updated/expanded as required for integrating the new equipment into the new/existing BAS system.

1.2 SUBMITTALS/DRAWINGS

- a. The Control System Contractor shall submit prior to installation a set of installation drawings and control strategies for review by the consultant and/or owner's representative. These drawings shall include the physical location of building control system equipment and system architecture. The complete sequence of operation of the control system shall be provided.
- b. Upon completion of the installation and final system adjustment, the Control Contractor shall provide a full set of as-built drawings of the installation and the control strategies. In addition, the Control Contractor shall provide a thumb drive containing the as-built control drawings in AutoCad format
- c. Framed control diagrams shall be mounted on the wall inside the appropriate mechanical room.

1.3 GUARANTEE:

- a. The entire control system shall be installed by the control system contractor and guaranteed free of defects and shall include required servicing and maintenance for one year after final acceptance.

1.4 CONTROL AND INTERLOCK WIRING:

- a. All electrical work required under this section of specifications shall comply with the latest National Electrical Code. Control system power supply shall be served by a separate breaker and fused in control center for secondary protection.
- b. The mechanical contractor shall furnish and turn over to the electrical contractor, motor starters for mounting and power connections through starter to motor. Disconnect switches, when required, shall be furnished by electrical contractor.
- c. All control wiring shall be run in rigid conduit below grade or, on outdoor installation. Galvanized EMT may be run in dry wall construction,

above ceilings, or in equipment rooms where permitted by electrical specifications.

d. Control wiring shall be color-coded #16 TFF of TFFN wire with 600 volt insulation. Run all wiring between terminal points without changing color. Color code of control wiring shall be as indicated on control wiring diagram. Multi-conductor thermostat cable will not be acceptable.

1.5 TRAINING/OWNER'S INSTRUCTION:

a. The Control System Contractor shall provide two copies of an operator's manual describing all operating and routine maintenance service procedures to be used with the system. The Control System Contractor shall instruct the Owner's designated representatives in these procedures during the start-up and test period. The duration of the instruction period shall be no less than 8 hours. These instructions are to be conducted during normal working hours. The instructions shall consist of both hands-on and classroom training at the jobsite.

1.6 SYSTEM ARCHITECTURE:

a. The building control system shall consist of a modular building controller (MBC), and its network of independent Mechanical Equipment Controllers (MEC), and terminal equipment controllers (TEC). The new MBC and network of Mechanical Equipment Controllers, and Terminal Equipment Controllers shall be connected to the existing building automation system.

1.7 OPERATOR INTERFACE:

a. The building control system shall permit full operator communication including: obtaining information about the performance of his system; allowing the operator to change the system operation; and diagnosing system malfunctions. Operator communication shall be through the use of any one of the owner operator terminals.

b. The network shall be addressable as a whole and shall not require referencing a particular control unit for the commanding or monitoring of points on the network.

c. Dynamic color graphic software shall be provided for the central operator's computer. Graphics shall be drawn and installed by this contractor.

d. All color graphic software shall display and update current control point data automatically.

e. The following graphics shall be generated and installed under this contract:

1. Building layout with unit locations and temperatures displayed

f. The software shall provide, as a minimum, the following functionality:

1. Graphical viewing and control of environment

2. Scheduling and override of building operations

3. Collection and analysis of historical data
4. Definition and construction of dynamic color graphics
5. Editing, programming, storage and downloading of controller databases

PART 2: PRODUCTS

2.1 MODULAR BUILDING CONTROLLER (MBC):

a. Existing. Upgrade as required for new system or provide new that is backward compatible with existing.

2.2 APPLICATION SPECIFIC CONTROLLERS:

a. Provide application specific controllers (ASCs) as required for each mechanical system or piece of equipment. Each ASC shall be a microprocessor- based direct digital control unit and shall be capable of operating either as a standalone controller or on a multi-drop communications network originating at the MBC. Provide each ASC with sufficient memory to operate in a truly independent manner; that is, each ASC shall support its own inputs and outputs, operating system, database and programs necessary to perform control sequences and energy management routines.

b. Provide the following types of ASCs as a minimum:

1. Unitary controllers
2. Terminal equipment controllers

c. Controllers shall include all point inputs and outputs necessary to perform the specified control sequences.

d. Each controller shall have connection provisions for a portable laptop or similar operator's terminal. This connection shall be possible at both the controller and at the matching room temperature sensor as previously specified. The terminal may be used for readout of system variables, override control, adjustment of control parameters, air balancing, servicing and troubleshooting. The terminal shall provide the user with the following functionality as a minimum:

1. Display system status (heating, cooling, etc.)
2. Display all point values and setpoints
3. Set and change all setpoints
4. Set and change heating/cooling deadbands
5. Set and change PID loop gains
6. Set and change system mode (occupied/unoccupied)
7. Set and change system mode times

8. Override all setpoints
9. Override all digital and analog outputs
10. Command all digital and analog outputs
11. Select application mode
12. Assign controller address

e. All communication and displays via the portable terminal shall be in full English language with accompanying English and SI (International System of Units) engineering units for all displayed data. Selection between English and SI units shall be accomplished via a single keystroke on the portable terminal.

f. In addition to local interface capabilities, all functionality as specified above may be performed both from the central operator's workstation and from any MBC on the communications network via the same portable terminal. From a terminal connected to any MBC it shall be possible to issue global commands to groups of controllers. Provide the following global commanding capabilities for all controllers as a minimum:

1. Heating/Cooling setpoint changes
2. Stage Off/On heating
3. Fan on/off control

2.3 DAMPER OPERATORS:

a. All damper operators shall be electric and shall be two-position or proportional as indicated. They shall be furnished in sufficient numbers and with sufficient power to insure satisfactory operation of the damper to provide tight close off. They shall be spring return type to return the damper to the normal positions indicated. Mark full open and full closed positions of all dampers. Marks shall be made with Bakelite nameplates, attached to ductwork.

PART 3: EXECUTION

3.1 PROJECT MANAGEMENT:

- a. Provide a designated project manager who will be responsible for the following:
1. Construct and maintain project schedule.
 2. On-site coordination with all applicable trades and subcontractors.
 3. Authorized to accept and execute orders or instructions from owner/architect.
 4. Attend project meetings as necessary to avoid conflicts and delays.

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SECTION 16010

ELECTRICAL GENERAL REQUIREMENTS

PART 1: GENERAL

1.1 SCOPE:

a. Applicable requirements of the General Conditions of the Contract, Amendments, Supplementary General Conditions, and Special Conditions govern work under this Division.

b. Work covered by this Division consists of providing all labor, equipment, supplies, and materials; and performing all operations, including trenching, backfilling, cutting, patching, and chasing necessary for the installation of complete electrical systems in strict accordance with these specifications and the applicable drawings.

c. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

d. This Contractor is referred to the General and Special Conditions of the contract which shall form a part and be included in this section of the specification and shall be binding on this Contractor.

e. Some items of equipment are specified in the singular; however, the Contractor shall provide and install the number of items or equipment as indicated on the drawings, and as required for complete systems.

1.2 DEFINITION:

a. The word "Contractor" as used in this section of the specification refers to the Electrical Contractor unless specifically noted otherwise. The word "provide" means furnish, fabricated, complete, install, erect, including labor and incidental materials necessary to complete in place and ready for operation or use the item referred to or described herein and/or referred to on the Contract Drawings.

1.3 CONTRACTOR'S QUALIFICATIONS:

a. It is assumed that the Contractor has sufficient general knowledge and experience to anticipate the needs of a construction of this nature. The Contractor shall furnish all items required to complete the construction with reasonable interpretation of the intent of the Drawings and Specifications. Any minor items required by code, law or regulations shall be provided even if not specified or specifically shown, where it is part of a major system.

1.4 CONTRACT DOCUMENTS:

a. The contract drawings are diagrammatic and are not intended to indicate every detail of construction, or every item of material or equipment required, or exact locations. Indicated locations of outlets, equipment, and connections are approximate and shall be verified by reference to related documents.

b. The Contractor shall procure complete drawings and specifications on all coincident construction and fit the Electrical work in with it. He shall cooperate with other trades to achieve well-coordinated progress and result; and avoid conflicts with other trades. He shall make minor moves and changes necessary to accommodate other equipment and/or preserve symmetry without claim for extra payment. Should there be any doubt as to the spacing intent, or location of equipment, the Contractor shall have the point clarified by the Architect/Engineer before proceeding with the installation.

1.5 RECORD DRAWINGS:

a. During construction of this project, the Contractor shall maintain one complete set of electrical contract drawings, on which shall be recorded all significant changes. This set of drawings shall be used for no other purpose. Upon completion of the work, the Contractor shall submit these drawings to the Architect/Engineer for approval and presentation to the Owner.

1.6 REGULATIONS AND COMPLIANCE:

a. The requirements of the International Building Code, the National Electrical Code, and of all other State and Local codes, ordinances, regulations, and interpretations by authorities having jurisdiction are binding upon this Contractor, and nothing contained in, or inferred by, these specifications or the applicable drawings may be construed as waiving those requirements. The latest edition of the National Electrical Code, referred to herein and on the drawings as "N.E.C.", forms a part of these specifications; and under no circumstances may the installation fail to meet the minimum requirements therein.

b. This Contractor shall secure and pay for all permits, fees, inspections, and licenses required. Upon completion of the project and prior to his request for final payment he shall present to the Architect/Engineer a certificate of inspection and approval from the inspection authorities.

c. The Contractor shall include in his work, without extra cost to the Owner, any labor, materials, service, apparatus, drawings, to comply with all applicable laws, ordinances, rules, and regulations, whether shown on drawings and/or specified.

e. All materials furnished, and all work installed shall comply with the National Fire Codes of the National Fire Protection Association, and with the requirements of all governmental departments having jurisdiction.

f. All materials and equipment shall bear the approval label, and shall be listed by the Underwriters' Laboratories, Inc.

g. It is the responsibility of the contractor to notify the local electrical inspector to schedule the required inspections.

1.7 ELECTRICAL TESTING:

a. Conduct full scale tests with all lights, equipment and appliances in operation and prove the electrical system satisfactory for operation and free

from defects. Pay attention to the balancing of the single-phase loads on the three-phase system. Promptly remedy all defects.

b. All current phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. This shall be done with a 500-volt megger. The procedures listed below shall be followed:

1. Minimum readings shall be one million or more ohms for #6 AWG wire and smaller, 250,000 ohms or more for #4 AWG wire or larger, between conductors and between conductor and the grounding conductor.

2. After all fixtures, devices and equipment are installed and all connections completed to each panel, the contractor shall disconnect the neutral feeder conductor from the neutral bar and take a megger reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the contractor shall disconnect the branch circuit neutral wires from this neutral bar. He shall then test each one separately until the low reading is found. The contractor shall correct troubles, reconnect, and retest until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.

3. At final inspection, the contractor shall furnish a megger and show that the panels comply with the above requirements. He shall also furnish a hook-on type ammeter and voltmeter to take current and voltage readings as directed.

c. All tests specified shall be completely documented indicating time of day, date, temperature, and all pertinent test information.

d. All required documentation of readings indicated above shall be submitted to Engineer prior to, and as one of the prerequisites for, final acceptance of the project.

e. All elements of the electrical system provided, furnished, installed, or otherwise altered under this contract shall be subjected to testing required under this contract. Where test results indicate failure, the contractor shall repair, adjust, or replace as required and repeat the testing at no extra cost.

f. Testing shall be performed by qualified testing agencies and field services companies as necessary to augment the contractor's own capabilities. Testing and reporting methods shall comply with published standards. All test results shall be published on the Contractor's or testing company's letterhead or test forms bearing the legal name and address of the company.

1.8 GUARANTEE:

a. The Contractor shall guarantee that the work done has been done in accordance with the Contract Documents, free of imperfect materials and defective workmanship. For a period of one year after acceptance by the Owner, the Contractor shall repair or replace, at no additional expense to the Owner, any imperfect materials or defective workmanship.

1.9 OPERATING AND MAINTENANCE INSTRUCTIONS:

- a. At the completion of the project, submit 3 sets of complete operating and maintenance instructions.
- b. Organize material in the following format:
 1. Section I:
 - (a) Name of Project
 - (b) Address
 - (c) Owner's Name
 - (d) Electrical Contractor's Name and Address
 - (e) Warranty Dates
 2. Section II:
 - (a) Description of System
 3. Section III:
 - (a) Major Equipment List (name, manufacturer)
 - (b) Routine Maintenance Instructions in Step-by-Step form
 4. Section IV:
 - (a) Operating and Maintenance Instructions by Manufacturer
 - (b) Shop Drawings
 - (c) Wiring Diagrams
 - (d) Warranty Information PART

2: PRODUCTS

2.1 GENERAL:

a. Except where reuse of existing items is specifically indicated or permitted, all materials and equipment shall be new and shall conform with the standards of the National Electrical Manufacturer's Association and Underwriter's Laboratories, Inc. in every instance where such a standard has been established for the item involved.

b. Catalog numbers and trade names in these specifications and drawings are intended only to set forth and convey to bidders the general style, type, character, and quality of product desired. Similar products of other manufacturers; of equal quality, size, capacity, character, and appearance may be substituted on the written approval of the Architect/Engineer. Requests for approval of substitutions shall be made after the award of the contract in accordance with the bidding requirements of these specifications.

c. It is the intent of the drawings and specifications that the installation be complete, of finished appearance, and ready for operation. Manufacturers' catalog numbers as used herein and on the drawings are indicative of the type of product to be installed, and do not necessarily identify all parts and accessories required for the proper assembly, installation, and utilization of the product. All required parts and accessories shall be provided.

d. Materials shall be inspected by the Contractor upon their arrival at the site to be sure they are correct. Material and equipment stored on the site shall be protected against physical damage, dirt and damage caused by precipitation, wind, condensation, excessive humidity, and extremes of temperature. Materials shall be stored in their original cartons within substantial, clean, and dry storage facilities provided under this Contract. Conduit, large, galvanized boxes, and lighting poles may be stored outdoors on suitable blocks or racks clear of the earth and undergrowth and pitched to drain. Large electrical equipment intended for ultimate installation outdoors may be stored in the weather on suitable blocks or platforms clear of the earth and undergrowth, and with interior lamps or space heaters continuously energized to prevent condensation. Alternate storage provisions may be submitted to the Architect/Engineer for approval prior to the arrival of the material. Under no circumstances shall equipment be stored in the weather under a cover of polyethylene or tarpaulin. The Architect/Engineer will be the sole judge as to the acceptability of storage facilities, and when directed by the Architect/Engineer, improperly stored or damaged material shall be removed from the site and replaced with new material.

2.2 SUBMITTALS:

a. Within 30 days after the date of award of contract, submit a complete list, in quadruplicate, of materials proposed for installation including requests for approval of substitutions and names of specialty subcontractors to the Architect/Engineer for approval. Upon approval of the list, the Architect/Engineer will indicate those items for which submittal of shop drawings, cuts, descriptive literature and/or samples are required; and these items will not be approved until such supplementary data is approved. Any items which fail to comply with specification requirements will be rejected. Intent to use exact material specified does not relieve the Contractor of responsibility for submitting a list. Mention of several manufacturers for any item will not be acceptable.

b. Prior to delivery of any material to the job site, and sufficiently in advance of requirements to allow the Architect ample time for checking, submit for approval detailed, dimensioned drawings or cuts, showing construction, size, arrangement, operating clearances, performance, characteristics, and capacity. Each item of equipment proposed shall be standard catalog product of an established manufacturer and of equal quality, finish, performance, and durability to that specified.

c. Submittal of shop drawings, cuts, and descriptive literature shall be made in sufficient quantity to permit the retention by the Architect/Engineer of two copies. Submittal data will not be checked prior to the Approval of the Contractor's material list. In addition to the submittal data requested by the Architect/Engineer, the Contractor may, at his option, submit additional shop drawings and/or descriptive data for approval, provided the manufacturer of the additional items has previously been listed on the Contractor's approved Material List.

d. Submittal data shall be thoroughly reviewed and approved by the Contractor prior to being forwarded to the Architect/Engineer. Submittal data received from the Contractor will be considered to have been reviewed and approved by the Contractor as suitable for the application and for installation

in the space allotted.

e. The submittal of shop drawings shall be with the Contractor stamp affixed. This stamp indicates that the Contractor, by approving and submitting shop drawings, represents that he has determined and verified all field measurements and quantities, field construction criteria, material, catalog material, and similar data that he has reviewed and coordinated information in the shop drawings with the requirements of the work and the Contract Documents. It, also, indicates that any deviation from the Contract Documents has been shown on the submittal and clearly defines the deviations from the specifications.

f. Approval rendered on shop drawings shall not be considered as a guarantee of quantities, measurements, or building conditions. Where drawings are approved, said approval does not mean that drawings have been checked in detail. Said approval does not in any way relieve the Contractor from his responsibilities or necessity of furnishing material or performing work as required by the contract drawings and specifications.

g. Failure of the Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of Contract time, and no claim for extension by reason of default will be allowed.

h. All shop drawings and submittals are to be in the office of the Architect within 30 days after the Contracts have been awarded. Contractor shall be financially responsible for any price increase of shop drawing items from the time these drawings are issued until they are returned to the Contractor for purchase of items.

i. Contractor shall keep on the job at all times copies of all approved shop drawings.

2.3 EQUIPMENT DEVIATIONS:

a. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical, or architectural layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Contractor at his own expense and submitted for approval by the Architect/Engineer.

b. Where such approved deviation requires a different quantity and arrangement of wiring, conduit, and equipment from that specified or indicated on the drawings, the Contractor shall furnish and install any such structural supports, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

PART 3: EXECUTION

3.1 GENERAL:

a. The Contractor shall coordinate the work and equipment of this Division with the work and equipment specified elsewhere to assure a complete and satisfactory installation. Work such as excavation, backfill, concrete, flashing, wiring, etc., which is required by the work of this section shall be

performed in accordance with the requirements of the applicable section of the specifications.

b. It is the intention of these specifications and drawings to call for finished work, tested and ready for operation. Whenever the work "provide" is used, it shall mean "furnish and install complete and ready for use".

3.2 DUTIES OF CONTRACTOR:

a. Contractor shall furnish and install all materials called for in these Specifications and accompanying drawings and must furnish the apparatus complete in every respect. Anything called for in the specifications and not shown on the drawings or shown on the drawings and not called for in the specifications must be furnished by the Contractor.

b. Contractor is responsible for familiarizing himself with the details of the construction of the building. Work under these specifications installed improperly or which requires changing due to improper reading or interpretation of building plans shall be corrected and changed as directed by the Architect/Engineer without additional cost to the Owner.

c. The Contractor shall follow drawings in laying out work and check drawings or other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom or space conditions appear inadequate, Architect/Engineer shall be notified before proceeding with installation.

d. While every effort has been made to accommodate the equipment necessary for the work of this contract, it is the responsibility of the Contractor to ensure that equipment supplied as a part of this contract will fit in the spaces provided for by the drawings. Any concern by the contractor regarding the adequacy of a space for the equipment supplied, shall be brought to the attention of the Architect/Engineer in a written form prior to the approval of the related equipment submittals and prior to any rough-in associated with this equipment.

e. The plans are diagrammatic and are not intended to show each fitting or a complete detail of all the work to be done; but are for the purpose of illustrating the type of system, etc., and special conditions considered necessary for the experienced mechanic to take off his materials and lay out his work. This Contractor shall be responsible for taking such measurements as may be necessary at the job and adapting his work to local conditions.

f. Conditions sometimes occur which require certain changes in drawings and specifications. If such changes in drawing and specifications are necessary, the same are to be made by the Contractor without expense to the Owner, providing such changes do not require furnishing more materials, or performing more labor than the true intent of the drawings and specifications demands. It is understood that while the drawings are to be followed as closely as circumstances will permit, the Contractor is held responsible for the installation of the system according to the true intent and meaning of the drawings. Anything not entirely clear in the drawings and specification will be fully explained if application is made to the Architect/Engineer. Should, however, conditions arise where in the judgment of the Contractor certain changes will be advisable, the Contractor will communicate with the

Architect/Engineer and secure his approval of these changes before going ahead with the work.

g. The right to make any responsible change in location of apparatus, equipment, routing of conduit up to the time of roughing in, is reserved by the Architect without involving any additional expense to the Owner.

h. It shall be the duty of prospective Contractors to visit the job site and familiarize themselves with job conditions. No extras will be allowed because of additional work necessitated by, or changes in plans required because of evident job conditions, that are not indicated on the drawings.

i. Contractor shall leave the premises in a clean and orderly manner upon completion of the work and shall remove from the premises all debris that has accumulated during the progress of the work.

3.3 COORDINATION:

a. This Contractor shall coordinate the work of all subs and shall furnish any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

b. Where the work will be installed near, or may interfere with the work of other trades, the Contractor shall assist in working out space conditions to make a satisfactory adjustment. If directed by the Engineer, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than 3/8" = 1'-0", clearly showing how his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordination, or to cause any interference with work of any subs, he shall make the necessary changes in his work to correct the condition without extra charge.

c. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

3.4 EXCAVATION:

a. Required excavation for installation of all electrical work shall be provided by the Electrical Contractor. Care shall be taken not to disturb or damage work of other trades.

b. Trenching and shoring shall comply with requirements of the State of North Carolina.

c. In backfilling pipe trenches, approved fill shall first be compacted firmly and evenly on both sides of pipe in 6" layers to a depth of 12" over the top of the pipe. Remainder of trench shall be backfilled to established grade in 6" layers. The Contractor shall compact between each layer with a high- frequency vibrator tamper such as Dart Soil Compactor (as manufactured by Dart Manufacturing Company, Denver, Colorado). Fill shall be compacted to density specified in Earthwork Section for the area through which trench is cut. Where compaction requirements are not established for an area, the Contractor shall compact fill to 95% maximum density at optimum moisture content.

- d. Excess earth shall be deposited on the site as directed by the Architect/Engineer.
- e. Where ditches occur outside of building, the surface shall be finished to match existing surfaces. Any existing work, or work of other trades, which is damaged or disturbed shall be repaired or replaced and left in good order.

3.5 SLEEVES, CUTTING, AND PATCHING:

a. Contractor shall place his own sleeves and advise other trades of required chases and openings so they can be properly built in. Sleeves provided under this division shall be formed out of no less than schedule 40 galvanized rigid steel conduits. Where any raceway supports installed under this Contract pierce the roof, suitable pitch pockets shall be provided and coordinated with the roofing contractor as necessary to be acceptable to the Architect/Engineer.

Provide suitable fittings where any raceways or equipment cross expansion joints.

b. Permitted cutting or patching necessary shall be done by Contractor. Structural members shall not be cut except by written permission of Architect/Engineer.

3.6 PROTECTION AND CLEAN-UP:

a. Protect all material and work from damage during construction. Equipment installed in the building prior to its being closed in and dried out shall be protected from the elements in the same manner as previously specified for stored materials. Protect finished surfaces from splattering of mortar, paint, dirt, plaster, etc. Do not install device plates, face plates, canopies, flush cabinet trims, or fixtures on walls or ceilings until after painting or cleaning of the surface has been completed and arrange for such items that are required to be field painted to be painted before being mounted. Repair, clean and touch-up or replace all damaged material. At the completion of the project, remove all dust from finished surfaces, including lighting fixtures, and lenses.

b. The Contractor shall keep premises free of debris resulting from his work.

3.7 PAINTING AND FINISHING:

a. Suitable finishes shall be provided on all items of electrical equipment and materials which are exposed. This shall consist of either an acceptable finish as manufactured and supplied to the job or application of suitable finishes after installation.

b. Where installed in finished areas, exposed equipment and materials shall be supplied with prime coat and shall be professionally painted or enameled as directed to match or blend with adjacent surfaces.

c. In unfinished areas such as equipment rooms, exposed equipment shall be furnished with suitable factory applied finishes (e.g., standard gray enamel finish for panelboards, etc.).

d. Equipment furnished in finishes such as stainless steel and brushed

aluminum shall not be painted.

e. All finishing shall be as directed by, and shall be satisfactory to, the Architect/Engineer.

f. Paint material shall be selected from the products listed below and, insofar as practical, products of only one manufacturer shall be used. Contractor shall submit to the Architect/Engineer the listed manufacturer he proposes to use in the work. Should the Contractor desire to use products of a manufacturer not listed below, or products made by a listed manufacturer but not scheduled herein, Contractor shall submit complete technical information on the proposed products to the Architect/Engineer for approval. Only products approved by the Architect/Engineer shall be used.

1. Rust Inhibitive Primer:

(a) Devoe: Bar-Ox Quick Dry Metal Primer, Red. (b) Duron: Deluxe Red Primer.

(c) Glidden: Rustmaster Tank and Structure Primer. (d) Pittsburgh: Inhibitive Red Primer.

2. Galvanized Metal Primer:

(a) Devoe: Mirrolac Galvanized Metal Primer. (b) Duron: Duron Deluxe Galvanized Metal Primer. (c) Glidden: Rustmaster Galvanized Iron Metal Primer. (d) Pittsburgh: Speedhigh Galvanized Steel Primer.

3.8 OBSERVATION:

a. The project will be observed periodically as construction progresses. The Contractor will be responsible for notifying the Architect/Engineer at least 72 hours in advance when any work to be covered up is ready for inspection. No work shall be covered up until after observation has been completed.

SECTION 16018

SEISMIC RESTRAINT REQUIREMENTS FOR ELECTRICAL SYSTEMS

PART 1: GENERAL

1.1 GENERAL:

a. All seismic restraint materials specified herein shall be provided by a single manufacturer to assure single responsibility for their proper performance. Installation of all seismic restraint materials specified herein shall be accomplished following the manufacturer's written instructions.

b. The Contractor shall furnish to the seismic restraint materials contractor a complete set of shop drawings and other necessary information, for all electrical equipment and components that receive seismic devices. The information to be furnished shall include operating weight of the equipment to be restrained, distribution of weight to support points and dynamic characteristics along with any internal isolation systems to be analyzed. The Contractor shall also furnish a complete layout of conduit, components, and equipment to be restrained, including vertical risers, showing size or weight and support points, to the seismic restraint materials contractor for selection and layout of mountings.

c. The seismic restraint materials contractor shall use the above listed information to design a complete system of seismic mounts in accordance with the contract documents along with the ASCE 7 Standard and the International Building Code. The seismic restraint materials Contractor shall analyze all "multiple degree of freedom" systems and provide properly designed restraint systems avoiding all resonance frequencies. To accomplish this, the seismic restraint materials contractor shall employ an Engineer registered in the State of North Carolina to design all restraint systems and prepare a complete set of calculations and shop drawing submittals with his professional Engineer's seal certifying that the design meets all requirements of these contract documents. A seismic design "errors and omissions" insurance certificate must accompany submittals from the Seismic Engineer. Manufacturer's product liability insurance certificates are not acceptable.

d. The Seismic Engineer or his designated representative shall inspect the project upon completion of the applicable work and provide written certification that the installation is in compliance with the approved shop drawing submittals. This certification shall also bear the professional Engineer's seal and shall become part of the contract closeout documents. All seals shall be signed and dated appropriately.

PART 2: PRODUCTS AND EXECUTION

2.1 SEISMIC RESTRAINT:

a. All required equipment shall be bolted to the structure to allow for seismic acceleration with no failure or displacement. All connections shall be positive bolted type; no friction clamps of any kind are allowed.

b. Provide cable and connection sets for suspended equipment at each of four comers secured to the building structure.

c. Floor mounted equipment shall be provided with seismically housed springs or springs with seismic snubbers as determined by the equipment to be restrained.

d. Seismic restraint systems shall be provided by The VMC Group, Mason Industries, Consolidated Kinetics, or prior approved equal.

2.2 WIND RESTRAINT:

a. All electrical equipment exposed to wind must be evaluated and restrained for wind loading per the requirements of the N.C. Mechanical Code.

SECTION 16030

EQUIPMENT CONNECTIONS AND COORDINATION

PART 1: GENERAL

1.1 SCOPE:

a. The connection of all equipment provided under any Division of these specifications or by the owner requiring electrical connection shall be provided as part of this Division, unless otherwise indicated or specified. A special outlet, where indicated, is the electrical connection to the equipment.

b. Drawings indicate approximate equipment capacity (including motor horsepower) and approximate location of connection. It is the responsibility of this Contractor to determine the exact characteristics of equipment being supplied; and to provide proper branch circuit connections, conductor protection and grounding.

PART 2: EXECUTION

2.1 GENERAL:

a. Heating, Ventilating, Air Conditioning and Plumbing Equipment: Unless otherwise indicated, provide all power wiring, including feeders and branch circuits, to the terminals of the equipment and mounting of motor starters; feeder and branch circuit over-current protection; disconnecting means within sight of each motor and each starter, whether specifically indicated on drawings.

b. Individually mounted motor starters: Unless otherwise indicated, individually mounted motor starters will be furnished as part of the Division furnishing the driven equipment. Unless otherwise indicated, remote control wiring for Heating, Ventilating, Air Conditioning and Plumbing equipment will be provided as part of those respective Divisions.

SECTION 16100

BASIC MATERIALS AND METHODS

PART 1: GENERAL

1.1 WIRING METHODS:

a. Unless otherwise indicated or specified, the Wiring Method for this project shall consist of copper conductors with 600-volt insulation installed in metal raceways.

b. The word "Raceway" and the word "Conduit" (or abbreviation "C") used herein or on the drawings indicate Rigid Metal Conduit, and where permitted, Intermediate Metal Conduit, Electrical Metallic Tubing, Rigid Nonmetallic Conduit, Flexible Metal Conduit, or Liquidtight Flexible Metal Conduit.

c. Reference to "Rigid Conduit" or "RMC" indicates heavy-wall Rigid Metal Conduit only.

d. Reference to "IMC" indicates Intermediate Metal Conduit.

e. Reference to "PVC" indicates Rigid Nonmetallic Conduit.

f. Reference to "EMT" or "Tubing" indicates Electrical Metallic Tubing.

g. Reference to "Flex" or "Flexible Conduit" indicates Flexible Metal Conduit, or, where required, Liquidtight Flexible Metal Conduit.

h. Other wiring methods, such as Metal-Clad Cable, shall be provided to the extent indicated on the drawings and/or hereinafter specified.

i. Aluminum conductors may be used only where specifically indicated on the drawings; however, aluminum shall not be used for grounding.

1.2 FASTENING METHODS:

a. Acceptable fastening methods include wood screws and nails on wood construction, toggle bolts on hollow masonry, expansion bolts and lead anchors on brick and concrete, and machine screws on metal surfaces.

b. Explosive fasteners may be used in steel and concrete in accordance with the manufacturer's recommendations.

c. Wire, perforated metal strap, and wooden plugs are not acceptable as fastening material.

d. Materials used shall be good quality, made of zinc or cadmium coated steel or other non-corroding material.

e. Materials, whether exposed or concealed, shall be firmly and adequately held in place. Fastening and support shall afford safety factor of three or higher and shall be in full compliance with the seismic protection requirements of the International Building Code.

f. Fixtures, raceways, and equipment shall be supported from the structure. Nothing may be supported on suspended ceiling unless noted so on the Drawings or specifically permitted by the Architect/Engineer.

g. Equipment and raceways attached to outside walls, or interior walls subject to permanent moisture, shall be shimmed out with non-corrodible material to provide 1/4" air space between wall and equipment or raceway.

1.3 EQUIPMENT IDENTIFICATION:

a. Suitable nameplates shall be provided for the identification of electrical equipment including Panelboards, Motor Starters, Safety Switches, and Circuit Breakers.

b. Nameplates shall be of engraved white core plastic laminate, not less than 1/16" thick. For 120/208-volt systems, nameplates shall have white letters on black backgrounds.

c. Engraving shall be of professional quality, with block style letters, minimum 1/4" high.

d. Nameplates shall be attached with sheet metal screws. They shall be sized to allow for installation of screws without obscuring text.

1.4 SLEEVES AND PENETRATIONS:

a. The Electrical Contractor shall provide sleeves and openings for his penetrations through exterior walls, interior walls and partitions, floors, and roofs. Provisions for all such penetrations shall be as approved by the Architect/Engineer.

b. For any raceway passing through an exterior wall, above or below grade, provide appropriate sleeve and water proofing. Center the conduit in the sleeve and fill the space between conduit and sleeve with appropriate compound such as lead and oakum, and then apply caulking compound - Thiocaulk or approved equal - flush with the wall surfaces.

c. For raceways penetrating floor slabs, smoke partitions, and fire-rated walls, provide steel pipe sleeves and seal with high-temperature non-shrink grout or other material as approved by the Architect/Engineer. Materials and installation methods shall be UL listed as a Through-Penetration Firestop System suitable for use with the UL Fire Resistance Design encountered. Refer to the UL fire protection details shown on the drawings. Refer to the UL fire penetration details shown on the drawings.

d. Conduits penetrating roof surfaces for purpose of connecting to roof- top mechanical equipment shall utilize openings and curbs provided for the equipment where possible.

e. For other raceway penetrations through the roof the Contractor shall provide appropriate prefabricated roof curb assemblies - "Pipe Portal System" as manufactured by Roof Products and System Corp., Addison, Illinois or equal method as approved by Architect/Engineer and Roofing Subcontractor.

SECTION 16110

RACEWAYS AND FITTINGS

PART 1: GENERAL

1.1 SCOPE:

a. Provide complete raceway systems as indicated on the drawings, as herein specified, and as required by applicable codes. Comply with Section 16100 Basic Materials and Methods.

b. All wiring shall be installed in raceways unless specifically noted otherwise.

1.2 SUBMITTALS:

a. Submit for approval manufacturer's data sheets for all raceway system components.

PART 2: PRODUCTS

2.1 MANUFACTURERS:

a. Metal raceway and components shall be as manufactured by Allied, Triangle, Wheatland, Thomas & Betts, or other approved manufacturers.

b. Non-metallic raceway system components shall be as manufactured by Carlon, Queen City Plastics, Ipex, or other approved manufacturers.

2.2 MATERIALS AND APPLICATIONS:

a. Rigid Metal Conduit shall be zinc coated Schedule 40 steel or alloy 6063-T42 aluminum with threaded couplings and fittings. Termination at sheet metal enclosures shall consist of double locknuts and insulating bushings. Rigid Steel conduit shall be used for all exposed and concealed work except where other raceways are indicated or permitted. Aluminum conduit complete with aluminum fittings may be used in lieu of steel conduit except in wet locations, underground, or in poured concrete. Steel and aluminum shall not be mixed in the same run of conduit.

b. Intermediate Metal Conduit (IMC) with threaded couplings and fittings may be used for exposed and concealed work in lieu of rigid metal conduit except underground outside the building foundation, or where supporting light fixtures, or in hazardous locations, or where exposed to severe impact or injury. Termination at sheet metal enclosures shall consist of double locknuts and insulating bushings.

c. Electrical Metallic Tubing (EMT) of 4" maximum size may be used for concealed work in lieu of Rigid Metal Conduit except underground or in poured concrete. EMT of 2" maximum size may be used for exposed work in lieu of Rigid Metal Conduit except outdoors, or above a roof, or where supporting lighting fixtures, or where exposed to severe impact or injury, or in hazardous locations, or less than 10 feet above a floor or platform in other than in electrical, mechanical, or communications closets or equipment rooms.

d. Rigid PVC Conduit shall be Schedule 40, UL listed for use with 90°C. Conduit run underground or run in or under a poured concrete slab shall be rigid PVC. Vertical elbows and vertical extensions from underground or concrete embedded PVC conduits smaller than 3" trade size may also be of PVC provided that they remain concealed or otherwise protected but shall be of Rigid Steel Conduit (or IMC where permitted) where they stub up into exposed locations or trade size is 3" or larger. An insulating bushing or end bell shall be provided at each termination. Conduit run underground and not under a poured concrete slab shall have installed continuously above it a warning tape. Tape shall be 12 inches wide, centered on conduit and located 12 inches below finished grade.

e. Flexible Metal Conduit shall be of zinc coated steel of minimum length and shall be used in lieu of Rigid Metal Conduit for connections to moving or vibrating apparatus, recessed lighting fixtures, dry-type transformers, and motors. Flexible Metal Conduit may be used where rigid connections are impractical due to obstructions or space limitations. Flexible Metal Conduit used in wet, damp, or corrosive location shall be PVC jacketed liquid-tight complete with liquid-tight connectors.

f. Fittings for steel conduit and tubing shall be of zinc coated steel or malleable iron. Insulating bushings of plastic provided for Rigid and Intermediate Metal Conduits shall be rated for 150°C. Bonding bushings shall be steel or malleable iron with non-removable plastic throats rated 150°C. EMT fittings shall be of the compression type. Setscrew, indenter, pressure cast, and die cast fittings are not acceptable. Connectors for EMT, Flexible Metal Conduit and Liquid-tight Flexible Metal Conduit shall be the insulated throat type. Connectors for Flexible Metal Conduits shall be of the "Tite-Bite" design.

g. Conduit expansion fittings shall be of zinc coated cast or malleable iron and steel conduit, complete with flexible bonding straps. Expansion fittings shall allow longitudinal conduit movement of 4 inches.

h. Minimum raceway size shall be 1/2", except Flexible Metal Conduit connections to individual lighting fixtures may be 3/8". Other raceway sizes, unless indicated on the drawings, shall be determined by the Contractor in accordance with NEC requirements for type THW insulated conductors, or the actual insulation used if it is thicker than type THW.

PART 3: EXECUTION

3.1 INSTALLATION:

a. Rigid and Intermediate Metal Conduits shall be made up with full threads, to which a conductive pipe compound (T & B Kopr-Shield or equal) has been applied and butted in coupling. Terminations at sheet metal enclosures in indoor dry locations shall be made with double locknuts and an insulating bushing. Terminations at sheet metal enclosures in outdoor, damp, and wet locations shall be made with threaded conduit hubs of zinc coated malleable iron.

b. Except where run under a concrete slab on grade, underground conduits shall be installed a minimum of 30" below graded. Trenching and backfilling shall comply with Section 16010 Electrical General Requirements.

c. All underground conduits shall have metalized warning tape installed above the conduit that identifies the specific system buried below. The warning tape shall consist of a minimum 3.5 mil solid foil core encased in a protective plastic jacket (total thickness 5.5 mils). Tape shall be 6 inches wide with black lettering imprinted on a color-coded background that conforms to APWA color code specifications. Tape shall be installed 18 inches above the conduit and in no case less than 6 inches below grade.

d. Installation of PVC conduit shall be in accordance with the manufacturer's recommendations using solvent welded couplings and fittings. Field bends shall be made with approved heating equipment. Open flames are not permitted. An insulating bushing or end-bell shall be provided at each termination.

e. Conduits shall be rigidly supported not more than 8 feet on center and shall be concealed within walls, ceilings, and floors, except as indicated or specifically approved by the Architect/Engineer; kept at least 6" from flues and steam or hot water pipes; and protected against the entry of dirt, plaster, or trash. Raceways shall be supported independently of suspended ceiling members and suspension wires.

f. Suspended EMT shall be provided with additional hangers at elbows and bends, and where necessary to avoid strain at couplings and connectors.

g. Exposed conduits, where permitted, shall be run parallel or perpendicular to walls, structural members, and ceilings; with right-angle turns consisting of symmetrical bends or cast metal fittings with threaded hubs. Offsets may be used where necessary if they are of minimum length.

h. Conduits crossing expansion and contraction joints shall cross perpendicular to the joint and shall be provided with expansion fittings. Conduits shall not be embedded in the concrete slabs at the expansion and contraction joints.

i. Conduit may not be installed laterally in any concrete slab where the outside diameter of the conduit, measured at a coupling, exceeds one-third the thickness of the concrete. Conduits shall occupy the middle third of the slab when practical and leave at least 3/4-inch concrete cover. Where reinforcing bars occur at the 3/4-inch level the conduit shall be run inside them toward the center of the slab. Conduits may cross each other within the slab provided the 3/4-inch concrete cover is maintained. Conduits shall be tied to the reinforcing rods or otherwise supported when necessary to prevent sagging when concrete is poured. They shall be laterally spaced not closer than three diameters on centers to allow complete coverage.

SECTION 16120

CONDUCTORS

PART 1: GENERAL

1.1 SCOPE:

a. Furnish and install a complete system of wire and cable in compliance with Section 16100 Basic Materials and Methods.

1.2 SUBMITTALS:

a. Submit for approval manufacturer's data sheets for all conductor types.

PART 2: PRODUCTS

2.1 MATERIALS:

a. Insulated conductors shall be as manufactured by Rome, Triangle, Southwire, or approved equal.

b. Unless otherwise indicated, all wire and cable conductors shall be copper.

c. Conductors shall be not smaller than #12 AWG except that #10 AWG minimum is required for the entire length of 120-volt branch circuits whose distance to the center of the load exceeds 75 feet. #14 AWG may be used for signal and remote-control circuits. #16 AWG may be used for taps to individual recessed lighting fixtures on circuits protected by over-current devices rated at 20 amperes or less and contained within flexible metal conduits that do not exceed 6 feet in length. Other conductors that are smaller than #14 AWG may be used only where specifically indicated on the drawings or specified herein.

d. Conductors #10 AWG and smaller shall be solid, dual rated type THWN/THHN.

e. Conductors #8 AWG and larger shall be stranded, dual rated type THWN/THHN.

f. Each conductor shall bear easily readable markings along entire length, indicating size and insulation type.

g. Insulation on conductors #10 AWG and smaller shall be suitably colored in manufacture.

h. Conductors in any location subject to abnormal temperature shall be furnished with an insulation type suitable for temperature encountered.

i. Where no indication is made of wire size, the conductor shall be of N.E.C. size to match its over-current protective device, but in no case smaller than #12 AWG.

PART 3: EXECUTION

3.1 SPLICES, TAPS, AND CONNECTIONS:

a. Splices in conductors #10 AWG and smaller shall be made with twist-on spring steel devices UL listed as Pressure Cable Connectors, with integral insulating covers rated 75°C at 600 volts, except that those used for connections to light fixtures and other heat-producing equipment shall comply with temperature ratings marked on the equipment but not less than 90°C.

b. Splices in copper conductors #8 AWG and larger shall be made with mechanical devices UL listed as Pressure Cable Connectors and insulated with thermoplastic tape UL listed for use as sole insulation. Tape may be omitted from connectors supplied with securely fastened insulating covers which completely enclose the connector and the conductors. Insulating covers shall be rated 75°C at 600 volts.

c. Connect solid wires to equipment, switches, and devices equipped with binding screw terminals by looping the wire under the screw head in such a manner that the loop is tightened as the screw is tightened. Straight-in wiring under screw terminals is not acceptable.

d. Stranded wires shall not be inserted into back-wiring holes on devices, nor shall they be directly connected to screw head terminals. They shall be fitted with insulated crimp-on type spade terminals for connection under the screw head.

3.2 COLOR-CODING:

a. All wiring shall be color-coded.

b. On 208Y/120V, 3 phase, 4 wire power systems, conductor insulation shall be color-coded Black (Phase A), Red (Phase B), Blue (Phase C), and White (Neutral).

c. On 480Y/277V, 3 phase, 4 wire power systems, conductor insulation shall be color-coded Brown (Phase A), Orange (Phase B), Yellow (Phase C), and Gray (Neutral).

d. Insulation for grounding conductors on all systems shall be Green.

e. Conductors #8 AWG and larger may be identified with two or more bands of proper color plastic tape applied near each splice and termination. Painting of wire will not be acceptable.

f. Phase sequence shall be "A", "B" and "C" from left to right, top to bottom or front to back when facing equipment.

g. Control and signal wiring shall not use the above-named colors except green for grounding. Any other colors or striping may be used but the coding shall provide same color or striping between any two terminals being joined.

h. Switch legs, including "Travelers", shall be the same color as phase circuit conductors.

3.3 BRANCH CIRCUIT RACEWAY WIRING:

- a. Three-phase circuits shall be limited to one such circuit per raceway. They shall consist of three different phase wires, and a neutral where required.
- b. A neutral shall not serve more than one circuit. Run a separate neutral for each 120 Volt circuit.
- c. The neutral carrying all or any part of the current of any specific load shall be contained in the same raceway or enclosure with the phase wire or wires also carrying that current.
- d. Circuits shall be connected to panels as shown in the panel schedules.
- e. Conductors supplying lighting outlets may be combined in the same raceways with conductors supplying receptacles; but lighting outlets and receptacle outlets shall not be connected to the same circuits unless specifically indicated on the drawings.

3.4 SERVICE & FEEDER CONDUCTORS:

- a. Unless specifically shown otherwise, each feeder and each set of service conductors shall be installed in a separate raceway.
- b. Where paralleling of conductors is shown for feeders or service entrance, it is absolutely required they be the same length between terminations.
- c. Where service or feeder conductors are so installed that the conductor markings cannot be read without moving or twisting conductors, they shall be provided with suitable tags indicating the conductor size and insulation.

SECTION 16122

METAL-CLAD CABLE SYSTEMS

PART 1: GENERAL

1.1 SCOPE:

- a. Furnish and install a complete system of Metal-Clad Cable for branch circuit, signal, and remote-control wiring as specified herein. Comply with Section 16100 BASIC MATERIALS AND METHODS.
- b. Other branch circuit cable systems such as Types AC, NM, and NMC are not permitted.

1.2 APPLICATIONS:

- a. Metal-clad cables may be used in lieu of wire in metal raceway only for concealed work in dry locations above suspended ceilings and within stud partitions.
- b. Cables may not be run in, or through, concrete or masonry, fire-rated partitions, smoke partitions, or floors.

1.3 SUBMITTALS:

- a. Submit for approval manufacturer's data sheets for metal-clad cable systems.

PART 2: PRODUCTS

2.1 MATERIALS:

- a. Metal-clad cables shall be UL listed as type MC with copper conductors, THHN insulated, with full size green insulated grounding conductors. Minimum sizes shall be #12 AWG for branch circuits, #14 AWG for signal and remote control. Maximum size shall be #10 AWG.
- b. Cable connectors shall be UL listed for grounding the metal sheath. Connectors shall be of steel or malleable iron with insulated throats.
- c. Cables shall be color-coded in manufacture. Color-code shall comply with Section 16120 CONDUCTORS where feasible.
- d. In areas covered by NEC Article 517, provide metal-clad cables suitable for use in health care facilities.

PART 3: EXECUTION

3.1 INSTALLATION:

- a. Cables shall not be run exposed. Conduit skirts may be provided on surface mounted panelboards to conceal cables between panel tops and ceilings.

b. Except where installed in continuous rows, lighting fixtures shall be individually connected to a concealed outlet box. Cables may not be looped from fixture to fixture.

c. Cables above ceilings shall be supported from overhead structure clear of ductwork, suspended ceilings, and ceiling hanger wires.

SECTION 16130

GROUNDING AND BONDING

PART 1: GENERAL

1.1 SCOPE:

- a. The electrical system neutral and all non-current-carrying metal parts, raceways, and enclosures shall be permanently and effectively grounded.
- b. Grounding and bonding shall be provided in strict accordance with the National Electrical Code, and as specified herein and on the drawings.
- c. The Contractor shall note that required grounding conductors and connections are not all shown on the drawings. NEC requirements apply.

1.2 SUBMITTALS:

- a. Submit for approval manufacturer's data sheets for grounding and bonding materials.

PART 2: PRODUCTS

2.1 MATERIALS AND APPLICATIONS:

- a. Grounding conductors shall be of THWN insulated copper, unless otherwise indicated.
- b. Grounding bus bars in distribution equipment shall be bare copper.
- c. Aluminum and aluminum alloys are not acceptable as grounding materials.
- d. Clamps for attaching conductors to water pipes and ground rods shall be of bronze. Ground rod clamps shall be U.L. listed for direct burial.
- e. Clamps for attaching conductors to building steel shall be of steel, bronze, or malleable iron.
- f. Threaded hubs for bonding metal raceways to the contained grounding electrode conductors and to the water pipe clamps shall be of bronze or malleable iron. Similar hubs shall be used to bond the same raceways to the conductors and to sheet metal equipment enclosures.
- g. Driven grounding electrodes shall consist of copper clad steel rods. Rods shall be 10 feet long and 3/4" diameter unless otherwise indicated.
- h. Bonding bushings shall be of steel or malleable iron with non-removable plastic throats rated 150°C.
- i. Bonding locknuts and wedges for service conduits shall be of zinc coated steel.

j. Grounding type insulated bonding bushings and jumpers shall be provided where conduits terminate in service entrance equipment, generator feeders, transfer switches, transformers, and where concentric, eccentric, or over-sized knockouts are encountered. The jumpers shall be sized per NEC Table 250-66 for services, generator feeders, and transformers, and per Table 250-122 for branch circuits.

PART 3: EXECUTION

3.1 EQUIPMENT GROUNDING:

a. All non-current-carrying metal parts, raceways, and enclosures of the electrical system and of equipment supplied through the electrical system shall be permanently and effectively grounded.

b. Equipment grounding conductors shall be provided for each feeder and for each branch circuit and shall be contained within the same raceways as the feeder and branch circuit conductors. The equipment grounding conductor shall be THWN insulated copper, not smaller than #12 AWG.

c. Copper bonding strips normally included in small sizes of liquid-tight flexible metal conduit and dependent upon the terminal connectors for bonding continuity will not be accepted in lieu of the equipment grounding conductors specified herein.

d. Grounding terminals on wiring devices, including switches, shall be connected to the equipment grounding conductor included in the branch circuit raceway, and to the device box with suitable jumpers and lugs bolted to the box, not the plaster ring. "G" clips are not acceptable, and "self-grounding" type device mounting screws will not be accepted as the device grounding method.

e. Where metal raceways enter sheet metal enclosures through knockouts provide bonding bushings and jumpers to the enclosure under any of the following conditions:

1. Branch circuit conduit exceeds 1" in size.
2. Feeder conduit regardless of size.

3.2 GROUNDING OF OTHER SYSTEMS:

a. All metal piping systems including water piping, gas piping and sprinkler piping shall be permanently and effectively bonded to the electrical equipment ground system as required by N.E.C. 250.

b. Structural metal systems shall be permanently and effectively bonded to the electrical grounding electrode system as required by N.E.C. 250.

3.3 SEPARATELY DERIVED SYSTEMS:

a. The secondary of a dry-type transformer that is not solidly connected

to the service neutral is a Separately Derived System and must be grounded per NEC 250.

b. The Grounding Electrode Conductor for the neutral and equipment of each Separately Derived System shall be connected to the nearest accessible member of the grounded structural metal building frame where applicable; or, in the absence of suitable structural metal, to the nearest accessible cold-water pipe. This connection shall remain accessible after construction is complete.

c. Grounding Electrode Conductors for Separately Derived Systems shall be without splice and shall be contained within steel raceways and bonded to the raceway at both ends. Raceway may be omitted only where specifically indicated on the drawings.

d. Bond the following together within the enclosure of each Dry-Type Transformer, unless otherwise indicated:

1. Grounding Electrode Conductor described above.
2. Transformer secondary neutral.
3. Transformer enclosure.
4. Equipment Grounding Conductor included in raceway with primary feeder conductors.
5. Equipment Grounding Conductor included in raceway with secondary service conductors.

SECTION 16140

BOXES

PART 1: GENERAL

1.1 SCOPE:

a. Furnish and install outlet boxes, switch boxes, pull boxes, terminal boxes and junction boxes complete as shown and specified.

1.2 SUBMITTALS:

a. Submit for approval manufacturer's data sheets for all box types.

PART 2: PRODUCTS

2.1 MATERIALS AND APPLICATIONS:

a. Unless specifically noted or approved otherwise, boxes shall be of zinc coated steel or cast ferrous alloy as manufactured by Steel City, Raco, Crouse-Hinds, Appleton, or approved equal.

b. For exposed work on the exterior of the building, and in damp or wet interior locations, boxes shall be of cast metal with threaded conduit hubs and gasketed covers; or of zinc coated sheet steel of NEC gauge and size with screw fastened gasketed covers and threaded conduit hubs of zinc coated malleable iron and no knockouts or extraneous openings. Cover screws shall be stainless steel.

c. For exposed work in interior dry locations less than 8 feet above a floor or platform in other than Electrical, Mechanical or Communications Closets or Equipment Rooms, boxes shall be of cast metal with threaded conduit hubs and matching covers; or of zinc coated sheet steel of NEC gauge and size with screw fastened covers and no knockouts or extraneous openings. Cover screws shall be steel.

d. For exposed work in interior dry locations in Electrical, Mechanical, or Communications Closets or Equipment Rooms; or, in other dry areas, 8 feet or more above a floor or platform, boxes 5" square and larger shall be NEC gauge and size of zinc coated sheet steel. 4" octagonal, 4" square and 4-11/16" square "knockout" boxes shall be of zinc coated steel, NEC gauge and size. Box extensions are not permitted on exposed "knockout" boxes, and covers shall be of the raised surface type. "Handy" boxes are not permitted.

e. For concealed work, fixture outlet boxes shall be 4" octagonal minimum, provided with plaster rings in plastered surfaces. Concrete ring boxes shall be used in poured concrete. Switch and outlet boxes in plastered and dry walls shall be 4" square minimum or one-piece multi-gang with appropriate plaster rings. Switch and outlet boxes in exposed brick, block or tile walls shall be single or multi-gang one-piece boxes not less than 3-1/2" deep with square corners and with internal device mounting holes, equal to Steel City Type GW. Boxes in walls finished with ceramic tile or wood paneling shall be 4" square minimum or one-piece multi-gang boxes, fitted with appropriate tile rings having square corners and internal device mounting holes. Gangable boxes

are not permitted.

f. Floor boxes shall be manufactured from stamped steel and painted with a fusion-bonded epoxy designed for use on metal reinforcement bar and related accessories before encapsulation in concrete and approved for use on grade and above grade floors. The box shall be 13-1/8" L x 12-1/2" W x 4" H. Provide the box with six (6) independent wiring compartments that allow capacity for up to six (6) duplex receptacles, communication and/or audio/video services. The box shall permit feed through tunneling from adjacent compartments. Two (2) of the six (6) compartments shall have a minimum wiring capacity of 23 cu in and four (4) compartments shall have a minimum wiring capacity of 52cu in. Four (4) of the six (6) compartments shall have a minimum of 3-1/4 inches of space behind the device plates, and two (2) of the six (6) compartments shall have a minimum of 2-3/8 inches of space behind the device plates. The box shall contain the following number of conduit knockouts: twelve 3/4-inch, four (4) 1-inch, and twelve 1-1/4-inch. The box shall be fully adjustable, providing a maximum of 1- 3/8-inch pre-pour adjustment, and a maximum of 3/4-inch after-pour adjustment. The box shall include a series of device mounting plates that will accept both duplex power devices as well as plates that will accommodate workstation connectivity outlets and modular adapters, audio/video device plates, and other open system devices. Floor boxes shall be Wiremold RFB6E-OG or equal. Activation covers shall be round and manufactured of die-cast aluminum finished in powder-coated gray, black, brass, nickel or bronze as selected by the architect. Activation covers shall be available in flanged and flangeless versions. Covers shall be available with options for tile or carpet inserts, or flush covers. Coordinate cover type with floor conditions. The cover's hinge shall allow for the cover to open 180 degrees. Covers shall be Wiremold 6CT Evolution 6AT Series or equal.

PART 3: EXECUTION

3.1 INSTALLATION:

- a. Set recessed boxes with edges flush with finished surfaces.
- b. Immediately after installation cover boxes to prevent entrance of foreign matter.
- c. Scaling of plans for outlet locations is not necessarily accurate enough for the intent of these specifications. It is the Contractor's responsibility to comply with the evident intent for centering or symmetric arrangement in ceiling and wall spaces. Special attention is also directed to the location of any outlets which are built into, or located in relation to, other features such as shelving, work counters, and equipment. The Contractor shall consult plans and shop drawings on such features and locate outlets as thereby indicated.
- d. Mounting heights indicated herein and on the drawings are approximate dimensions of the center of the box to the floor and may vary slightly to clear obstructions and match joints in masonry. References to "Horizontal" and "Vertical" apply to the orientation of the long dimension of a single-gang plate and of the device mounting strap. Alignment tolerance shall be 1/16 inch.

1. Wall receptacle, data, and telephone outlets shall, unless

otherwise indicated, be installed vertical, 18" up.

2. Outlets indicated as "counter height," as well as boxes for wall switches and wall telephones shall be installed vertical, 46" up, clear of wall cabinets, back-splashes, and wainscot interferences.

e. Switch boxes beside doors shall be on the strike side, with edge approximately 2" from door jamb or trim.

f. Junction and pull boxes may be used as necessary to facilitate wiring if they are hidden from sight (but accessible), or installed in locations where exposed wiring is permitted, or flush mounted at locations approved by the Architect/Engineer.

SECTION 16150

WIRING DEVICES

PART 1: GENERAL

1.1 SCOPE:

a. The Contractor shall furnish and completely install lighting switches, convenience outlets, and special purpose receptacles along with appropriate outlet boxes and device plates as indicated on the drawings and as herein specified.

b. Where connection to an item of equipment is required under this contract, and where such equipment requires a receptacle for connection, the Contractor shall furnish and install the appropriate device, whether the device is specifically shown or specified.

1.2 SUBMITTALS:

a. Submit for approval catalog data sheets for all wiring devices.

PART 2: PRODUCTS

2.1 MANUFACTURERS:

a. Wiring devices and device plates shall be manufactured by Hubbell, Bryant, Arrow Hart, Pass and Seymour, Leviton, or Eagle.

b. Catalog numbers of one or more of the manufacturers are used herein and, on the drawings, to set a standard of quality and capacity. Equivalent products of the other named manufacturers are also acceptable, provided they are submitted and approved in accordance with Section 16010, Electrical General Requirements.

c. All wiring devices of any one general type (e.g., all duplex receptacles or all light switches) shall be of the same manufacturer and shall match throughout.

2.2 WIRING DEVICES AND PLATES - GENERAL:

a. Wiring devices shall be specification grade unless otherwise indicated.

b. Unless otherwise indicated or directed, wiring devices shall be gray in color.

c. Unless otherwise indicated, plates for flush outlets shall be the type 302 stainless steel and shall be standard size. Those for surface cast boxes shall be of steel, of shape and finish to match the box. Screws shall be steel to match the plate.

d. Each wiring device (including each switch) shall be equipped with a Hex-Head green grounding screw for grounding the device and plate to the outlet

box and to the equipment grounding conductor run with the circuit conductors. "Self-Grounding" type mounting screws will not be accepted as the device grounding method.

2.3 SWITCHES:

a. Switches used for lighting control shall be listed to Fed Spec W-S- 896E and rated 20 amps, 120-277 VAC, side wired, Hubbell 1221 series.

b. Switches used for disconnecting small single-phase motors and appliances shall be listed to Fed Spec W-S-896E and rated 20 or 30 amps to match the branch circuit rating and comply with their horsepower ratings, 120-277 VAC, side wired, Hubbell 1221 and 3031 series.

c. Switches with collars around the operating toggle will not be accepted.

2.4 RECEPTACLES:

a. Receptacles shall be listed to UL498 and Fed Spec W-C-596. Unless otherwise indicated or required, receptacles shall be the duplex type, side and back wired, with nylon face. On circuits supplying two or more such receptacles, they shall be rated 15 amps, 125 volts, NEMA 5-15R. Duplex receptacles on individual circuits shall be rated 20 amps, 125 volts, NEMA 5- 20R.

b. Where no other features are indicated on the drawings provide Hubbell 5262 and 5362 series for 5-15R and 5-20R respectively.

c. Where indicated on the drawings provide Ground Fault Circuit Interrupter receptacles, Hubbell GF5262 and GF5362 series for 5-15R and 5-20R respectively. GFCI receptacles shall be Class A, listed to UL standard 943.

d. Where indicated on the drawings, weather-resistant receptacles shall consist of Ground Fault Circuit Interrupter receptacles as specified above with a weather-resistant "WR" rating. Provide with aluminum covers UL listed for wet locations while in use, Pass and Seymour WIUCAST1.

PART 3: EXECUTION

3.1 INSTALLATION:

a. Devices shall be mounted tightly to boxes and be adjusted plumb and level. Devices shall be mounted flush with its associated coverplate. Ears on flush devices shall be in uniform contact with wall surfaces, or the devices shall be fitted with Caddy RLC device levelers. Device plates shall not be used for support of flush devices.

b. Where two or more devices are indicated for gang installation, they shall be trimmed with gang type plates.

c. Grounding type receptacles shall be grounded with insulated copper grounding conductors routed with the circuit conductors.

d. The Contractor shall provide suitable testers, and demonstrate, when directed, that receptacles are operational and correctly wired; and that ground fault circuit interrupter type receptacles will trip when current to ground has a value in the range of 4 through 6 milliamperes.

SECTION 16160

RACEWAY AND OUTLET SYSTEMS

PART 1: GENERAL

1.1 SCOPE:

a. Contractor shall furnish and install systems of raceways, outlet boxes, as indicated on the drawings and as herein specified to accommodate the installation by others of wiring and equipment.

PART 2: PRODUCTS

2.1 MATERIALS:

a. Raceways, and boxes, shall be in compliance with the relevant sections of these specifications.

b. Wall outlets shall consist of standard 4" x 4" x 2-1/2" outlet boxes with single device rings. Trim plates shall be blank to match wiring device trim plates, unless otherwise indicated.

c. Special outlets including floor outlets shall be as noted on the drawings.

PART 3: EXECUTION

3.1 COORDINATION:

a. Contractor shall fully coordinate with the system installer, and shall install raceways, backboards, and grounding conductors in accordance with their requirements.

3.2 INSTALLATION:

a. Install pull boxes as necessary to limit runs between pull points to two 90-degree bends (or equivalent) and to 100 feet in length unless other arrangements are approved by the wiring installers.

b. Leave all raceways with 100 lb. test nylon pull cord.

c. Install raceways and boxes in accordance with relevant sections of these specifications.

d. Unless specifically noted otherwise, provide an individual 1" conduit from each indicated outlet to the nearest cabinet or terminal board for the system involved.

e. Provide all conduits not terminating on boxes with plastic bushings.

SECTION 16190

MISCELLANEOUS MATERIALS

PART 1: GENERAL

1.1 SCOPE:

a. Contractor shall furnish and install miscellaneous materials as indicated on the drawings and as herein specified.

1.2 SUBMITTALS:

a. Submit for approval manufacturer's data sheets on each device specified by this section.

PART 2: PRODUCTS

2.1 CONTROL RELAYS:

a. The relay coil shall operate satisfactorily with coil voltages within 85% to 110% of its voltage rating. Unless otherwise noted, contact rating shall be 10 amps, continuous for the applied voltage level.

b. Time delay relays shall be provided with on-delay or off-delay as required, and repetitive accuracy of plus or minus 0.2%.

c. Relays shall be installed in a suitable enclosure to fit the environment of their location.

d. Relays shall be manufactured by GE, Square D, Eaton or approved equal.

2.2 CONTACTORS:

a. Contactors shall be "electrically held" or "mechanically held" type, as indicated on drawings.

b. Electrically held contactors shall include auxiliary contacts as indicated and line and load terminal connectors.

c. Mechanically held contactors shall be industrial type, single or dual solenoid operator, with mechanism capable of withstanding reduction or loss of control voltage without change of position. Contactor shall incorporate control power cut-out contacts so that the magnetic solenoid operator is only momentarily energized during the instant the switch changes position.

d. Contactor core and coil assembly, or operators, shall operate satisfactorily with coil voltage within 85% or 110% of its voltage rating.

e. All contacts shall be of non-welding, non-corroding silver alloy.

f. Rating of contactors shall be as indicated on drawings. Auxiliary relays shall be provided as applicable. Contactors shall be contained in a suitable enclosure for the environment of their location. Contactors shall be suitable for a continuous load not less than 100% of their electrical rating.

- g. Contactors shall be manufactured by GE, Square D, Eaton or approved equal.

2.3 INDIVIDUAL PUSHBUTTONS, SELECTOR SWITCHES AND INDICATING LIGHTS:

- a. Pushbuttons shall be heavy-duty, oil-tight, momentary, or maintained contact, as applicable, devices rated 600 volts with the number of buttons and the marking of nameplates in accordance with NEMA Publication ICS.

- b. Pushbuttons shall be designed with the indicated number of normally open circuit closing contacts, normally closed-circuit opening contacts, or combination thereof. Pushbuttons shall have positive make and break non-welding, non-corroding silver alloy contacts.

- c. Selector switches for control circuits shall be heavy-duty, oil-tight maintained contact devices with the number of positions and the marking of nameplates as indicated on drawings or otherwise specified.

- d. Indicating lights for control circuits shall be oil-tight, instrument type devices with threaded base and collar for flush mounting and translucent convex lens. Indicating lights shall be long life type, rated 7500 hours, minimum. Provide Owner with two spare indicating lights of each size and type used.

- e. Pushbuttons, selector switches and indicating lights shall be contained in an enclosure suitable for the environment of their location, and shall be Square D Class 9001, Type T Series, or equivalent as accepted by the A-E, and shall be Square D Class 9001, Type T Series, or approved equal.

2.4 CONTROL CIRCUIT TRANSFORMERS:

- a. Control circuit transformers shall be provided within the enclosure of magnetic contactors when indicated on drawings or specified otherwise and the line voltage is more than 120 volts. The transformer shall be dry type single phase, 60 hertz alternating current with a 120-volt isolated secondary winding in accordance with NEMA Publication STL "Specialty Transformers".

- b. The rated primary voltage of the transformer shall be not less than the rated voltage of the controller. The rated secondary current of the transformer shall be not less than continuous duty current of the control circuit.

- c. The voltage regulation of the transformer shall be such that with rated primary voltage and frequency the secondary voltage will not be less than 95% or more than 105% of rated secondary voltage.

- d. The source of supply for control circuit transformers shall be taken from the load side of the main disconnecting device. The primary and secondary windings of the transformer and control circuit wiring shall be protected against overloads and short circuits with properly selected fuses. The secondary winding of the control circuit transformer shall be grounded.

2.5 WALL BOX DIMMERS:

- a. Wall box dimmers shall be flush mounted, with built-in push-push switch and rotary dimming control, or sliding knob, as applicable. Dimmers shall be continuously rated for AC (60 Hz) loads of wattage as shown on drawing.
- b. LED dimmers shall be suitable for dimming 120-volt LED 0-10V driver loads and shall be single pole or 3-way type as indicated on drawing. Dimmers shall be Lutron Diva Series or equivalent.
- c. Dimmers shall be installed in accordance with manufacturer's recommendations.
- d. Dimmers shall be UL listed.

2.6 PROGRAMMABLE LIGHT SWITCHES:

- a. The digital time switch shall be programmable to turn lights off after a preset time.
- b. Time switch shall be a completely self-contained control system. It shall have a ground wire and ground strap for safety. Switching mechanism shall be a latching air gap relay.
- c. Time switch shall be compatible with all LED and motor loads.
- d. Time switch shall operate at universal voltages of 100-300 VAC, 50/60 Hz.
- e. Time switch shall have no minimum load requirement and shall be capable of controlling 0 to 800 watt incandescent, fluorescent @ 100/120 VAC, 50/60 Hz; 0 to 1200 watts fluorescent @ 230/277 VAC, 50/60 Hz; 1/6 hp @ 125 VAC.
- f. Time scroll feature shall allow manual overriding of the preset time- out period.
- g. Time switch shall have the option for a one second light flash warning at five minutes before the timer runs out and twice when the countdown reaches one minute (when used to control lighting loads).
- h. Time switch shall have the option for a beep warning that shall sound every five seconds once the time switch countdown reaches one minute.
- i. Time switch shall have manual feature for timer reset where pressing the ON/OFF switch for more than 2 seconds resets the timer to the programmed time-out period.
- j. Time switch shall have an electroluminescent backlit Liquid Crystal Display that shows the timer's countdown.
- k. Time-out period shall be adjustable increments of 5 minutes from 5 minutes to 1 hour, and in increments of 15 minutes from 1 hour to 12 hours.

- l. Time switch shall be capable of operating as an ON/OFF switch.
- m. The time switch shall have a 100% OFF override switch with no leakage current to the load.
- n. In the event there is an open circuit in the AC line such as a ballast or lamp failure, the time switch shall automatically switch to OFF mode.
- o. Time switch shall have 5-year warranty and shall be UL and CUL listed.

2.7 SPECIAL ENCLOSURES:

- a. Special enclosures designed in accordance with UL and NEMA Standards shall be provided as required to protect devices and equipment from wet, dusty, corrosive, hazardous or flammable atmospheres. Enclosures shall be NEMA Type 3R, 3S, 4X, 7, 9, 12, or 13 in accordance with the environment present in the specific location.
- b. Enclosures shall be made of metal unless otherwise specifically noted.
- c. NEMA Type 4X enclosure shall be made of corrosion-resistant, chromium nickel stainless steel conforming with UL Standard No. 50 "Cabinet and Boxes".
- d. NEMA Type 7 and 9 enclosures shall be made of cast iron, bolted-type UL listed for the use intended. Cast metal enclosures shall be not less than 1/8" thick at every point, except that it shall be not less than 1/4" thick at tapped holes for conduits.

2.8 OCCUPANCY SENSORS:

- a. Occupancy sensors shall be provided where indicated on the drawings. Sensors shall be the dual technology type suitable for sensing both passive infrared and ultrasonic wave type, complete with a self-contained power/switch unit to avoid the need for low voltage wiring to a remote sensor. Each sensor shall have a time delay circuit adjustable from 6 - 15 minutes with a shortened 30 second time delay feature for set-up purposes and a manual time delay bypass feature. In addition, each sensor shall have a LED walk test indicator for set-up purposes.
- b. The power/switch pack shall consist of a control transformer and rectifier circuit and a relay with contacts rated 277 VAC, 20 Amp, 4800 Watts.
- c. The sensor shall be sensitive to 9 - 10 micron/meter wavelength infrared heat waves.
- d. Upon detection of the heat waves or motion, the relay contacts shall instantly close to activate the room lighting. The contacts shall remain closed until no motion or presence of waves is sensed for the full length of time set by the adjustable time delay circuit.
- e. The sensor shall be ceiling mounted and located as recommended by the manufacturer. The sensor shall be provided complete with all necessary hardware, brackets, special boxes and covers.

f. Unless otherwise indicated, all lighting within the room where the occupancy sensor is located shall be controlled by the occupancy sensor.

g. Occupancy sensors shall provide 95% coverage of space where shown. Provide additional sensors as required to achieve this coverage.

h. Submit layout of all occupancy sensors specific for this project as developed by the sensor manufacturer prior to installation of sensors.

PART 3: EXECUTION

3.1 INSTALLATION:

a. Devices specified by this section shall be installed such that only one wire is terminated on any given screw.

3.2 COMMISSIONING:

a. For all lighting control devices specified in this section, provide a factory-certified field service engineer to make a site visit to ensure proper system installation and operation under following parameters:

1. Qualifications for factory-certified field service engineer:

(a) Minimum experience of 2 years training in the electrical/electronic field.

(b) Certified by the equipment manufacturer on the system installed.

2. Make a visit upon completion of installation of lighting control device:

(a) Verify connection of power feeds and load circuits.

(b) Verify connection and location of controls.

(c) Program system data.

(d) Verify proper operation of manufacturers interfacing equipment.

(e) Obtain sign-off on system functions.

(f) User to be trained on system operation.

SECTION 16400

SECONDARY DISTRIBUTION EQUIPMENT

PART 1: GENERAL

1.1 SCOPE:

a. Provide equipment for over-current protection, switching, disconnecting, transformation, control of services, separately derived systems, feeders, and branch circuits as indicated on the drawings and as herein specified.

PART 2: PRODUCTS

2.1 MANUFACTURERS:

a. Distribution equipment, other than fuses, shall be manufactured by Square D, General Electric, Siemens, or Eaton. Equipment design features and components indicated on the drawings are those of Eaton, and the standard construction features of that manufacturer shall be considered as minimum requirements, with additional requirements as specified herein and on the drawings.

b. Fuses shall be manufactured by Bussmann, Gould Shawmut, or Littelfuse.

2.2 OVERCURRENT PROTECTION DEVICES:

a. Unless otherwise indicated, circuit breakers shall be provided as the over-current protection devices for services, separately derived systems, feeders, and branch circuits. Fuses may be used only where indicated on the drawings, or required by the nameplate for equipment connected, or specified herein.

b. Molded-case and insulated-case circuit breakers shall be the static or thermal-magnetic type, quick-make, and quick-break for manual and automatic operation. Multi-pole breakers shall be common trip. Circuit breakers shall be bolted in place where possible. Thermal-magnetic breakers shall be calibrated at 40°C or ambient compensated. Ampere ratings, frame sizes, and short circuit ratings shall be as indicated on the drawings. Series ratings may be applied only where specifically indicated on the drawings. Individual enclosures shall be NEMA 1 indoors, 3R outdoors, unless otherwise indicated. Other circuit breakers shall be suitable for installation in Panelboards as hereinafter specified.

c. Single-pole 15- and 20-amp circuit breakers shall be SWD rated.

d. Fuses shall be the non-renewable, time delay, cartridge type, UL Class RK5 unless otherwise indicated; for installation in Safety Switches, as hereinafter specified.

2.3 SWITCHING EQUIPMENT:

a. Fusible switches shall be incorporated into Safety Switches, as

hereinafter specified. Manual operation shall be quick-make and quick-break. Fuse holders shall be the Class R rejection type unless otherwise indicated.

b. Safety Switches shall be the NEMA heavy duty type, horsepower rated, with interlocked covers, non-fusible except where fused switches are indicated, or fuses are required. Switch mechanisms shall be quick-make and quick-break. Enclosures shall be NEMA 1 indoors, NEMA 3R outdoors unless otherwise indicated. Fuse holders, where required, shall be as specified above for fusible switches.

c. Switches for disconnecting small single-phase motors and appliances shall comply with SECTION 16150 WIRING DEVICES.

2.4 APPLICATION:

a. Distribution Equipment shall be sized for installation with required clearances at the locations shown on the drawings. Alternative arrangements may be submitted to the Architect/Engineer by the Contractor for approval, in the form of shop drawings, drawn to scale and showing actual dimensions of proposed equipment and required clearances.

b. Unless otherwise indicated, Distribution Equipment shall be connected with wire and cable as specified in SECTION 16120 CONDUCTORS. In general, these specified conductors are rated for a maximum operating temperature of 75°C and are sized for that temperature rating in an ambient of 30°C. Distribution equipment, including terminal lugs, temperature sensitive devices, and enclosures shall be designed, sized, and labeled for field connection with conductors as specified.

c. Power conductors shall be properly tightened and/or torqued as recommended by the equipment manufacturer supplying the lugs/terminals used for terminating the conductors.

d. Lugs/terminals shall comply with UL standards UL486A and UL486B.

2.5 IDENTIFICATION:

a. Equipment nameplates, and nameplates for individually mounted switches, circuit breakers, shall comply with SECTION 16100 BASIC MATERIALS AND METHODS.

b. Group-mounted circuit breakers in Panelboards shall be provided with nameplates as described above; or they shall be identified with numerals and cardboard directories in metal or heavy polycarbonate, directory frames. Directories in metal frames shall be protected with rigid plastic covers. Directories shall be sized to permit all circuit designations to be read without removing the card from the frame.

c. Manufacturer's nameplates or labels on custom fabricated or factory assembled custom equipment shall contain sufficient identification to expedite the future procurement of parts, additions, and shop drawings.

d. Service equipment shall be UL labeled as "Suitable for use as Service Equipment." Service disconnects shall be clearly identified.

PART 3: EXECUTION

3.1 INSTALLATION:

- a. Distribution Equipment shall be installed in strict accordance with the manufacturer's instructions for handling, support, connections, assembly, protection, energizing, adjustment, and similar procedures.
- b. Fastening methods shall comply with SECTION 16100 BASIC MATERIALS AND METHODS.
- c. Equipment interiors shall be thoroughly cleaned of dust, dirt, trash, and other foreign material prior to energizing of the equipment.
- d. Exterior Safety Switches that are readily accessible to unauthorized persons shall have their covers padlocked closed by the Contractor. Keys shall be identified and delivered to the Owner.
- e. Upon completion of the project, furnish to the Owner one complete set of replacement fuses, consisting of three fuses of each type and rating used.
- f. Directory cards for Panelboards shall be neatly filled-in with a typewriter to indicate the type and location of the load on each circuit or feeder.

SECTION 16420

PANELBOARDS

PART 1: GENERAL

1.1 SCOPE:

a. Furnish and install Lighting, Power, and Distribution Panelboards as indicated on the drawings and as herein specified.

b. Panelboards and their installation shall comply with applicable requirements of SECTION 16400 - DISTRIBUTION EQUIPMENT.

1.2 SUBMITTALS:

a. Submit for approval panelboard shop drawings which include as a minimum the following information:

1. Cabinet dimensions.
2. Mounting requirements.
3. Bussing arrangement.
4. Circuit breaker arrangement.
5. Accessories.

PART 2: PRODUCTS

2.1 BRANCH CIRCUIT PANELBOARDS:

a. Panelboard types, ratings, and contents shall be as shown on the Drawings.

b. Equipment shall be built to NEMA Standard PB-1, UL Standards UL50 and UL67, and NEC requirements.

c. Panelboard back-boxes shall be constructed of galvanized sheet steel and shall be securely fabricated with screws, bolts, rivets, or by welding. Back-boxes shall be a minimum 20" wide and 5-3/4" deep, unless noted otherwise, and heights shall not exceed 72" overall. Top or bottom gutter space shall be increased 6" where feeder loops through panel. End plates shall be supplied without knockouts.

d. Covers shall be constructed of high-grade flat sheet steel with:

1. Door-in-door construction shall be provided. The inside hinge door shall allow access to device handles only. Door shall close flush with cover and against a full inside trim stop. Hinges shall be inside type. The outer hinged door shall allow access to wiring gutter.

2. A flush latch and tumbler type lock, so panel door may be

held closed without being locked. All such locks shall be keyed alike. Furnish to the Owner two keys with each lock, or a total of 10 keys for the project.

3. Four or more cover fasteners of a type which will permit mounting plumb on box. Cover shall also have inside support studs to rest on lower edge of back-box while being fastened. For flush mounted panelboards, cover fastening hardware shall be concealed behind the hinged door.

e. A means shall be provided for readily adjusting projection of panel interior assembly with all connections in place. A method requiring stacking of washers is not acceptable. Interior trim shall fit neatly between interior assembly and cover leaving no gaps between the two.

f. Panelboard phase and neutral bus bus-work shall be copper. A copper ground bus shall be provided in each panel.

g. Minimum short circuit rating of any panelboard assembly shall be 10,000A. Furnish panelboards with higher rating where so noted or where evidently intended by specification of circuit breakers with higher interrupting capacity.

h. Ampacity of mains shall be equal to, or greater than, the ampacity of the feeder unless otherwise indicated.

i. Where drawing schedules indicate spaces for addition of future circuit breakers; furnish all necessary bus-work, strap, brackets, hardware, and removable blank covers.

j. Breakers in panelboards shall be physically arranged in locations shown in panel schedules on the drawings where possible. They shall be connected to the phases as shown.

k. Unless otherwise indicated and where available for the panelboard type specified, circuit breakers shall be of the bolt-on type.

l. Provide surge suppressor external to panelboard as indicated on the drawings and by Section 16401 of the specifications for limiting surge voltages and to prevent continued flow of follow current while remaining capable of repeating these functions.

PART 3: EXECUTION

3.1 INSTALLATION:

a. Equipment shall be perfectly plumb and level.

b. Openings in back-boxes shall be cut or sawed with tools made for that purpose. Burning of openings is absolutely unacceptable.

c. Unused openings shall be closed.

d. Only one solid wire is allowable under a screw. Provide approved lugs for connecting stranded wire or more than one solid conductor.

e. Centered above the breakers in each panelboard attach a nameplate indicating panel designation - for example "PANEL A", or "PANEL MDP". Nameplates shall comply with SECTION 16100 BASIC MATERIALS AND METHODS.

f. Panelboard back-boxes shall be mounted with their tops 6'-8" above the floor.

SECTION 16460

DRY-TYPE BUILDING TRANSFORMERS

PART 1: GENERAL

1.1 SCOPE:

a. Contractor shall furnish and install Dry-Type Transformers as indicated on the drawings and as specified herein.

b. Transformers and their installation shall comply with applicable requirements of SECTION 16400 – SECONDARY DISTRIBUTION EQUIPMENT.

c. Transformers shall be energy efficient. Transformers shall meet or exceed NEMA TP-1 requirements. A Class 220°C insulation system and a 115°C temperature rise rating shall be provided. The transformer overload capability shall be in accordance with IEEE C57.96; for standard transformers, and IEEE C57.110; for K-rated transformers.

d. The energy policy act of 2005 (EPACT 2005), public Law 109-58, came into effect January 1, 2007, will be enforced.

1.2 SUBMITTALS:

a. Submit for approval manufacturer's data sheets for each dry-type transformer provided. Submittal shall show as a minimum the following information:

1. Electrical characteristics.
2. Impedance.
3. Primary taps available.
4. Insulation class.
5. Decibel ratings.
6. Enclosure dimensions.
7. Installation and maintenance instructions.

PART 2: PRODUCTS

2.1 RATINGS:

a. Voltage and KVA ratings shall be as indicated on the drawings.

b. Unless otherwise indicated, 3-phase transformer primary voltages shall be 480V "delta", and secondary voltages shall be 120/208V, 4 wire "wye".

c. The transformer overload capability shall be in accordance with

IEEE C57.96 for standard transformers and IEEE C57.110 for non-linear transformers.

- d. Transformers shall be energy efficient and shall meet or exceed NEMA TP-1 requirements.

2.3 CONSTRUCTION FEATURES:

- a. Enclosures shall be ventilated for indoor use unless otherwise indicated.
- b. Transformers shall be designed for floor or platform mounting; however they shall be provided with wall mounting brackets where wall mounting is indicated on the drawings.
- c. Windings shall be of copper or aluminum. Windings shall be designed for full load operation at a maximum temperature rise of 115°C above a 40°C ambient; however winding insulation shall be rated 220°C.
- d. Each transformer shall be provided with FCBN taps on the primary winding of the manufacturer's standard percentages, but not less than four 2.5% FCBN taps.
- e. Core and coil assemblies shall be mounted on rubber isolation pads to minimize transmission of sound and vibration. Sound levels for individual transformers, measured in accordance with NEMA standards, shall not exceed 45 decibels for sizes 225 KVA and smaller and 50 decibels for sizes larger than 225 KVA.

PART 3: EXECUTION

3.1 MOUNTING:

- a. For floor mounted units, provide 4" high poured concrete pads. Provide vibration isolating pads under frame supports.
- b. Where transformers designed for floor mounting are indicated to be wall mounted, provide manufacturer's standard mounting brackets, or provide steel channel frames, attached to the wall and suspended from the building structure using 1/2" diameter threaded steel rods.

3.2 CONDUIT CONNECTIONS:

- a. Where feasible, conduits shall enter the enclosures of floor mounted transformers from underneath.
- b. Where conduits must attach to transformer housing, utilize 12" lengths of flexible conduit terminated with connectors and bonding bushings.

3.3 SECONDARY CONNECTIONS:

- a. Transformer enclosures and secondary neutrals shall be grounded as Separately Derived Systems. See Section 16130.

b. Transformer secondary protection shall be provided in accordance with the requirements of the NEC and local requirements.

3.4 LABELING:

a. Each unit shall bear manufacturer's nameplate indicating transformer rating and connection diagram.

b. Provide nameplate indicating transformer designation, voltage, and device from which transformer is supplied. Nameplates shall be in accordance with the requirements of Section 16100, Basic Materials and Methods.

3.5 ADJUSTMENTS:

a. The Contractor shall adjust the transformer taps to produce, approximately, the secondary voltages indicated at no load.

3.6 NOISE AND VIBRATION:

a. Transformers producing objectionable sound or vibration shall be corrected as directed by the manufacturer or replaced.

SECTION 16500

LIGHTING FIXTURES AND ACCESSORIES

PART 1: GENERAL

1.1 SCOPE:

a. The Contractor shall furnish and completely install Lighting Fixtures and Accessories as indicated on the drawings and as herein specified.

b. A lighting fixture shall be provided for each lighting outlet indicated. Outlets lacking fixture designations shall be brought to the attention of the Architect/Engineer before submitting proposal; otherwise, units selected by the Architect/Engineer shall be furnished and installed at no additional charge.

1.2 SUBMITTALS:

a. Submit for approval complete manufacturer's data sheets for all fixtures. Indicate all components, characteristics, and options.

b. Submit for approval Lighting Fixture samples as requested by the Architect/Engineer. Samples shall be equipped with lamps, cords, plugs, and ballasts for 120-volt operation.

PART 2: PRODUCTS

2.1 LIGHTING FIXTURES:

a. All fixtures shall be labeled by Underwriters' Laboratories, Inc.

b. Fixture designations on the drawings generally consist of a letter indicating the fixture type. Fixture types are identified in the Lighting Fixture Schedule or Symbol Schedule; however, the Schedule does not necessarily list all accessories and hardware necessary for the complete installation, nor does it detail the construction to be encountered at the fixture locations. It is the Contractor's responsibility to properly determine and provide correct components, accessories, and hardware required for the installation.

c. Pendant Fixtures shall be equipped with swivel hangers; twin stem for individual fixtures and single stem for continuous row fixtures, spaced according to the manufacturer's recommendations but not less than one per fixture unit plus one per row.

d. Recessed fixtures in plaster and gypsum board ceilings shall be equipped with plaster frames. In other ceilings they shall be equipped with plaster frames and/or other devices as approved by the Architect/Engineer, to facilitate removal of fixture and access to the concealed junction box.

e. Plastic materials indicated to be "acrylic" shall be of 100% virgin methyl methacrylate produced by Rohm and Haas, Dupont, or Cyanamid.

f. Recessed Fixtures (Troffers) shall conform to the following minimum

1. Housings shall be 5" maximum depth and of 22-gauge minimum steel, with deeply formed transverse ribs for rigidity, primed, and finished in baked white enamel. The use of pre-painted steel is acceptable.

2. Lenses shall be of flat clear K-12 type acrylic of .125" nominal (.115" minimum) thickness in rigid hinged steel or extruded aluminum door frames finished in baked white enamel and secured with inconspicuous spring-loaded or rotary cam type steel latches. Lenses shall be maintained in a flat position with invisible clips and shall be removable from the door frames using a screwdriver without damaging the lens or the frame.

3. Joints between housings and door frames shall be totally free of light leaks. Gaskets, if used, shall be invisible and in compression when the door is closed. Gasket material subjected to rubbing when the door is opened or closed will not be accepted. Flexible and/or removable black baffles will not be accepted.

4. Top access plates to facilitate wiring are optional with the Contractor. Each fixture shall be individually connected to a concealed junction box with #16 TFN conductors in 6 feet of 3/8" flexible metal conduit.

5. Troffers for inverted tee exposed grid ceilings shall be designed to be raised through the ceiling opening and shall be supported independently of the grid system with two hangers on diagonal corners. Hangers shall be No. 12 AWG and shall be attached to the building structural system. They shall be secured to the ceiling grid at all four corners using sheet metal screws.

6. Troffers for plaster and gypsum board ceilings shall be furnished with plaster frames.

7. Troffers for ceilings with concealed suspension systems including plaster, gypsum board, and acoustical tile shall be equipped with suitable adjustable yokes or brackets designed to hook onto the plaster frame or ceiling channels, prevent the channels from spreading, and support the fixture.

8. Fixtures shall be a regularly cataloged and commonly manufactured product of an established, recognized lighting fixture manufacturer, with published photometric data and Zonal Cavity Coefficients of Utilization based on tests conducted by an independent photometric testing laboratory. Tests and calculations shall be in accordance with current IES standards.

2.2 LED DRIVERS:

a. General

1. Provide with ten-year operational life while operating at maximum case temperature and 90 percent non-condensing relative humidity.

2. Designed and tested to withstand electrostatic discharges up to 15,000 V without impairment per IEC801-2.

3. Electrolytic capacitors to operate at least 20 degrees C below the capacitor's maximum temperature rating when the driver is under fully loaded conditions and under maximum case temperature.
4. Maximum inrush current of 2 amperes for 120V and 277V drives.
5. Withstand up to a 4,000-volt surge without impairment of performance as defined by ANSI C62.41 Category A.
6. Manufactured in a facility that employ ESD reduction practices in compliance with ANSI/ESD S20.20.
7. Class A Sound Rating – Inaudible in a 27-dBA ambient.
8. No visible change in light output with a variation of plus/minus 10 percent line voltage input.
9. Total Harmonic Distortion less than 20 percent and meet ANSI C82.11 maximum allowable THD requirements.
10. Drives to track evenly across:
 - a. Multiple fixtures.
 - b. All light levels.
11. Constant current drives must provide models to:
 - a. Support from 200mA to 2.1 Amps (in 10mA steps) to ensure a compatible driver exists.
 - b. Support LED arrays up to 40W or 50W (710mA to 1.05A in 10mA steps).
12. Constant voltage drives must provide models to:
 - a. Support from 10V to 40V (in 0.5V steps) to ensure a compatible driver exists.
 - b. Support LED arrays up to 40W.
13. Configuration tool must be available to optimize the following for LED fixtures:
 - a. Light level.
 - b. Efficacy.
 - c. Thermal performance.
14. Driver must be capable of operating from a supply voltage of 120 through 277VAC at 60Hz for digitally addressable and 3-wire models.
 - b. Three-Wire Control
 1. Continuous dimming from 100 percent to 1 percent relative light output.
 2. Provide integral fault protection to prevent driver failure in the event of an input mis-wire.
 - c. Digitally Addressable Control
 1. Continuous dimming from 100 percent to 1 percent relative light output.
 2. Ability to operate with installed or specified building control system.
 3. Lights automatically return to the setting prior to power interruption.
 4. Each driver responds independently to:
 - a. Up to 32 occupant sensors.
 - b. Up to 16 daylight sensors.
 5. Responds to digital load shed command.
 - a. Sets high end trim.
 - b. Automatically scales light output proportional to

load shed command.

d. Forward Phase Control (Neutral Wire Required)

1. Continuous dimming from 100 percent to 1 percent relative light output.

e. LED 0-10V Dimming Drivers

1. LED Driver shall be installed inside an electrical enclosure.
2. Wiring inside electrical enclosure shall comply with 600V/105°C rating or higher.
3. LED Driver is certified by UL Class 2 for use in a dry or damp location.
4. Led Driver has Class A sound rating.
5. LED Driver has a minimum operating ambient temperature of -40°C.
6. LED Driver has a life expectancy of 50,000 hours at Tcase of ≤70°C.
7. LED Driver has a life expectancy of 100,000 hours at Tcase ≤62°C.
8. LED Driver has a maximum self rise of 25°C in open air without heat sink.
9. LED Driver maximum allowable case temperature is 75°C.
10. LED Driver reduces output power to LEDs if maximum allowable case temperature is exceeded.
11. LED Driver has a failure rate ≤ 0.01% per 1,000 hours at Tcase ≤70°C.
12. LED Driver has a failure rate of 0.01% - 0.02% per 1,000 hours at Tcase of 70°C - 80°C.
13. LED Driver tolerates sustained open circuit and short circuit output conditions without damage.
14. LED Driver complies with FCC rules and regulations, as per Title 47 CFR Part 15 Non-Consumer (Class A).
15. The maximum available output parameters of the driver met the Class 2 Inherently limited parameters.
16. The Driver is suitable for use in "Dry" and "Damp" locations.
17. When the driver is installed in the end-use application, the measured case temperature at the (Tc) location specified on the marking label must not exceed 77.6°C.
18. The driver shall be installed in compliance with the requirements of the end-product standard.
19. The case of the driver must be connected to Earth ground when installed in the end-use application.

2.3 EMERGENCY EXIT LUMINARE:

a. It shall be completely self-contained, provided with maintenance-free battery, automatic charger, and other features. Luminaire must be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, N.C. Building Code, Volume X Energy Code, NFPA-101, and NEMA Standards.

b. Battery shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Battery shall have a normal life expectancy of 10 years. Batteries shall be high temperature type with an operating range of 0- degree C to 60 degrees C and contain a resealable pressure vent, a sintered + positive terminal and – negative terminal.

c. Charger shall be fully automatic solid-state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated with the voltage drops below 80 percent. A low voltage disconnect switch shall be included if LEAD Battery is used, to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.

d. Pilot light shall indicate the unit is connected to AC power. The battery shall have high-rate charge pilot light, unless self-diagnostic type. Tests switch shall simulate the operation of the unit upon loss of A.C. power by energizing the lamps from the battery. This simulation must also exercise the transfer relay.

e. The entire unit shall be warranted for three years. The battery must have an additional two more years' pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.

f. The use of LED is required due to their reliable performance, low power consumption, and limited maintenance requirements. Maximum LED failure rate shall be 25% within a seven (7) year period; otherwise, if exceeded, manufacturer shall replace the complete unit at no charge to the owner.

g. Contractor shall perform a test on each unit after it is permanently installed and charged for a minimum of 24 hours. Battery shall be tested for 90 minutes. The battery test shall be done 10 days prior to final inspection. Any unit which fails the test must be repaired or replaced and tested again. The test shall demonstrate that the batteries conform to the requirements of NEC 700.12 (F).

2.4 EMERGENCYEGRESSLUMINARE:

a. Shall be completely self-contained, provided with maintenance-free 12-volt battery, automatic charger, two lamps, and other features. Luminaire shall be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, International Building Code, NFPA-101, and NEMA Standards.

b. Pilot light shall indicate the unit is connected to A.C. power. The battery shall have high-rate charge pilot light unless self-diagnostic type. A test switch shall simulate the operation of the unit upon loss of A.C. power by energizing the lamps from the battery. This simulation must also exercise the transfer relay. If fluorescent emergency unit is used, an LED charging indicator light must be easily visible after installation and a remote test switch shall be installed adjacent to the fixture.

c. Battery shall be sealed, maintenance free type, with minimum of 90

minutes operating endurance. Battery shall have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of 0 degree C to 60 degrees C and contain a re-sealable pressure vent, a sintered + positive terminal and – negative terminal.

d. Charges shall be fully automatic solid-state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80%. A low voltage disconnect switch shall be included if LEAD battery is used, to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.

e. The entire unit shall be warranted for three years. The battery must have an additional two more years' pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.

f. Contractor shall perform a test on each unit after it is permanently installed and charged for a minimum of 24 hours. Battery shall be tested for 90 minutes. The battery test shall be done 10 days prior to final inspection. Any unit which fails the test must be repaired or replaced and tested again. The test shall demonstrate that the batteries conform to the requirements of NEC 700.12 (F).

PART 3: EXECUTION

3.1 COORDINATION:

a. Contractor shall verify ceiling or wall type in or on which each fixture is to be mounted, and shall furnish unit with appropriate trim type, mounting hardware, and accessories to fit the construction; and feed through junction boxes as required to maintain proper access to system wiring.

3.2 INSTALLATION:

a. Lighting fixtures shall be installed in accordance with the manufacturer's instructions.

b. Lighting fixtures shall be supported from the building structure using corrosion resistant steel hardware in compliance with Section 16100, Basic Materials and Methods.

c. A minimum of two No. 12 gauge wire supports attached to the structure shall be provided for each lighting fixture unless otherwise indicated or approved by the Architect/Engineer. The supports shall be located at diagonal corners of rectangular fixtures and angled away from fixture. A minimum of three full twists shall be made at each end to secure wire.

d. In addition to the supports from the structure, fixtures shall also be secured to suspended ceilings on which they are mounted, or in which they are recessed. Where fixtures are secured to suspended ceilings, the primary supports from the building structure shall be slack.

- e. Conductors in fixture taps shall be #16 AWG minimum, type TFN, in 3/8" flexible metal conduit of 72" maximum length. A green insulated equipment grounding conductor shall be included.
- f. Mount fixtures plumb and square. Keep rows in perfect line.
- g. At time of project completion, fixtures shall be clean and fully operational.

SECTION 16702

FIRE ALARM SYSTEM, ADDRESSABLE

PART 1: GENERAL

1.1 SCOPE:

- a. Contractor shall furnish and install a complete Fire Detection and Alarm System as indicated on the drawings and as specified herein.
- b. System shall include all devices, wiring, equipment, raceways, and connections required for a complete and satisfactorily operating system, whether every such item is specifically shown or mentioned.
- c. System shall be the fully supervised microprocessor based multiplex type utilizing addressable devices.
- d. All initiation devices shall be analog addressable devices. The notification devices shall be installed where required to meet ADA, NFPA 72 and the International Building Code.

1.2 STANDARDS AND CODES:

- a. The equipment and installation shall comply with the current provisions of the following standards and codes:
 - 1. The latest edition of the International Building Code.
 - 2. National Fire Protection Association Standards: NFPA 70
National Electric Code
NFPA 72 National Fire Alarm Code
NFPA 90A Air Conditioning Systems
NFPA 101 Life Safety Code
 - 3. Underwriters Laboratories Inc. Standards:
 - (a) Underwriters Laboratories Inc. for use in fire protective signaling systems shall list the system and all components. The UL Label shall be considered as evidence of compliance with this requirement. The equipment shall be listed by UL under the following standards as applicable:

UL 864/UOJZ, APOU	Control Units for Fire Protective Signaling Systems.
UL 1076/APOU	Proprietary Burglar Alarm Units and Systems.
UL 268	Smoke Detectors for Fire Protective Signaling Systems.
UL 268A	Smoke Detectors for Duct Applications.
UL 217	Smoke Detectors Single Station.
UL 521	Heat Detectors for Fire Protective Signaling Systems.
UL 228	Door Holders for Fire Protective

	Signaling Systems.
UL 464	Audible Signaling Appliances.
UL 1638	Visual Signaling Appliances.
UL 38	Manually Activated Signaling Boxes.
UL 346	Water flow Indicators for Fire Protective Signaling systems.
UL 1971	Visual Signaling Appliances.
UL 1481	Power Supplies for Fire Protective Signaling Systems.

4. Americans with Disabilities Act (ADA).

1.3 CONTRACTOR QUALIFICATIONS:

a. Equipment and materials shall be provided by a factory-authorized distributor to ensure proper specification adherence, final connection, test, turnover, warranty compliance, and service. The factory-authorized distributor is required to have been in the fire alarm industry (service and installation) for a minimum of 5 years.

1.4 SUBMITTALS:

a. Shop drawings shall be submitted for each item of equipment to be furnished.

b. Submittal shall include a complete wiring and conduit layout on the building floor plan, system battery calculations and notification appliance circuit voltage drop calculations, prepared by an authorized representative of the system manufacturer. Layout shall indicate conductor sizes, quantities, and color coding for each conduit run, as well as required conduit sizes.

c. Evidence of listing by Underwriters' Laboratories for all proposed equipment for use as Fire Alarm equipment. (Ref.: Underwriters' Laboratories, Section UOJZ).

d. A copy of the Contractors Training Certification, issued by the manufacturer of the Fire Alarm Control Equipment, shall be provided. These qualification credentials shall not be more than two years old, to ensure up-to-date product and application knowledge on the part of the installing contractor.

e. Proof shall be furnished that the manufacturer of the Fire Alarm System Components is certified as an ISO 9001 company in each of the following disciplines: Design Engineering, Manufacturing, Technical Support, Documentation, Training, and Marketing. In lieu of such proof, the manufacturer must be able to show that the method that they employ in those disciplines is equivalent to ISO 9001 requirements.

1.5 CLOSEOUT DOCUMENTS:

a. A complete set of record wiring schematics, drawn to scale; showing all device locations, wire routing and connections, etc. shall be provided prior to final inspection.

b. Warranty Statement from the manufacturer: Warranty statement will state the period of warranty for all the products proposed for the project and shall include the name and address of the authorized manufacturers' agent who will honor any and all warranty claims.

c. Written Certification by the Fire Alarm Contractor that no power supply or circuit in the system has an electrical load greater than 80% of its rated capacity.

d. A scaled plan of the building showing the placement of each individual item of fire alarm equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway. This shall be submitted in AutoCAD format on CD-Rom or Flashdrive.

e. A Single Line System Block Diagram and written System Operational Overview.

f. Complete battery and voltage drop calculations which include loads for all system components.

g. Field Connection Drawings: A complete set of drawings, one for each Fire Alarm Control Panel module which has any external (field) wiring connected to it, and one for each system detector, module or signaling appliance, shall be supplied.

h. Print-out report detailing the sensitivity of each smoke detector installed in the system. Include date on report.

i. Two copies of the operating system program on CD-Rom and two appropriate cables to load the program from a laptop computer.

j. An address map of the building showing the physical location of the devices and the associated addresses shall be provided.

1.6 SYSTEM FUNCTION:

a. In general, system function shall be as evidently intended by selection of equipment indicated herein.

b. Activation of any manual station, smoke detector, or other alarm initiating device shall cause:

1. The sounding of audible signals throughout the facility.

2. The flashing of alarm indicating signal lights.

3. Indication of the alarm condition at the control panel indicating type of alarm (e.g., whether manual station, smoke detector, etc.) as well as location of initiating device.

4. Shut down of air handling systems, closing of smoke dampers (power and controls) and other control functions as indicated or required.

5. A local sounding device in the panel shall be activated.
 6. All automatic programs assigned to the alarm point shall be executed and the associated notification appliance circuits and control relays addressed and activated.
 7. Other functions as noted on the drawings or as evidently intended or required.
- c. All strobes shall be synchronized in common spaces.
 - d. Provide a horn silence function with an adjustable delay of 2 minutes to 15 minutes. Delay shall prevent silence function from engaging. Silence function shall be manually activated only and shall not prevent visual alarm from flushing.
 - e. Provide a supervised "AHU Shutdown Defeat" switch in or adjacent to the FACP. This switch shall cause a system "trouble" indication when placed in the off-normal (shutdown defeated) position. This switch shall allow temporary resumption of HVAC operation if an unwanted alarm will not clear.

1.7 SUPERVISION:

- a. There shall be independently supervised and independently fused indicating appliance circuits for alarm speakers and strobes. Disarrangement conditions of any circuit shall not affect the operation of other circuits.
- b. All auxiliary manual controls shall be supervised so that all switches must be so that all returned to the normal automatic position to clear system trouble.
- c. Each independently supervised circuit shall include discrete panel readout to indicate disarrangement conditions per circuit.
- d. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the control panel and the remote annunciator. A green "power on" LED shall be displayed continuously while incoming power is present. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel and the remote annunciator.
- e. The System Expansion Modules shall be electrically supervised for module placement. Should a module become disconnected from the controls, the system trouble indicator must illuminate, and audible trouble signal must sound.
- f. The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.

PART 2: PRODUCTS

2.1 MANUFACTURERS:

- a. Gamewell FCI: S3 Series
- b. Notifier: ID60
- c. SimplexGrinnell4010

2.2 SYSTEM COMPONENTS:

a. Control Panel: The panel shall include a master controller board and all modules and components required for specified function including, but not limited to:

- 1. 24 VDC system power and supervisory control.
- 2. Signaling line circuit modules (Class B).
- 3. Notification appliance circuit modules (Class B).
- 4. Auxiliary control circuit modules.
- 5. Battery, charger, control, and metering. Batteries shall be lead-calcium sealed-cell type.

Capacity shall be adequate to operate system for 60 hours minimum in standby, plus 5 minutes in alarm.

6. Modules and/or relays as required for special system functions. Control panel enclosure shall include spare space for a minimum of five additional modules.

b. Multiple Addressable Peripheral Network:

1. The system must provide communications with initiating and control devices individually. All these devices will be individually annunciated at the control panel. Annunciation shall include the following conditions for each point:

- (a) Alarm
- (b) Trouble
- (c) Open
- (d) Short
- (e) Device missing/failed

2. The fire alarm system shall be microprocessor driven with stored program controllers. Each panel (node) on the network shall use a multiple microprocessor design so that the failure of a single microprocessor will not result in a local failure. Fire alarm systems that utilize only one microprocessor for system (node) and SLC control will not be accepted.

3. An Electronic 100% digital Loop Controller shall be provided in the Fire Alarm Control Panel to interface between the panel and the Analytical Microprocessor-based Detectors and modules.

4. All system programming and history shall be permanently stored in non-volatile memory to ensure that no programming or history is lost. Systems which store initial programming or field programming changes in battery backed memory will not be accepted.

5. Electronic Loop Controller shall detect the electrical location of each connected detector and module. The location and type of each connected device shall be mapped and stored in memory in the loop controller. It shall be possible to access and display this map at any time.

6. It shall be possible to obtain a mapping report of all devices connected to the Electronic Loop Controller for confirmation of "as-built" wiring. The mapping report shall show physical wiring of all connected devices, device types, and the panel addresses of devices on the circuit. The Electronic Loop Controller shall be capable of reporting any additional device addresses, which may have been added to the circuit, and/or changes that may have been made to the wiring in the data circuit. A specific trouble shall be reported for any and all off-normal non-alarm condition.

7. Addressable devices shall have the capability of being disabled or enabled individually. Up to 250 addressable devices may be multi-dropped from a single pair of wires. Systems that require factory reprogramming to add or delete devices are unacceptable.

8. The communication format must be a completely digital poll/response protocol. A high degree of communication reliability must be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission portion of the protocol. Systems that do not utilize full digital transmission protocol are not acceptable.

9. Each addressable device must be uniquely identified by an address code entered on each device at time of installation. Device identification schemes that do not use uniquely set addresses but rely on electrical position along the communication channel are unacceptable.

10. Wiring types shall be approved by the equipment manufacturer. The system shall allow a line distance of up to 2,500 feet to the furthest addressable device.

11. The system control panel must be capable of communicating with the types of addressable devices specified below. Addressable devices shall be located as shown on the drawings. There shall be no limit to the number of detectors, stations, or Addressable Modules, which may be activated or "in alarm" simultaneously.

c. Addressable Devices

1. System shall use Analytical Detectors that are capable of full digital communications with the Fire Alarm System using both broadcast and

polling communications protocols. Each detector shall be capable of performing independent advanced fire detection algorithms. The fire detection algorithm shall measure sensor signal dimensions, time patterns, and combine different fire parameters to increase reliability and distinguish real fire conditions from unwanted nuisance alarms caused by environmental events. Signal patterns that are not typical of fires shall be eliminated by digital filters and will not cause a system alarm condition. Devices not capable of combining different fire parameters or employing digital filters will not be acceptable.

2. Each detector shall be capable of identifying diagnostic codes to be used for system maintenance. All diagnostic codes shall be stored in the detector. Each smoke detector shall be capable of transmitting pre- alarm, alarm, and maintenance signals to the Fire Alarm Control Panel via the Electronic Loop Controller.

3. All devices and their bases will also be required to be labeled with engraved Lexan labels to identify device address and intended location. Labels shall be red background with white letters; letters shall be a minimum of 1/4" in height.

4. Heat Detector shall have a solid-state heat sensor and shall transmit an alarm at a fixed temperature of 135°F (57°C) or due to a temperature Rate of Rise of 15°F/minute (9°C/minute). The detector shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The heat detector shall be rated for ceiling installation at 70 ft (21.3m) centers and be suitable for wall mount applications.

5. Photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to detect visible particulates produced by combustion. The detector shall dynamically examine values from the sensor and initiate a system alarm based on the analysis of data. Detector shall continually monitor any changes in sensitivity due to the environmental affects of dirt, smoke, temperature, aging and humidity. The alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5% smoke obscuration per foot. The photo detector shall be suitable for operation in the following environment:

- (1) Temperature: 32°F to 120°F (0°C to 49°C)
- (2) Humidity: 0-93%RH, non-condensing
- (3) Elevation: no limit

6. Mounting base shall support all Smoke detector types detailed in this specification, and have the following minimum requirements:

- (1) Removal of the respective detector will not affect electronic loop communications with other detectors on that loop.
- (2) Field Wiring Connections shall be made to the room side of the base, so that wiring connections can be made or disconnected by the contractor without the need to remove the mounting base from the electrical box.

(3) The base shall be capable of supporting remote alarm annunciation.

(4) The base shall have the option of external L.E.D. operation, relay base or data line isolator base.

(aa) Relay base shall mount in a standard electrical box described above and provide Form "C" contacts rated at 1 amp @ 30VDC and listed for "pilot duty".

7. Duct smoke detector shall utilize a photoelectric smoke detector that is readily adaptable for use in air duct smoke detection applications, using a housing that mounts to the outside of the duct. When used for duct smoke detection, the smoke detectors shall not forfeit any of the system functionality which they have when used as area smoke detectors. The duct smoke detection housing shall allow the detector to sample and compensate for, variations in duct air velocity between 300 and 4000 feet per minute. The detector sampling tube shall extend the full width of the duct. Sampling tubes longer than 36 inches shall be supported from both ends. Remote alarm LEDs and Remote Test Stations shall be supported by the duct smoke detector and provided for each detector. All detectors used in duct applications shall be located in accordance with NFPA 72 recommendations.

8. The Fire Alarm System shall incorporate addressable modules for the monitoring and control of system Input and Output functions over a 2- wire electronic communications loop, using both broadcast and serial polling protocols. All modules shall display communications and alarm status via LED indicators. The function of each connected module shall be determined by the module type and shall be defined in the system software through the application of a personality code. Simply changing the associated personality code may change module operation at any time. All addressing of the Addressable Modules shall be done electronically, and the electrical location of each module shall be automatically reported to the Fire Alarm Control Panel, where it may be downloaded into a PC, or printed out. The addressing of the modules will not be dependent on their electrical location on the circuit. All field wiring to the Addressable Modules shall be supervised for opens and ground faults and shall be location annunciated to the module of incidence. Diagnostic circuitry, and their associated indicators, with reviewable Trouble Codes, shall be integral to the Addressable Modules to assist in troubleshooting system faults.

(1) Addressable Input Modules shall be used to provide supervised input circuits capable of latching operation for use with contact devices, non-damped water flow switches, non-latching supervisory sprinkler switches.

(2) Addressable Output Modules shall provide one form "C" dry relay contact rated at 2 amps @ 24 VDC or 0.5 amps at 120 VAC to, control external appliances or equipment processes. The control relay module shall be rated for pilot duty applications and releasing systems service. The position of the relay contact shall be confirmed by the system firmware.

9. The Addressable Fire Alarm Stations shall be a single action fire alarm stations and fit in to a standard electrical box. Stations shall be key reset. Station shall be in red with white lettering. Where shown on drawings, provide tamper-resistant manual pull station cover. The cover shall be clear Lexan, suitable for surface mount or semi-flush mount depending on the application. The cover shall have a local sounder option, which when operated, shall sound a local signal only.

d. Appliance Devices:

1. All appliances which are supplied for the requirements of this specification shall be U.L. Listed for Fire Protective Service and shall be capable of providing the "Equivalent Facilitation" which is allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADA(AG)), and shall be UL 1971, and ULC S526 Listed. All appliances shall be of the same manufacturer as the Fire Alarm Control Panel specified to ensure absolute compatibility between the appliances and the control panels, and to ensure that the application of the appliances is done in accordance with the single manufacturers' instructions.

2. Horns shall be electronic, with field selectable jumpers to set operation for either continuous ring or temporal pattern and shall provide an adjustable high output or low output at 98dB or 94dB. In - Out screw terminals shall be provided for wiring, the use of 'pig-tail' type connectors are not acceptable.

3. Strobes shall be supplied by the same manufacturer as the Fire Alarm Control Equipment. The Strobes shall have a red or white plastic faceplate. They shall provide the proper candela output for the project per NFPA 72 spacing guidelines and synchronized flash outputs minimum requirements. The strobe shall have lens distribution suitable for wall or ceiling mounted as required. In - Out screw terminals shall be provided for wiring. They shall provide synchronized flash outputs as required to comply with code requirements.

e. Remote LCD Annunciator: Remote LCD annunciator shall have the full ability and duplicate in all fashion the main user interface located on the control panel. This includes the ability to control all system functions, tests, programming, and annunciations. Annunciator shall also include the ability to add programmable switches and or LEDs as required for special functions with out the need to add additional wires or cabinets.

f. Notification Appliance Circuits: Provide where indicated on the plans supervised hard-wired Notification Appliance Circuits (NAC) for the control of 24VDC signaling appliances. Each NAC shall operate as a Class B circuit and shall be capable of controlling up to 3.5 amps of signaling power.

g. Relays: Relays for remote control wiring, where the wiring is provided under another contract, shall have DPDT contacts rated 10 amperes at 115 VAC, minimum.

h. Central Station Service Interface: The Contractor shall provide all necessary conductors, conduit, and relays to terminate the following signals into a central station service interface:

1. Fire Alarm
2. Fire Alarm System AC Power Trouble (only if 120vac interrupted for 8 hours)

Interface shall be capable of being disconnected and removed without affecting the building system. The interconnection shall be supervised. Upon any fire alarm initiated by a water flow switch, manual station, thermal detector, or a verified smoke detector alarm, one general alarm signal shall be sent to the central station. Upon the activation of any supervisory switch in the building connected to circuits reporting to the CPU, one separate signal shall be forwarded off-site. Upon the activation of the main FACP trouble, one trouble signal shall be sent to the central station.

The precedence of signals transmitted shall be as follows:

1. Fire Alarm
2. Security Alarm
3. Trouble Signal

The central station service interface shall be an eight circuit Digital Alarm Communicating Transmitter (DACT) installed and connected to two separate communications methods in accordance with NFPA 72. Where a DACT is used with public switched telephone as the means of communication, then, one of the following alternative transmission methods shall be employed as a redundant, secondary path:

1. One-way private radio alarm system (NFPA 72:26.6.3.3.2)
2. Two-way RF multiplex system (NFPA 72:26.6.3.3.1)
3. Performance based method (NFPA 72:26.6.3.1) These permissible performance-based methods include phone communication from alternate telephone provider than the primary including cellular; or, use of IP DACT, i.e., equipment that transmits data across a public switched network using IP.
4. Upon approval of the local jurisdiction with fire response authority a second telephone line will be permitted to be used.

All UL Standards and NFPA Standards for reliability shall be met. The Contractor shall verify all conditions relating to telephone numbers on both sending and receiving ends, being reliable according to NFPA Standards. All equipment shall be UL listed and shall provide a detailed narrative description in the operation and maintenance manuals of the final installed conditions and arrangements, including telephone circuits used on-site and numbers call off-site. Once the new system is complete, tested, and accepted, it shall be placed in service and connected to the off-site, central station, fire alarm reporting service.

The Contractor shall provide all necessary conductors, conduit, and

relays to terminate the following signals into a central station service interface and transmitter panel:

1. Fire Alarm
2. Fire Alarm System AC Power Trouble (only if 120vac interrupted for 8 hours)

The precedence of signals transmitted shall be as follows:

1. Fire Alarm
2. Security Alarm
3. Trouble Signal

Panel shall be in its own cabinet (not within the main panel) and shall be capable of being disconnected and removed without affecting the building system. The interconnection shall be supervised. Upon any fire alarm initiated by a water flow switch, manual station, thermal detector, or a verified smoke detector alarm, one general alarm signal shall be sent to the central station. Upon the activation of any supervisory switch in the building connected to circuits reporting to the CPU, one separate signal shall be forwarded off-site. Upon the activation of the main FACP trouble, one trouble signal shall be sent to the central station.

i. Spare Components: Any special tools, equipment, programming devices and cables needed to maintain or repair the system shall be provided to the owner. Furnish spare components to the Owner in the following quantities, but not less than one of each type of device used on the project:

1. Fuses – 2 of each type and size
2. Manual Stations – 2% of installed quantity.
3. Signal Devices – 4% of installed quantity of each type.
4. Automatic Detectors with Bases – 6% of installed quantity of each type.
5. Miscellaneous Devices – 2% of installed quantity.

PART 3: EXECUTION

3.1 INSTALLATION:

a. Wiring shall be in accordance with manufacturer's recommendations for proper system operation.

b. Signal line circuit cable for monitoring and control of addressable devices shall be not less than a #18 AWG twisted shielded pair type FPL/FPLR/FPLP fire alarm cable. Unless specifically noted or approved otherwise, other conductors shall be of stranded copper not smaller than #14

AWG, with THWN/THHN insulation. Color coding shall be as follows:

- | | | |
|----|---------------------------------|----------------------|
| 1. | Signaling Line Circuit | Red (+) Black (-) |
| 2. | Notification Appliance Circuits | Blue (+) Black (-) |
| 3. | 24 VDC Operating Power | Yellow (+) Brown (-) |
| 4. | Door Control Circuits | Orange |

c. All wiring shall be in metal raceway, unless specifically shown otherwise. Raceways shall be sized for the wiring requirements of the system proposed, with maximum conduit fill of 40%.

d. In multistory buildings, all wiring leaving the riser on each floor shall run through a labeled terminal block located in a hinged cabinet accessible from the floor. Terminations shall have pressure wire connectors of the self-lifting or box lug type.

e. Wall-mounted system devices shall be flush mounted where construction permits. Where necessary and approved by the Architect/Engineer, surface mounting enclosures may be utilized. Contractor shall coordinate trim types.

f. Automatic detectors shall be located at least three feet from any HVAC diffuser.

g. An identification map showing all initiating devices and their address numbers shall be provided and mounted beside the main panel for quick and easy location of alarmed or troubled devices. System map shall be mounted under Plexiglas.

h. All addressable loop controller (signaling line) circuits shall be Class A with no T-taps made. Each circuit shall have a minimum 20% spare addresses for future use.

i. All junction and connection boxes shall be painted red for easy identification.

j. Field Connected Devices must be installed and wired by a Factory Trained and Authorized Fire Alarm System Sub-Contractor or a licensed electrical contractor under direct supervision of a Factory Trained and Authorized Fire Alarm System Sub-Contractor.

k. All auxiliary Power Supplies or other Fire Panels shall be in electrical or mechanical rooms. They shall be mounted at a height between 48 to 60 inches from floor level. All such panels shall be "supervised" by the main Fire Alarm Panel. A smoke detector shall be located on the ceiling within five feet of all auxiliary power supplies.

l. No wiring associated with the fire alarm system shall be spliced other than at device or cabinet terminal blocks. Permanent wire markers shall be used to identify all connections at the fire alarm control panel, power supplies and terminal cabinets.

m. Provide all necessary power and control wiring for smoke dampers furnished and installed by Mechanical Contractor. Coordinate voltage requirements for smoke damper actuators with Mechanical Contractor.

n. Duct smoke detectors shall be furnished and wired by Electrical Contractor and installed by Mechanical Contractor. Coordinate installation, including sampling tube, with Mechanical Contractor.

o. Provide all necessary power and control wiring for magnetic door holder devices. Coordinate installation with Door Hardware Installer.

3.2 FIRE ALARM SYSTEM MONITORING:

a. All new fire alarm systems shall have either a central station fire alarm system or a proprietary supervising station system. These systems must be in compliance with NFPA 72. Central station fire alarm systems must be third party verified for new construction.

3.3 MANUFACTURER'S RESPONSIBILITIES:

a. Final system connections shall be made by or under the direct supervision of an authorized representative of the manufacturer, who shall verify to the Architect/Engineer that the system has been left in full and proper operating condition. Programming of the fire alarm system shall be as specified by the owner.

b. Manufacturer's representative and a Record of Completion presented upon completion shall verify system installation and operations. The manufacturer's representative shall be responsible for an on-site demonstration of the operation of the system and initial staff training.

c. Manufacturer shall supply a 2-year warranty from date of manufactured Control System and Field Devices and appliances.

d. System shall be maintained in perfect operating condition for a period of two years following completion of the project, at no additional cost to the Owner.

e. Manufacturer shall maintain a service organization with adequate spare parts stock within 50 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the owner notifying the contractor. Other defects shall be repaired within 48 hours of the owner notifying the contractor.

3.3 SURGE PROTECTION AND GROUNDING:

a. All equipment shall be properly grounded. Main panel shall be grounded directly to 'earth ground'. Surge protection and lightning arrestors shall be installed on the AC supply and all initiating, notification and monitoring circuits.

1. Ditek DTK-LVLP Series for low voltage data and signal line protection.

2. EFI HWM-120 or equal for AC line protection for 120 VAC. For added protection, wind small coil (5 to 10 turns, 1-inch diameter) in the branch circuit phase conductor just downstream of the suppressor connection. Install the suppressor in a listed enclosure near the electrical panelboard and trim excess lead lengths.

3.4 SYSTEM TEST AND CERTIFICATION/DEMONSTRATION:

a. The completely installed fire alarm system shall be fully tested in compliance with Testing Procedures for Signaling Systems (NFPA 72) under the supervision of a trained manufacturer's representative. The system shall be demonstrated to perform all the functions as specified.

b. The Fire Alarm System Sub-Contractor shall test:

1. Every alarm initiating device for proper response and program execution.

2. Every notification appliance for proper operation and audible/visual output.

3. All auxiliary control functions such as elevator capture, smoke door and damper release, and functional override of HVAC, ventilation, and pressurization controls.

c. The Contractor shall provide all necessary two-way radios, ladders and any other materials needed to test the system.

d. The Engineer and Owner must be notified at least 10 working days prior to the scheduled testing so that he may be present for such testing.

e. After the system has been completely tested to the satisfaction of the Engineer and Owner, the Fire Alarm System Sub-Contractor shall complete the Fire Alarm System Certification of Completion form published by the NFPA.

f. The completed form signed by a principal of the Fire Alarm System Sub-Contractor and shall be delivered to the Architect/Engineer with the other system documentation required by these specifications.

3.5 INSTRUCTION OF OWNER:

a. The Fire Alarm System Sub-Contractor shall schedule and execute an instruction class for the building owner, which details the proper operation of the installed fire alarm system. The instruction shall also cover the schedule of maintenance required by NFPA 72 and any additional maintenance recommended by the system manufacturer. This training shall also include, but not be limited to the following subjects:

1. How to replace heads and set addresses if not set automatically.

2. How to locate short in the circuit.

3. How to replace electronic cards and where to mount them in the panel.
4. Each electronic card shall be third party listed.
5. Get familiar with functionality of each electronic card.
6. How to do dirty head test report and sensitivity test report.
7. How to synchronize the strobe lighting for the entire building.
8. How to check the circuit ground fault and how to clear it.
9. How to interpret the display field codes {A=Alarm, S=Supervisory, T=Trouble, M=Modules}.
10. How to locate faulty Module from the trouble display codes.

b. The instruction shall be a minimum of 8 hours in duration and presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.

c. The Fire Alarm System Sub-Contractor shall provide service and operation manuals or any other curricula that may enhance the instruction of the Building Owners or Local Municipal Fire Department in the operation and maintenance of the system. Also provide software and hardware necessary to troubleshoot and completely program the system.