

**PROJECT MANUAL
FOR
Waverly Park**

No. 22-018



**GEORGETOWN COUNTY,
SOUTH CAROLINA**

DIVISION 0 – BIDDING AND CONTRACT DOCUMENTS

DIVISION 1 – GENERAL REQUIREMENTS

**PREPARED BY:
GEORGETOWN COUNTY
DEPARTMENT OF PARKS & RECREATION, AND
SGA/NW DESIGN, INCORPORATED**

SGA
NarmourWright
DESIGN

March 4, 2022

PROJECT MANUAL

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**SECTION 00010
INVITATION FOR BIDS**

Time Line: Invitation for Bid #22-018

Advertised Date of Issue:	Friday, March 4, 2022	n/a	n/a
Voluntary Pre-Bid Conf & Site Inspection	Monday, March 14, 2022	3:30 PM ET	ON SITE †
Material Substitution Cut-Off Time:	Wednesday, March 23, 2022	3:30 PM ET	n/a
Inquiry Cut-Off Time:	Wednesday, March 23, 2022	3:30 PM ET	n/a
Bids Must be Received on/or Before:	Wednesday, March 30, 2022	3:30 PM ET	Electronic
Public Bid Opening & Tabulation:	Wednesday, March 30, 2022	3:30 PM ET	Hybrid*

*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.

† Waverly Park – located at the intersection of Waverly Rd and Cochran Rd, in rear of Waccamaw Elementary School and accessible via Dupre Lane in Pawleys Island, SC 29585 (Georgetown County TMS #04-0203-017-00-00).

Bid #22-018

Waverly Park

**GEORGETOWN COUNTY,
SOUTH CAROLINA**

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.

Project Description:

The Project consists of the completion of four (4) 225' baseball/softball fields, including but not limited to site preparation and the construction of roadways, parking, underground storm drainage and utilities, retention ponds, concession/restroom building, dugouts, backstops, sports and site lighting, sidewalks, vinyl chain link fencing and gates, landscaping and irrigation.

Base Bid:

The Base Bid includes site preparation and construction of the ballfield complex, roadways, parking, underground storm drainage and utilities, retention ponds, concession/restroom building, dugouts, backstops, sports and site lighting, sidewalks, vinyl chain link fencing and gates, landscaping and irrigation.

Alternate #1:

SPORTS FIELD LIGHTING: Install concrete lighting poles in lieu of wood lighting poles. Contractor shall provide structural engineer's signed and sealed drawings for the poles. Engineering shall be based on the current listed applicable loading conditions and as determined by the applicable building codes.

Alternate #2:

ROOFING SYSTEM: Install asphalt shingle roof system in lieu of metal roofing on concession building, dugouts and scoring towers. Finish and install asphalt shingle roof system per Specifications Section 073113.

Alternate #3:

CONCRETE SIDEWALK: Remove concrete sidewalk from rear ballfield parking lot to front school parking lot area, limits as shown on L100, install sod in lieu of sidewalk within the ballfield complex fence and seed in lieu of sidewalk outside the ballfield complex fence.

Alternate #4:

SPORTS FIELD LIGHTING: Install galvanized steel lighting poles, including connections to concrete base, in lieu of wood lighting poles. All portions of the steel pole shall be a minimum of 8" above grade. Contractor shall provide structural engineer's signed and sealed drawings for the poles and bases. Engineering shall be based on the current listed applicable loading conditions and as determined by the applicable building codes.

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. All requirements of the State of South Carolina and all pertinent administrative regulations shall apply to this project as if herein written out in full.

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

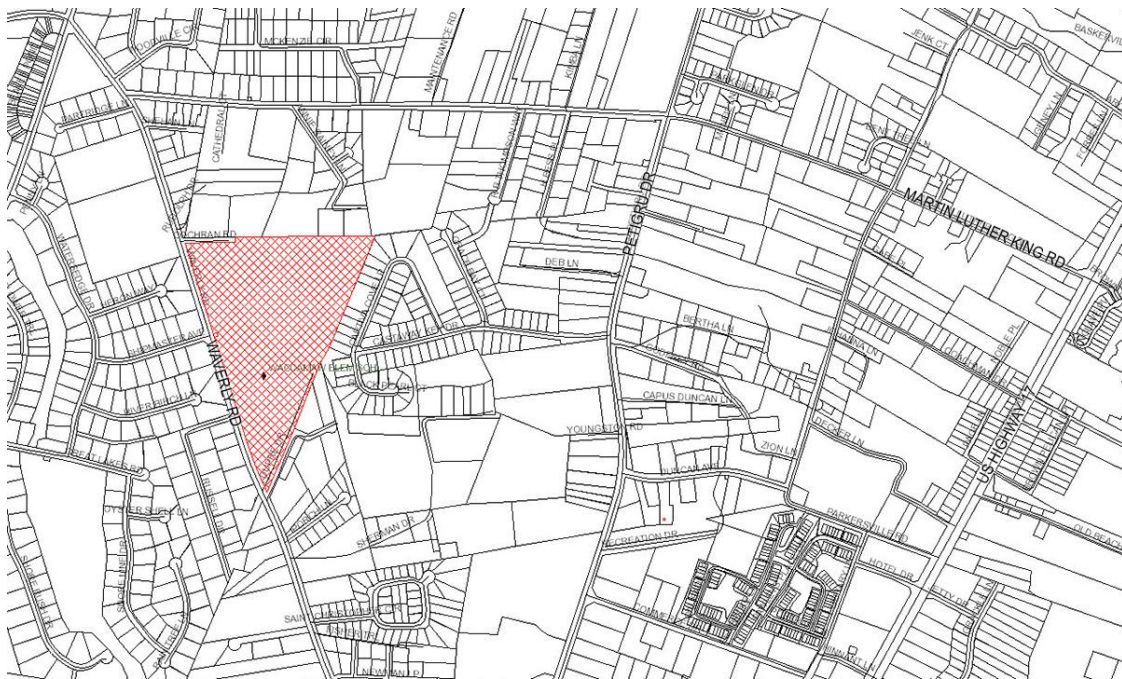
part such proposal or proposals where it deems it advisable in protection of the best interests of the County and to hold all proposals for examination for a period not to exceed ninety (90) calendar days. The selected Contractor is encouraged to utilize, to the extent possible, local firms and trades from within Georgetown County.

NOTICE TO SUBCONTRACTORS: The County is soliciting ONLY for a general contractor at this time and is not responsible for communicating interest on the part of sub-contractors to participating general contractors. The attendance sheet from the Pre-Bid Conference and Site Inspection will be posted as part of that addendum on the County website. Interested subcontractors are welcome to attend the pre-bid.

Construction Entrance

Construction traffic shall enter from Waverly Road onto Dupre Lane, then shall exit by the same route. Extreme attention will be taken so as to not interfere with school parking, traffic flow or access to neighboring properties. Site access necessary other than in designated entrance/exit shall be coordinated in writing in advance with Georgetown County School District, through the office of the Architect, prior to execution.

A **Voluntary Pre-Bid Conference and Site Inspection** will begin promptly at 3:30 PM on Monday, March 14 for the **Waverly Park** project. We will meet **on the baseball field at the back of Waccamaw Elementary School in Pawleys Island, SC 29585 (Georgetown County TMS #04-0203-017-00-00)**. In case of rain, there are covered dugouts available. Access for site inspection will be available immediately following the Pre-Bid Conference.



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. Note that this is a Public School site and that intent to visit the site at a time beyond the Pre-Bid Conference shall require a notice to the office of the Architect prior to being on-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. (S)he 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.

Bid Security/Bid Bonding:

- a) Each bid must be accompanied by a Bid Bond, or by a certified check payable to Georgetown County, SC, for an amount equal to five percent (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. Bid Bonds will be returned to unsuccessful vendors after award of Bid.
- b) The successful bidder 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 the after receipt of written notice of formal award of the Contract.

- c) The successful bidder must provide a Material Payment 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.

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

NOTE: Contractors who desire to download CAD files must first complete and return the attached CAD File Release form. Upon receipt, a web link and password will be provided. Forward requests to Nancy Silver at purch@gtcounty.org.

END OF SECTION 00010



Instructions for Bidders Bid #22-018, Waverly Park

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 four (4) 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: purch@gtcounty.org

2. Sealed bids to provide **Waverly Park** shall be received electronically through the County’s Vendor Registry webpage until the cut-off time shown in the bid timeline on page four (4) 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 “Waverly Park” 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.gtcountry.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#empl>

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. **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 effecting such requested changes.

50. **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>

51. **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.

52. **Bid Tabulation Results**

Vendors wishing to view the bid tabulation results may visit the Georgetown County, SC web-site 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.

53. 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.

54. 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.

55. 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.

56. **Response Clarification**

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

57. Georgetown County, SC has a Local Vendor Preference Option by ordinance. See the RESIDENCE CERTIFICATION FOR LOCAL PREFERENCE form attached for details.

58. 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.

59. Liquidated Damages

Refer to The Project Manual, Vol. 1, Division 1, Section 01100, Summary of Work.

60. Testing Laboratory Services will be provided by owner and at owner's expense as specified in Section 01410. These services are not intended to relieve the contractor of his/her responsibility for testing and / or laboratory services required in the construction contract documents as part of his/her Quality Control (QC) activities.

61. Retainage

Retainage in the amount of ten percent (10%) of the value of construction costs incurred for the project, shall be withheld until the project has been completed to the satisfaction of Owner.

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

END OF SECTION 00100



SECTION 00200

Intent to Respond

REF: **Bid #22-018, Waverly Park**

If your company intends to respond to this solicitation, please complete and promptly return this form to assure that you can be included on the mailing list to receive all addenda regarding this project.

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, then click on the "View Current Bid Solicitations" link.

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.

[End of Intent to Respond]



MATERIAL SUBSTITUTION REQUEST

Bid #22-018, Waverly Park

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: _____

CADD FILE REQUEST FORM

Dear Contractor:

In response to your request, we agree to the transmission of the digital base files for the construction plans for the referenced project in AutoCAD Release 2019 of the project upon receipt of this signed acceptance letter.

The electronic files will be provided for your use on the referenced project. Data stored on electronic media can deteriorate or be modified without Consultant’s knowledge. Your Firm agrees that it will accept responsibility for the completeness, correctness, or readability of the electronic media. This digital information will be provided for your convenience and preparation of other documents. Due to the nature of electronic files, graphic displays of structures, etc. may not be to scale for readability. It is the responsibility of the recipient to confirm that the digital file represents the contract documents. Consultant assumes no responsibility for damages or errors resulting from the misinterpretation of digital information.

By accepting these files, the recipient hereby acknowledges and holds harmless from all liability Consultant for the accuracy of the digital information and that the recipient is responsible for construction of the project in accordance with the contract documents.

Company: _____

Name of Contractor: _____

Email Address: _____

Office Phone: _____

Office Fax: _____

Mobile Phone: _____

Signature: _____ Title: _____

Date: _____

Forward requests to Nancy Silver at nsilver@gtcounty.org.



SECTION 00300
MANDATORY BID SUBMITTAL FORM

Waverly Park
Bid #22-018

The undersigned, on behalf of the vendor, certifies that: (1) this bid is made without previous understanding, agreement or connection with any person, firm or corporation making a bid on the same project; (2) is in all respects fair and without collusion or fraud; (3) the person whose signature appears below is legally empowered to bind the firm in whose name the bid is entered (4) they have read the complete Request for Bid and understand and accept all provisions: (5) if accepted by the County, this bid is guaranteed as written and amended and will be implemented as stated; and (6) mistakes in writing of the submitted bid will be their responsibility.

The undersigned, having visited the site of the Work and having familiarized themselves with local conditions affecting the cost of the work and with all requirements of the proposed Construction 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) Name of Company submitting bid _____

2) BASE BID PROPOSAL: 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)

3) ALTERNATES:

Alternate #1: SPORTS FIELD LIGHTING: Bidder / Proposer shall install concrete lighting poles in lieu of wood lighting poles, for the sum of:

[] Add [] Deduct
_____ \$ _____
(words shall govern)

Alternate #2: ROOFING SYSTEM: Bidder / Proposer shall install asphalt shingle roof system in lieu of metal roofing on concession building, dugouts and scoring towers, for the sum of:

[] Add [] Deduct
_____ \$ _____
(words shall govern)

Alternate #3: CONCRETE SIDEWALK: Bidder / Proposer shall remove concrete sidewalk from rear ballfield parking lot to front school parking lot area, limits as shown on L100, install sod in lieu of sidewalk within the ballfield complex fence and seed in lieu of sidewalk outside the ballfield complex fence, for the sum of:

[] Add [] Deduct
_____ \$ _____
(words shall govern)

Alternate #4: SPORTS FIELD LIGHTING: Install galvanized steel lighting poles, including connections to concrete base, in lieu of wood lighting poles, for the sum of:

Add Deduct

\$ _____

(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: Contractor must conform with *Division 0, Section 00750, Summary Schedule and Key Milestones*.
- 6) LIQUIDATED DAMAGES: A schedule will be determined with the Owner and the awarded Contractor(s). Liquidated damages will be set at \$500 per day for the Contractor's failure to meet the agreed upon construction schedule.
- 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, 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:

	Bid Form
Exhibit A	Acknowledgement of Addenda
Exhibit B	Non-Collusion Affidavit
Exhibit C	Indemnification
Exhibit D	List of Prime & Subcontractors
Exhibit E	Statement of Experience
Exhibit F	Unit Price Schedule
Exhibit G	Resident Certification for Local Preference

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 and Certificate of Insurance (COI) and Payment and Performance Bonds must be received.

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 the Georgetown County Council and appropriation by them 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. 22-018 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)

<p><u>INFORMATION ONLY:</u></p> <p><input type="checkbox"/> Our company accepts VISA government procurement cards. If yes, list any upcharge for P-Card Payment? _____</p> <p><input type="checkbox"/> Our company does not accept VISA government procurement cards.</p>

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 A

ADDENDA ACKNOWLEDGEMENT
(Mandatory Bid Submittal Form)

Bid No. 22-018, Waverly Park

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: _____

Company Name: _____

Authorized Signature: _____

Printed Name: _____

“EXHIBIT B”

**FORM OF NON-COLLUSION AFFIDAVIT OF PRIME PROPOSER / BIDDER
(Mandatory Bid Submittal Form)**

NON-COLLUSION OATH)

COUNTY OF: _____)

STATE OF: _____)

Before me, the Undersigned, a Notary Public, for and in the County and State aforesaid, personally appeared _____ and made oath that the Offeror Herein, his agents, servants, and/or employees, to the best of his knowledge and belief have not in any way colluded with anyone for and on behalf of the Offeror, or themselves, to obtain information that would give the Offeror an unfair advantage over others, not have they colluded with anyone for and on behalf of the Offeror, or themselves, to gain any favoritism in the award of the contract herein.

SWORN TO BEFORE ME THIS

_____ DAY OF _____, 2022

Authorized Signature of Offeror

NOTARY PUBLIC FOR THE

STATE OF: _____

My Commission Expires: _____

Notary Printed Name: _____

Notary Signature: _____

(Note: Affix Notary seal below)

“EXHIBIT C”

**INDEMNIFICATION
(Mandatory Bid Submittal Form)**

The Bidder / Proposer will indemnify and hold harmless the Owner, Georgetown County, South Carolina and their agents and employees from and against all claims, damages, losses and expenses, including attorney’s fees, arising out of or resulting from the performance of the Work provided that any such claims, damages, loss, or expense is attributable to bodily injury, sickness, disease or death, injury to or destruction of tangible property, including the loss of use resulting there from, and is caused by any negligent or willful act or omission of the Bidder / Proposer, and anyone directly or indirectly employed by him/her or anyone for whose acts any of them may be liable.

In any and all claims against the Owner, Georgetown County, South Carolina or any of their agents and / or employees by an employee of the Bidder / Proposer, and anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way to the amount or type of damages, compensation or benefits payable by or for the Bidder / Proposer under the Worker’s Compensation Acts, Disability Benefit Acts, or other employee benefit acts.

The obligation of the Bidder / Proposer under this paragraph shall not extend to the liability of Georgetown County, South Carolina or its agents and / or employees arising out of the reports, surveys, Change Orders, designs or Technical Specifications.

BIDDER / PROPOSER: _____

BY: _____

DATE: _____

TELEPHONE NO.: _____

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

“EXHIBIT D”

**LIST OF PRIME AND SUBCONTRACTORS
(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
(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 five (5) references from the Primary Contractor. The Bidder may print additional pages to provide additional references if they so choose.

<u>Project and Location</u>	<u>Reference</u>
1) _____ _____ _____	_____ _____ _____
2) _____ _____ _____	_____ _____ _____
3) _____ _____ _____	_____ _____ _____
4) _____ _____ _____	_____ _____ _____
5) _____ _____ _____	_____ _____ _____

Dated: _____

Firm Name: _____

Signed: _____

Title: _____

“EXHIBIT F”

**UNIT PRICE SCHEDULE
(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. All unit prices for utility conduits shall include sweeps, bends, couplings, caps, fittings, etc. which shall be included in the unit price per linear foot. Unit prices for undercut soils shall include material in place, surveyed and compacted pursuant to the Contract Documents.

Submit unit price and proposal amount for the following items. 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. In case of errors in the extension of prices, unit price governs. In case of error in summations, corrected bid amounts will be totaled and will govern.

Contractor shall be responsible for all necessary electric and water hookups.

Contractor shall make quantity take-offs using drawings to determine quantities to his satisfaction, reporting promptly any discrepancies which may affect bidding. This is not a comprehensive list of items included in the contract documents, and represents only a portion of the project total.

UNIT PRICE SCHEDULE

ITEM	QTY	TOTAL
Site Work (Including, but not limited to: sediment & erosion control, grading, stormwater, utilities, parking areas, sidewalks, fencing/gates, ballfields, landscape & irrigation, electrical, etc)		\$ _____
Concessions Building (complete construction)	_____	\$ _____
Score Tower (complete construction)	_____	\$ _____
Signage (park identification sign)	_____	\$ _____
Signage (directional signage)	_____	\$ _____
Signage (park rules signage)	_____	\$ _____
Signage (field identification signage)	_____	\$ _____

Bidder/Proposer: _____

Signature: _____

Title: _____

Dated: _____



“EXHIBIT G”

RESIDENCE CERTIFICATION FOR LOCAL PREFERENCE

MANDATORY VENDOR SUBMITTAL FORM

WHEREAS, Georgetown County Council desires to further its support of local businesses when awarding contracts for the provision of supplies and construction services to the County through its established procurement procedures.

THEREFOR pursuant to Georgetown County, SC Ordinance #20-32, §2-50 Local Preference, the Georgetown County Purchasing Officer requests each offeror provide Residence Certification. The Local Preference Option provides some restrictions on the awarding of governmental contracts; provisions of which are stated below:

Sec 2-50. Local Preference

1. A vendor shall be deemed a Local Georgetown County vendor for the purposes of this Section if such vendor is an individual, partnership, association or corporation that is authorized to transact business within the State, maintains an office in Georgetown County, and maintains a representative inventory or commodities within the County on which the bid is submitted, and has paid all taxes duly assessed.
2. This option allows the lowest local Bidder whose bid is within five-percent (5%) of the lowest non-local Bidder to match the bid submitted by the non-local Bidder and thereby be awarded the contract. This preference shall apply only when (a) the total dollar purchase is greater than \$30,000; (b) the vendor has a physical business address located and operating within the limits of Georgetown County and has been doing business in the County for a period of twelve (12) months or more; and (c) the vendor provides proof of payment of all applicable Georgetown County taxes and fees if so requested.
3. Should the lowest responsible and responsive Georgetown County bidder not exercise its right to match the bid as granted herein, the next lowest qualified Georgetown County bidder shall have that right and so on. The right to exercise the right to match the bid shall be exercised within 24 hours of notification of the right to match the non-Georgetown County bidder's bid.
4. In order to qualify for the local preference authorized by this Section, the vendor seeking same shall be required to submit with its bid a statement containing relevant information which demonstrates compliance with the provisions of this Section. This statement shall be on a form provided by the County purchasing department and shall be signed under penalty of perjury. Failure to provide such affidavit at the time the bidder submits its bid shall constitute a waiver of any claim for preference.
5. For all contracts for architecture, professional engineering, or other professional services governed by Section 2-56, Architect-Engineer and Land Surveying Services – Public Announcement and Selection Process, the county shall include the local business status of a firm among the factors considered when selecting which firms are “most highly qualified.” In determining which firm is the “most qualified” for purposes of negotiating

a satisfactory contract, preference shall be given to a local business where all other relevant factors are equal.

6. Local preference shall not apply to the following categories of contracts:

- (a) Goods or services provided under a cooperative purchasing agreement or similar “piggyback” contract;
- (b) Contracts for professional services except as provided for in section five (§5) above;
- (c) Purchases or contracts which are funded, in whole or in part, by a governmental or other funding entity, where the terms and conditions of receipt of the funds prohibit the preference;
- (d) Purchases or contracts made pursuant to a noncompetitive award process, unless otherwise provided by this section; or
- (e) Any bid announcement which specifically provides that the general local preference policies set forth in this section are suspended due to the unique nature of the goods or services sought, the existence of an emergency as found by either the county council or county administrator, or where such suspension is, in the opinion of the county attorney, required by law.

I certify that [Company Name] _____ is a **Resident Bidder** of Georgetown County as defined in Ordinance #20-32, (see §1. above) and our local place of business within Georgetown County is: _____

I certify that [Company Name] _____ is a **Non-Resident Bidder** of Georgetown County as defined in Ordinance #20-32, and our principal place of business is _____ [City and State].

(X) _____
Signature of Company Officer

“EXHIBIT H”

EXCEPTIONS PAGE

MANDATORY BID SUBMISSION FORM

List any areas where you cannot or will not comply with the specifications or terms contained within the bid documentation.

END OF SECTION

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 PRESENT 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 #22-018, WAVERLY PARK**

NOW THEREFORE, If the Principal shall not withdraw said Bid within NINETY (90) 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

**SECTION 00500
SAMPLE CONTRACT**



STATE OF SOUTH CAROLINA)	CONSTRUCTION
)	
GEORGETOWN COUNTY)	CONTRACT

THIS CONTRACT made and entered into this _____ day of _____ 2022, by and between Georgetown County, hereinafter referred to as the “Owner”, a body politic and corporate and political subdivision of the State of South Carolina, whose administrative address is: 129 Screven Street, Georgetown, South Carolina 29440; and _____ hereinafter referred to as the “Contractor”, a limited liability corporation formed and existing under the laws of the State of _____ and authorized to do business within the State of South Carolina whose administrative address is: _____.

IN WITNESS WHEREOF:

WHEREAS the Owner has a project entitled “ _____ ” hereinafter referred to as the “Project”, and;

WHEREAS, the Contractor has submitted a proposal for the Project at \$ _____ which is the Lump Sum Base Bid and the Owner has awarded the Project to the Contractor; and

NOW, THEREFORE, in consideration of the mutual promises and covenants contained herein, as well as other good and valuable consideration not specifically mentioned, the parties agree as follows:

SAMPLE

1. The Contractor, for and in consideration of the payments hereinafter specified and agreed to be made by the Owner, hereby covenants and agrees to furnish and deliver all materials required, to do and perform all the work and labor, in a satisfactory and workmanlike manner, required to complete the Project within the time specified, in strict and entire conformity with the Plans, Technical Specifications and other Contract documents, on file at Georgetown County, which are duly approved by the Owner and which said Plans, Specifications and other Contract documents are hereby made part of this Contract as fully and with the same effects as if the same had been set forth at length in the body of this Contract.

2. The Contractor hereby agrees to indemnify, defend and hold the Owner and, the Engineer, and each of their agents, representatives, directors, officers, and employees harmless from any and all liabilities, losses, damages, penalties, judgments, awards, claims, demands, costs, expenses, (including reasonable attorney’s fees and court costs), actions, lawsuits or other proceedings arising directly or indirectly, in whole or in part, out of the negligence or willful acts or omissions of the Contractor, Trade Subcontractors, or their respective agents, directors, officers or employees in connection with this Agreement or in any way with the services or Work described herein, any occurrence at the Project site, or any occurrence arising in connection with or at the Project site or in connection with the Work, whether within or beyond the scope of its duties hereunder.

3. The Project has been designed by _____ whose office is located at _____ and who will act as the ENGINEER in connection with completion of the Work in accordance with the Contract Documents.

4. The project will be considered substantially complete upon completion of all items listed in the Bid Form and appurtenances in accordance with the Contract Documents, including successful performance of all testing requirements.

5. The Contractor’s indemnity and defense obligations under this Contract shall be absolute notwithstanding any provision contained herein or elsewhere to the contrary, and shall survive Final Completion and Final

Payment for a period equal to the statute of limitations for any action which could be brought against the Owner or its agents, officers, directors and employees and shall continue through the duration of any action brought during the applicable time periods.

6. The Contractor agrees to indemnify, defend and hold the Owner, and the Engineer, and each of their agents, representatives, officers, directors and employees, harmless from all costs, damages and expenses, including reasonable attorneys fees, incurred by the Owner and its consultants by virtue of any claim or claims filed by any Trade Subcontractor, mechanic, laborer, or materialman making claims arising from the performance of the Work by, through, or under the Contractor, provided the Contractor has received from the Owner all amounts properly due under this Contract concerning the claim. The Contractor shall execute and deliver to the Owner's title insurer similar indemnifications or such other document as such title insurer shall reasonably request in order to protect it against lien claims from Trade Subcontractors. The Contractor also hereby agrees to indemnify and hold harmless, protect and defend the Owner and its consultants from and against any liability, claim, judgment, loss or damage, including, but not limited, to direct damages, attorney's fees, court costs and expenses of collection, occasioned in whole or in part by the sole failure of the Contractor, and its Trade Subcontractors to comply with any of the terms or provisions of this Contract.
7. In any and all claims against the Owner, by any employee of the Contractor or Trade Subcontractor, anyone directly or indirectly employed by any of them, their agent or anyone for whose acts any of the Contractor or Trade Subcontractors may be liable, the indemnification obligation under this Paragraph 2 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Trade Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.
8. The Owner hereby agrees to pay to the Contractor for the said work, when fully completed, the total sum of \$_____ (the said sum being the total of the Contractor's bid, a copy of which is attached hereto and, pro tanto, made a part hereof for all purposes), subject to such additions and deductions as may be provided for in the Contract Documents. In the event the bid contains multiple pay items, it is understood that the amount to be paid shall be the total based on the unit prices, together with lump sum prices, contained in said bid, for the work actually completed. Payments on accounts will be made as customarily provided by the County and consistent with applicable County procedures. The Contractor shall submit bills for fees or other compensation for services or expenses in detail sufficient for a proper pre-audit and post audit thereof. Any unit of provision of goods and services must be approved in writing by the Owner prior to payment.
9. The Owner may unilaterally cancel this Contract and the goods and services there under in the event that the Contractor fails and refuses to allow public access to all documents, papers, letters, or other material subject to the provisions of the applicable South Carolina Code of Laws, made or received by the Contractor in conjunction with this Contract.
10. This Contract has been executed by the parties prior to the rendering of any goods or services by the Contractor.
11. The Contractor shall provide a payment and performance bond (the "Bond") to the Owner meeting the requirements of applicable South Carolina Code of Laws, The Georgetown County Procurement Ordinance, as amended, and associated bid documents referenced herein, which by virtue of executing this contract the Contractor has accepted in the sum of \$_____ and shall cause the Bond to be recorded with the Notice of Commencement in the Public Records of Georgetown County, South Carolina.
12. This Contract shall be subordinate to any rule, regulation, order or law of the United States of America, or the State of South Carolina, respectively.
13. Contractor and its employees shall promptly observe and comply with all applicable provisions of any Federal, State and local laws, ordinances, rules or regulations which govern or apply to the goods or services rendered by Contractor hereunder including the wages paid by Contractor to its employees. Contractors shall require all of its Subcontractors to comply with the provisions of this paragraph.

14. Contractor shall procure and keep in force during the term of this contract all necessary insurance (including but not limited to general liability, casualty, workers compensation, and automobile), licenses, registrations, certificates, permits and other authorizations as are required by law in order for Contractor to render its services hereunder. Contractor shall require all of its Subcontractors to comply with the provisions of this paragraph.
15. All remedies provided in this Contract shall be deemed cumulative and additional and not in lieu of or exclusive of each other or of any other remedy available to any party at law or in equity. In the event one party shall prevail in any action (including appellate proceedings), at law or in equity arising hereunder, the losing party will pay all costs, expense, reasonable attorneys' fees and all other actual and reasonable expenses incurred in the defense and/or prosecution of any legal or arbitration proceedings, including, but not limited to, those for paralegal, investigative, legal support services and actual fees charged by expert witnesses for testimony and analysis, incurred by the prevailing party referable thereto.
16. Contractor represents and warrants unto Owner that no officer, employee or agent of Owner has any interest, either directly or indirectly, in the business or property for/on which the Contractor to conduct activities hereunder. Contractor further represents and warrants to Owner that it has not employed or retained any third party person, other than a bona fide employee working solely for Contractor, to bid, solicit or secure this Contract, that it has not paid or agreed to any person, company, corporation, individual or firm, other than a bona fide employee working solely for Contractor, any fee, commission, percentage, gift, or any other consideration contingent upon or resulting from the award or making of this Contract, and that it has not agreed, as an express or implied condition for obtaining this Contract, to employ or retain the services of any firm or person in connection with carrying out this Contract. Contractor assures that it will insert the above provision in each of its Subcontractor agreements relating to the services to be performed hereunder.
17. The headings of the sections of this Contract are for the purpose of convenience only and shall not be deemed to expand or limit the provisions contained in such sections.
18. This Contract, including all Contract documents such as, but not limited to, bid documents and procurement packages, constitutes the entire agreement between the parties and shall supersede and replace all prior agreements or understandings, written or oral, relating to the matters set forth herein.
19. This Contract shall not be amended or modified other than in writing signed by the parties hereto. Notwithstanding the foregoing, any Amendments that are not being paid for, in whole or in part, with funds granted by the United States or State of South Carolina need not be approved by them.
20. The validity, interpretation, construction and effect of this Contract shall be in accordance with and be governed by the laws of the State of South Carolina. In the event any provision hereof shall be finally determined to be unenforceable, or invalid, such unenforceability or invalidity shall not affect the remaining provisions of this Contract which shall remain in full force and effect.
21. Termination of Contract
 - a) The Owner may, by written notice, terminate this Contract in whole or in part at any time, either for the Owner's convenience or because of failure to fulfill the Contract obligations. Upon receipt of such notice, services shall be immediately discontinued (unless the notice directs otherwise) and all materials as may have been accumulated in performed this Contract, whether completed or in process, delivered to the Owner.
 - b) If the termination is due to failure to fulfill the Contractor's obligations, the Owner may take over the work and prosecute the same to completion by contract or otherwise. In such case, the Contractor shall be liable to the Owner for any additional cost occasioned to the Owner thereby.
 - c) If, after notice of termination for failure to fulfill its Contract obligations, it is determined that the Contractor had not failed, the termination shall be deemed to have been effected for the convenience of the Owner. In such event, adjustment in the Contract price shall be made as provided in paragraph 21.a of this clause.

d) The rights and remedies of the Owner provided in this clause are in addition to any other rights and remedies provided by law or under this Contract.

e) 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.

22. Waiver or Forbearance

Any delay or failure of County to insist upon strict performance of any obligation under this Agreement or to exercise any right or remedy provided under this Agreement shall not be a waiver of County's right to demand strict compliance, irrespective of the number or duration of any delay(s) or failure(s). No term or condition imposed on Contractor under this Agreement shall be waived and no breach by Contractor shall be excused unless that waiver or excuse of a breach has been put in writing and signed by both parties. No waiver in any instance of any right or remedy shall constitute waiver of any other right or remedy under this Agreement. No consent to or forbearance of any breach or substandard performance of any obligation under this Agreement shall constitute consent to modification or reduction of the other obligations or forbearance of any other breach.

23. Title VI Compliance:

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>.

IN WITNESS WHEREOF, the Owner and Contractor hereto have signed and sealed this Contract on the day and date first above written. To facilitate execution, this Agreement may be executed, including electronically, in as many counterparts as may be required. It shall not be necessary that the signature on behalf of both parties hereto appear on each counterpart hereof. All counterparts hereof shall collectively constitute a single agreement.

Georgetown County, South Carolina

Attest:

By: _____

Louis Morant
Georgetown County Council Chair

Sample Vendor

By: _____

Its: _____

Witness:

SAMPLE

END OF SECTION 00500

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 #22-018, WAVERLY PARK.**

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 the Contract entitled **Bid #22-018, WAVERLY PARK.**

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)

By: _____
(Title)

WITNESS

SURETY

(Firm Name)

By: _____
(Title)

WITNESS

END SECTION 00601

SECTION 00750

SUMMARY SCHEDULE AND KEY MILESTONES

1.0 GENERAL

1.01 THIS SECTION INCLUDES

- A. Summary Submittals
- B. Key Milestones
- C. Base Bid Summary Schedule
- D. Alternate Summary Schedule (If Applicable)

1.02 SUMMARY SCHEDULE

- A. Summary Schedules referred to in this section will be developed by the Contractor and the Owner illustrating an approach to constructing the project. The activities to be shown on the schedules will be monitored by the Owner and updated by the Contractor.
- B. Milestones shown on the Summary Schedules will be “Key Milestones” and are to be included in the Contractor’s Contract Schedule. The Contractor is responsible to develop his/her own activities and logic to meet the required Key Milestone Intermediate Dates. Refer to Division 1, Section 01310, Project Management and Coordination.

1.03 KEY MILESTONES

- A. Key Milestones shall be included in all Contractor Schedules and show completing on the intermediate dates shown in this Section.
- B. Key Milestones are a contractual requirement and liquidated damages as specified in *The Project Manual, Vol. 1, Division 1, Section 01100, Summary of Work*, will be assessed for each Key Milestone that completes beyond the dates listed below. Refer to Division 1, Section 01100 and Summary of Work.
- C. Key Milestones for this Project are as follows:

Milestone: Substantial Completion

by Friday, January 13, 2023

Milestone: Final Completion

by Monday, February 13, 2023

END OF SECTION 00750

SECTION 00800

SPECIAL PROJECT CONDITIONS

1.0 PURPOSE

The Special Project Conditions are intended to identify those elements of work and items of material, and responsibilities of the Contractor, which are unique to the **Waverly Park** and required by the Contract Documents. They are intended to supplement those contractual requirements contained within the Contract Documents including, but not limited to: the Contract; Division 1, General Requirements, Drawings and Technical Specifications.

2.0 SAFETY AND SECURITY

2.0.1 ENTRY ONTO THE PROJECT SITE

The only entrance to the Project site shall be off Waverly Rd via Dupree Lane. The Contractor shall be responsible for security. Vehicles allowed on the Project site will include only those of the Contractor, prime and sub-contractors and those designated by the Owner. Contractor shall have sole responsibility for the control and safety of vehicles traversing to and from the Project site. No access will be allowed thru the existing school parking lots. Access to existing single-family residences and school facilities, including bus drop-off and pick-up lines, must be maintained at all times. Trespass into or around existing school building or facilities is prohibited, unless per coordination with the Architect and Owner permission.

2.0.2 EXISTING BUILDING ACCESS

The Owner reserves the right to maintain access to and independently improve the existing building and its surrounds located on the project site.

2.0.3 STORAGE / STAGING AREA

All construction material, the Contractor's, prime and sub-contractor's vehicles and equipment, and personal vehicle parking areas will be established and regulated by the Contractor and approved by the Owner.

2.0.4 OPEN TRENCHES

All open trenches and excavations within the project site shall be marked by lighted and flagged barricades. TRENCHES SHALL NOT REMAIN OPEN AT NIGHT.

2.0.5 SECURITY

The Contractor shall be responsible for the security of his/her equipment and materials, as well as the security of the equipment and materials of his agents prime and sub-contractors. Further, he/her shall be responsible for the security of all gates and entrances to the Project site. The gates shall be locked at all times, or guards posted at the gates to control ingress and egress through them. The Contractor shall provide adequate lighting for the entire area of the Project site.

The Contractor shall provide to Owner a list of all his/her employees as well as a list of all the employees of the prime and sub-contractors and shall, during the work of the Project, advise the Owner of changes to the list of personnel working on the Project. The Contractor shall be responsible for the direct supervision of his/her employees, those of his agents, prime and sub-contractors at all times while on the Project site.

The Contractor shall exercise and take all precautions in the storage and dispensing of all flammable liquids such as, but not limited to, gasoline, diesel fuel and lubricants.

2.0.6 ONGOING MAINTENANCE

The Contractor is responsible for any on-going maintenance and repairs of existing fencing, clay infields, irrigation and athletic field grassing during construction and until final acceptance by the owner.

3.0 SURFACE INFORMATION AND MATERIALS INSPECTION

The Contractor shall have full responsibility for acquisition, interpretation, analysis and cost impact of sub-surface conditions in the performance of the Work required by this contract. The Contractor shall provide, to the Owner, written certification that all materials and equipment meet the design requirements, established in the drawings and technical specifications for permitting and are in conformance with the Construction Documents. Copies of all test, inspection and certification reports shall be submitted to the Owner within twenty-four (24) hours of receipt of such reports by the Contractor.

4.0 PAVEMENT

The Contractor shall be responsible for all roadways adjacent to or on the project site over which his, his agents prime and / or sub-contractors vehicles may travel. The Contractor shall at his sole cost and expense, repair any damage caused by operation of equipment or hauling of debris on any and all roads off of the project site used to travel on.

5.0 PROJECT SIGN

The Contractor shall install a project sign with applicable information, as shown in Drawings.

6.0 PROJECT PROGRESS PHOTOGRAPHS

The Contractor shall furnish to the Owner progress photographs that shall be taken monthly for the duration of the Work of this Contract. The photographs shall be taken before the start of construction work and continuing throughout the work as it progresses and as long as the work of this Contract is being performed. Refer to Division 1, Section 01322, Photographic Documentation. A photograph shall be taken from each corner of the construction limit lines of this Contract looking towards the center of the Project site.

PART 2- PRODUCTS

Not Used

PART 3- EXECUTION

Not Used

END OF SECTION 00800

SECTION 00900

LIST OF DRAWINGS AND TECHNICAL SPECIFICATIONS

I - LIST OF DRAWINGS:

SHEET	SHEET	ORIGINAL	REVISION
G000	COVER SHEET	2/9/2022	
G001	OSF BUILDING CODE ANALYSIS FORMS	2/9/2022	
G002	OSF BUILDING CODE ANALYSIS FORMS	2/9/2022	
AG001	KEYNOTE ABBERRVIATIONS	2/9/2022	
A001	CODE ANALYSIS & CONSTRUCTION DOCUMENTS	2/9/2022	
C002	SCDOT NOTES	2/9/2022	
C101	EXISTING CONDITIONS / DEMOLITION PLAN	2/9/2022	
C102	CIVIL SITE PLAN	2/9/2022	
C201	SEDIMENT & EROSION CONTROL PLAN – PHASE 1	2/9/2022	
C202	SEDIMENT & EROSION CONTROL PLAN – PHASE 2	2/9/2022	
C203	SEDIMENT & EROSION CONTROL PLAN – PHASE 3	2/9/2022	
C301	DRAINAGE PLAN	2/9/2022	
C302	DRAINAGE PROFILES	2/9/2022	
C303	GRADING PLAN	2/9/2022	
C304	ROAD PROFILE & CROSS SECTIONS	2/9/2022	
C305	GRADING & DRAINAGE DETAILS	2/9/2022	
C401	WATER DISTRIBUTION & SANITARY SEWER PLAN	2/9/2022	
C402	WATER DISTRIBUTION & SANITARY SEWER DETAILS	2/9/2022	
C501	SITE DETAILS	2/9/2022	
C502	SITE DETAILS	2/9/2022	
L100	OVERALL SITE PLAN	2/9/2022	
L101	KEY PLAN	2/9/2022	
L102	LAYOUT PLAN	2/9/2022	
L103	LAYOUT PLAN ENLARGEMENT	2/9/2022	
L104	LIFE SAFETY, FIRE APPARATUS ROUTING & CONSTRUCTION COORDINATION PLAN	2/9/2022	
L200	TREE PLAN	2/9/2022	
L201	PLANTING PLAN	2/9/2022	
L202	PLANTING PLAN ENLARGEMENT	2/9/2022	
L203	PLANTING DETAILS & SCHEDULE	2/9/2022	
L301	LANDSCAPE CONSTRUCTION DETAILS	2/9/2022	
L302	LANDSCAPE CONSTRUCTION DETAILS	2/9/2022	
L303	LANDSCAPE CONSTRUCTION DETAILS	2/9/2022	
L304	LANDSCAPE CONSTRUCTION DETAILS	2/9/2022	
IR1	IRRIGATION PLAN	2/9/2022	
IR2	IRRIGATION PLAN	2/9/2022	
IR3	IRRIGATION PLAN	2/9/2022	
ES000	PHOTOMETRIC PLAN	2/9/2022	
ES100	ELECTRICAL SITE PLAN	2/9/2022	
ES200	ELECTRICAL SPECS & SCHEDULES	2/9/2022	
A101	FLOOR PLAN CONCESSION	2/9/2022	
A102	FLOOR / ROOF PLAN / EXTERIOR SCORE TOWER	2/9/2022	

A151	ROOF PLAN CONCESSION	2/9/2022
A201	EXTERIOR ELEVATIONS CONCESSION	2/9/2022
A251	BUILDING SECTION CONCESSION	2/9/2022
A252	SECTIONS / DETAILS SCORE TOWER	2/9/2022
A301	WALL SECTIONS / PLAN DETAILS CONCESSION	2/9/2022
A401	FINISH SCHEDULE / DOOR SCHEDULE / DOOR DETAILS CONCESSION	2/9/2022
A501	ENLARGED RESTROOM PLANS	2/9/2022
A502	INTERIORS / ROOF DETAILS CONCESSION	2/9/2022
S100	CONCESSIONS & SCORING TOWER NOTES	2/9/2022
S101	CONCESSIONS & SCORING TOWER NOTES	2/9/2022
S200	CONCESSIONS PLANS & NOTES	2/9/2022
S201	SCORING TOWER PLANS, SECTIONS & NOTES	2/9/2022
S300	CONCESSIONS SECTIONS & DETAILS	2/9/2022
S301	CONCESSIONS SECTIONS & DETAILS	2/9/2022
P100	PLUMBING PLANS, LEGEND & SCHEDULES	2/9/2022
P200	PLUMBING NOTES & DETAILS	2/9/2022
P300	PEX PIPING SPECIFICATIONS	2/9/2022
M100	MECHANICAL PLAN, NOTES, LEGEND & SCHEDULES	2/9/2022
E100	ELECTRICAL PLANS & LEGEND	2/9/2022
E200	ELECTRICAL NOTES, DETAILS & SCHEDULES	2/9/2022

END OF SECTION 00900

SECTION 01100

SUMMARY OF WORK

PART 1-GENERAL

The Summary of Work in this Section comprises the **Waverly Park** in Georgetown County, South Carolina. The following scope of work description is intended to be general in nature. The intention is to have the successful Contractor perform all of the work included and presented within the Contract Documents, paying particular attention to the Summary Schedule, Key Milestones in Division 0, Section 00750. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual. The Drawings and Technical Specifications are not intended to indicate or describe all work, or means and method of construction required for completion of the Work. The Contractor shall provide and install all incidentals that are required for completion of the Work.

Project Description:

The Project consists of the completion of four (4) 225' baseball/softball fields, including but not limited to site preparation and the construction of roadways, parking, underground storm drainage and utilities, retention ponds, concession/restroom building, dugouts, backstops, sports and site lighting, sidewalks, vinyl chain link fencing and gates, landscaping and irrigation.

Base Bid:

The Base Bid includes site preparation and construction of the ballfield complex, roadways, parking, underground storm drainage and utilities, retention ponds, concession/restroom building, dugouts, backstops, sports and site lighting, sidewalks, vinyl chain link fencing and gates, landscaping and irrigation.

Alternate #1:

SPORTS FIELD LIGHTING: Install concrete lighting poles in lieu of wood lighting poles. Contractor shall provide structural engineer's signed and sealed drawings for the poles. Engineering shall be based on the current listed applicable loading conditions and as determined by the applicable building codes.

Alternate #2:

ROOFING SYSTEM: Install asphalt shingle roof system in lieu of metal roofing on concession building, dugouts and scoring towers. Finish and install asphalt shingle roof system per Specifications Section 073113.

Alternate #3:

CONCRETE SIDEWALK: Remove concrete sidewalk from rear ballfield parking lot to front school parking lot area, limits as shown on L100, install sod in lieu of sidewalk within the ballfield complex fence and seed in lieu of sidewalk outside the ballfield complex fence.

Alternate #4:

SPORTS FIELD LIGHTING: Install galvanized steel lighting poles, including connections to concrete base, in lieu of wood lighting poles. All portions of the steel pole shall be a minimum of 8" above grade. Contractor shall provide structural engineer's signed and sealed drawings for the poles and bases. Engineering shall be based on the current listed applicable loading conditions and as determined by the applicable building codes.

1.01 RELATED REQUIREMENTS INCLUDED

- A. Project Manual, Division 0, Bidding and Contract Documents
- B. Project Manual, Division 1, General Requirements
- C. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual, without exception.
- D. The Contract Form for this Project shall be as stipulated in Division 0, Section 00500 in the Project Manual.

1.02 SCOPE OF WORK AND USE OF THE PREMISES

- A. Contractor shall have use of the Project Site as shown on the applicable Drawings for execution of the Work of this Contract, except as may be otherwise indicated or necessitated by the requirements of the Project Manual, or as may be determined by the Owner.
- B. Contractor shall provide, or cause to be provided, and shall pay for all testing, labor, equipment, materials and such other utilities, transportation and facilities necessary for the proper execution of the Work, whether temporary or permanent, and whether or not incorporated or to be incorporated in the Work.
- C. Construction services shall be performed by qualified, licensed construction contractors and suppliers selected and paid by the Contractor.
- D. Contractor shall provide protection at all affected areas of the site during the performance of the Work.
- E. Contractor shall perform all work in conformance with O.S.H.A. requirements, which will be strictly enforced.
- F. Contractor shall coordinate the use of the premises consistent with the Project requirements as may be directed by the Owner.
- G. Contractor shall use access routes for delivery of materials and equipment only as indicated on the drawings approved by the Owner and as may be directed by the Owner. Do not use access routes other than those indicated. Contractor shall keep clean, maintain and repair all access routes used.
- H. Electrical power will not be provided for welding or any other equipment.
- I. Contractor shall assume full responsibility for the protection and safekeeping of all products under this contract, stored and / or installed on the Project Site as well as those products stored off the Project Site. Materials, products and equipment shall be stored on the Project Site only in those areas indicated or allowed for staging and approved by the Owner.
- J. Safe staging and material storage shall be limited to the area indicated on the drawings, which have been approved by the Owner and as may be designated by the Owner. Contractor must obtain specific permission from the Owner for the use of other areas for storage and staging.
- K. Contractor shall protect existing building exteriors, utilities, hardscape, driveways / parking areas, open space / yards / play areas and other areas adjacent to or outside of Project Site that are subject to damage by Work performed under this contract. Contractor shall, at his sole cost and expense, repair or replace any existing work damaged by his/her prime and/or sub-contractor's personnel or equipment.
- L. Contractor shall pay extreme attention to maintaining access to existing school facility and single-family homes.

1.03 WORK SEQUENCE AND COMPLETION

- A. Contractor shall work in an orderly manner coordinated with the work of other disciplines and trades.
- B. No disruption to, or use of adjacent facilities and access to those facilities will be allowed.
- C. The Owner may require certain work to be performed after normal working hours or on holidays or weekends or as may be necessitated in the Public interest. Such work does not constitute a change of scope or additional cost.
- D. Contractor shall perform the Work in conformance with the Summary Schedule and Key Milestones in Section 00750. This Section includes critical interim completion dates that the Contractor is required to meet.

1.04 LIQUIDATED DAMAGES

The Contractor agrees to commence Work under this Contract on the effective date established as “Notice to Proceed”, and to complete the Work in conformance with the established Summary Schedule and Key Milestones in Section 00750 of the Project Manual. Should the Contractor neglect, fail or refuse to complete the Work by any one of the key milestone activities by its critical interim completion date(s) or the Substantial Completion date then the Contractor shall pay to the Owner Liquidated Damages as specified in *The Project Manual, Vol. 1, Division 1, Section 01100, Summary of Work*, for those damages suffered by the Owner as a result of delay for each and every calendar day that the Contractor has failed to complete any key milestone activity by its interim completion date or the Substantial Completion date. **Liquidated damages will accrue at an amount of \$500 per calendar day.** The aforementioned Liquidated Damages are not a penalty, but rather are a pre-agreed liquidation of the losses incurred by the Owner due to failure of the Contractor to complete the Work on time.

1.05 SUBSTITUTIONS AND PRODUCT OPTIONS

Refer to Division I, Section 01600, Product Requirements in the Project Manual.

1.06 SURVEY

Contractor shall verify all survey data, Geotechnical reports and Dilatometer investigations included within the Contract Documents and report any errors and inconsistencies in writing to the Owner before any work is performed in those areas where errors and inconsistencies may exist. Refer to Division 1, Section 01310, Project Management and Coordination in the Project Manual.

PART 2- PRODUCTS [Not Used]

PART 3- EXECUTION [Not Used]

END OF SECTION 01100

SECTION 01230

ALTERNATES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. This Section identifies each Alternate by number and describes the basic changes to be incorporated into the Work, only when that Alternate is made part of the Work by specific provisions in the Contract Agreement. Administrative and procedural requirements governing Alternates is included

1.02 RELATED REQUIREMENTS

- A. An Alternate is an amount proposed by Bidders and stated on the Bid Form for certain work defined in the Bidding and Contract Documents that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in products, materials, equipment, systems or installation methods described in the Contract Documents.
- B. The Contract shall incorporate Alternates accepted, in writing, by the Owner.
- C. Sections of the Technical Specifications as may be referred to and listed under the respective Alternates.
- D. Referenced Sections of the Technical Specifications stipulate pertinent requirements for products and methods to achieve the Work stipulated under each Alternate.
- E. Coordinate pertinent related work and modify surrounding work as required to properly integrate work under each Alternate, and to provide the complete construction work required by the Contract Documents.
- F. Each Alternate shall be quoted giving a date on which the Alternate must be accepted so as to have no effect on the Contract amount and schedule.
- G. Division 1, General Requirements, in the Project Manual governs the execution of all Technical Specification Sections.

1.03 ALTERNATES

- A. Alternates will be accepted and executed at the option of and after review by the Owner.
- B. This Section identifies each Alternate by number, and describes the basic changes to be incorporated into the Work but only when that Alternate is made a part of the Work by specified provisions in the Contract and approved by the Owner in writing. No other adjustments will be made to the Contract Sum.

1.04 DESCRIPTION OF ALTERNATES

Alternate #1:

SPORTS FIELD LIGHTING: Install concrete lighting poles in lieu of wood lighting poles. Contractor shall provide structural engineer's signed and sealed drawings for the poles. Engineering shall be based on the current listed applicable loading conditions and as determined by the applicable building codes.

Alternate #2:

ROOFING SYSTEM: Install asphalt shingle roof system in lieu of metal roofing on concession building, dugouts and scoring towers. Finish and install asphalt shingle roof system per Specifications Section 073113.

Alternate #3:

CONCRETE SIDEWALK: Remove concrete sidewalk from rear ballfield parking lot to front school parking lot area, limits as shown on L100, install sod in lieu of sidewalk within the ballfield complex fence and seed in lieu of sidewalk outside the ballfield complex fence.

Alternate #4:

SPORTS FIELD LIGHTING: Install galvanized steel lighting poles, including connections to concrete base, in lieu of wood lighting poles. All portions of the steel pole shall be a minimum of 8" above grade. Contractor shall provide structural engineer's signed and sealed drawings for the poles and bases. Engineering shall be based on the current listed applicable loading conditions and as determined by the applicable building codes.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01230

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SECTION 01290

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents of the Project Manual.
- B. Division 1, General Requirements of the Project Manual

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing the Contractor's Certified Applications for Payment.
- B. This Section requires the coordination of the Contractor's Applications for Payment with the Construction Schedule, including established Key-Milestone Dates, Schedule of Values, Submittal Schedule, Prime and Sub-Contractors work.

1.3 APPLICATION FOR PAYMENT

A. General

1. Progress payments shall be applied for and made as the construction of the Work proceeds at intervals stated in the Contract. The Contractor will provide, to the Owner a "draft" copy of his/her Application for Payment on the 25th day of the month, or the closest workday should the 25th day fall on a weekend or holiday. This provides an opportunity to discuss figures (Schedule of Values) before they become "fixed", and will expedite the processing of the final typed Application when the Owner receives it.
2. Formal Applications for Payment shall be submitted to the Owner by close of business on the 1st day of the succeeding month, or the closest work day should the 1st day fall on a weekend or holiday of the month. The Certified Application for Payment will be processed, by the Owner, thirty (30) calendar days from the day that the Contractor submits the final Application for Payment, except if that day should fall on a weekend or holiday in which case payment shall be made on the next succeeding work day.
3. All information required on the Application shall be provided and filled in, including that for Change Orders executed prior to the date of submittal of the Application. Summary of dollar values must agree with respective totals indicated on continuation sheets.
4. Each Certified Application for Payment shall be consistent with previous Applications as approved by and paid for by the Owner.
5. All Work covered by Progress Payments shall, at the time of payment, become the property of the Owner.

6. Form of Application for Payment will be AIA Document G 702 revised, and Continuation Sheets G 703.
7. All formal Applications for Payment shall be submitted in duplicate to the Owner by means ensuring receipt within twenty-four (24) hours. Itemized Applications and supporting documents shall be submitted with a complete transmittal form listing attachments, and recording appropriate information related to the Application in a manner acceptable to the Owner. Itemized data and format provided on continuation sheets shall include schedules, line items, values as stipulated in the Schedule of Values as accepted by the Owner.
8. With each Application for Payment the Contractor shall certify that such Application for Payment represents a just estimate of costs reimbursable to Contractor under terms of the Contract and shall certify there are no Mechanic's or Materialmen's Liens outstanding at the date of that Application for Payment, that all due and payable bills with respect to the Work have been paid to date or shall be paid from the proceeds of that Application for Payment, that there is no known basis for the filing of any Mechanic's or Materialmen's Lien against the Surety in connection with the Work, that Waivers and Bills Paid Affidavit forms from all prime and subcontractors, consultants and materialmen have been, or will be, obtained in the form agreeable to the Owner and that amount of the contract remaining to be expended is sufficient to complete the project.
9. The Contractor shall complete each entry on the forms, including notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. Incomplete Applications for Payment will be returned without action.
10. Conditions governing regular schedule for applications, payment and retainage shall be as stated in the Contract.
11. Continuation sheets shall include a total list of all scheduled component items of work with item number and scheduled dollar value for each item. Dollar values to be included in each column for each scheduled line item when Work has been performed or products stored. Round off values to nearest dollar or as may be specified for Schedule of Values.
12. List each Change Order executed prior to date of submission at end of continuation sheets. List by Change Order number and description as to original component item of Work.

B. Waivers and Mechanics Liens

1. Monthly Applications for Payment shall include Waivers of Mechanic's Liens and Claims for all Work included in the period of construction covered by the Application for Payment and the previous month's Application. Waivers of Liens and Claims from prime contractors or subcontractors and suppliers shall include the period of construction covered by the Application for Payment, the total amount paid prior to and including the previous month's Application

2. Partial Waivers of Liens shall be submitted on each item of work for the amount requested, prior to deduction for retainage, for each item.
3. Contractor shall submit final or full Waivers of Liens and Claims for completed items of work shown on the monthly Application for Payment.
4. The Owner reserves the right to designate which entities involved in the Work must submit Waivers of Liens.
5. The Contractor's final Application for Payment shall be submitted with, or preceded by final Waivers from every entity involved with the performance of work, supplying of materials or the providing of professional services covered by the Application who could lawfully be entitled to a Lien.
6. Waivers of Liens shall be provided on forms, and executed in a manner acceptable to the Owner.

C. Initial (First) Monthly Application for Payment

1. Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include, but are not limited to the following:
 - a. List of all prime contractors, first and second tier subcontractors.
 - b. Contractor's Sworn Statement of principal suppliers, fabricators, prime and subcontractors.
 - c. Schedule of Values.
 - d. Contractor's construction schedule, to be updated monthly.
 - e. Schedule of principal products and long lead delivery items, to be updated monthly.
 - f. Submittal Schedule, Procurement Schedule.
 - g. Copies of all required permits.
 - h. Copies of authorizations and licenses from governing authorities for performance of work.
 - i. Initial progress report.
 - j. Certificates of Insurance and insurance policies.
 - k. Any material stored off site must carry additional insurance (All Risk Rider) stating Owner as insured. All material will be inspected by the Owner before billing can be approved. Bill of Sale and receipts for items being billed at cost only are required and 25% retainage will be held for off-site stored materials. Paperwork must accompany request two weeks prior to billing to insure adequate time to schedule Owner's inspection.
 - l. Contractor's Construction Safety Plan (Initial Only).

D. Application for Payment at Substantial Completion

1. The Contractor shall, upon issuance of the Certificate of Substantial Completion, submit his/her Application for payment, which shall reflect any Certificates of Substantial Completion issued previously for Owner occupancy for designated portions of the Work.

2. Application shall include, but not be limited to and as may be determined by the Owner, the following:
 - a. Certificates of Occupancy and such other permits and approvals as may be required.
 - b. Warranties (Guarantees) and maintenance agreements as may be applicable.
 - c. Testing, adjusting and balance records.
 - d. Maintenance manuals, training and instructions.
 - e. Equipment start-up performance reports.
 - f. Changeover information related to Owner's occupancy, use, operation and maintenance.
 - g. Final cleaning of the entire project site..
 - h. Application for Reduction of Retainage, and Consent of Surety.
 - i. List of incomplete Work, recognized as exceptions to issuance of Certificate of Substantial Completion.

E. Final Application for Payment

1. Administrative actions and submittals that shall precede or coincide with this final Application for Payment shall include, but not be limited to and as may be determined by the Owner, the following:
 - a. Completion of Project Closeout requirements.
 - b. Completion of items specified for completion after Substantial Completion.
 - c. Prepare and submit to the Owner a list of unsettled claims, as may be applicable.
 - d. Transmit to the Owner all required project records including permit drawings, as constructed drawings both on hard copy and in electronic (PDF) format.
 - e. Provide to the Owner evidence that all requisite taxes, fees and similar obligations have been paid in full.
 - f. Removal of all temporary facilities and services.
 - g. Removal of all surplus materials, rubbish and similar elements.

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01290

SECTION 01300

REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.01 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents of the Project Manual
- B. Division 1, General Requirements of the Project Manual

1.02 CODES, AUTHORITIES, REGULATORY AGENCIES, AND INDUSTRY REFERENCES

- A. Where references are made on the Drawings or in the Technical Specifications to codes, they shall be considered an integral part of the Contract Documents as minimum standards. Nothing contained in the Contract Documents shall be so construed as to be in conflict with any law, bylaw or regulation of the municipal, state, federal or other authorities having jurisdiction.
- B. Perform Work in compliance with the following code:
 - 1. Current edition of all applicable building code(s), local, state and federal.
 - 2. State of South Carolina Department of Education, Office of School Facilities (OSF)
- C. Perform Work in compliance with the following Authorities and Regulatory Agencies:
 - 1. Georgetown County, South Carolina
 - 2. South Carolina Dept. of Natural Resources (SCDNR)
 - 3. South Carolina Dept. of Transportation (SCDOT)
 - 4. South Carolina Department of Health Environmental Controls (SCDHEC)
 - 5. OSHA Code of Federal Regulations. (OSHA)
 - 6. All federal, state and local clean air, clean water, water rights, resource recovery, and solid waste disposal standards and the Federal Endangered Species Act, and the Occupational Safety and Health Acts.
 - 7. Environmental Protection Agency (EPA).
- D. Perform Work in compliance with the following industry references:
 - 1. National Fire Protection Association (NFPA), National Electric Code (NEC).
 - 2. NFPA 101, Life Safety Code.
 - 3. ASCE 7-10: Minimum Design Loads for Buildings and Other Structures.
 - 4. American Society for Testing and Materials (ASTM).
 - 5. Underwriters Laboratories (UL).
 - 6. The National Board of Fire Underwriters.

1.03 FIRE RATINGS

- A. Where material, component, or assembly is required to be fire rated, fire rating shall be determined or listed by the following testing agency:
 - 1. Factory Mutual Laboratories (FM).
- B. Equivalent fire rating as determined or listed by another testing authority is acceptable if approved by applicable governing authorities having jurisdiction and the Owner.

1.04 PERMITTING

- A. At no additional expense to the Owner, file for and obtain necessary licenses and permits for any interim phases for construction, and be responsible for complying with any Federal, State, County, and Municipal Laws, Codes, regulations applicable to the performance of the Work, including, but not limited to, any laws or regulations requiring the use of licensed prime and /or subcontractors to perform parts of the Work.

1.05 INSPECTION AND CERTIFICATIONS

- A. Arrange inspection and obtain Certificates of approval from applicable authorities having jurisdiction. Furnish Certificates of Approval in accordance with the applicable Technical Specifications and the General Requirements of the Contract.
- B. Notify and coordinate for all appropriate Georgetown County, State, and Federal inspections of the work. Allow enough time to maintain progress of the work.

1.06 PERFORMANCE

- A. Should the Contractor knowingly perform any Work that does not conform with the requirements of applicable codes, ordinances, regulations, or standards, without given prior written notice to the Owner and obtaining required variance, etc. from the governing body, Contractor shall assume full responsibility thereof and shall bear all costs involved in correcting such non-complying Work. Costs shall include but not be limited to: All fines, inspection costs, damages, design and management fees in addition to the cost of removal and replacement of the work of all trades involved.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION 01300

SECTION 01310

PROJECT MANAGEMENT AND COORDINATION

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual and the Construction Contract Documents, without exception
- B. The Contractor shall be responsible for general project coordination of all construction phases and aspects, trades and disciplines of the Work of the Project.
- C. The Contractor shall be responsible for general coordination of all construction site operations with other improvement projects that may be conducted by the Owner.
- D. The Contractor shall be responsible for general coordination with other interested parties including, but not limited to the Owner, other Contractors working on Owner or abutting property projects, and all involved permitting authorities.

1.02 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents in the Project Manual.
- B. Division 1, General Requirements in the Project Manual

1.03 GENERAL COORDINATION

- A. Coordinate scheduling, submittals, and work of various Sections of the Technical Specifications to assure efficient and orderly sequence of installation of construction elements with provisions for accommodating items furnished by the Owner, or others, to be installed by the Contractor.
- B. Coordinate sequence of Work to accommodate partial occupancy for the Owner as specified in Section 01100, Summary of Work and / or as directed by the Owner.
- C. Review and coordinate requirements of all Divisions of the Project Manual and Sections of the Technical Specifications. Report any discrepancies to the Owner
- D. Maintain services of prime and major sub-contractors throughout duration of the Contract, except as may be required by provisions of Conditions of Contract. Notify the Owner, in writing, of intention to replace prime or sub-contractor(s), outlining reasons for the action and naming proposed replacement contractor(s).
- E. Coordinate work of prime and sub-contractors and record contractor installation(s) data on Project Record Drawings.

- F. All communications regarding Contract requirements shall be addressed to the Owner. Outline any special procedures required for coordination and include such items as required notices, reports and attendance at meetings.
- G. Arbitrate and resolve coordination conflicts between prime and sub-contractors to ensure complete and operational systems.
- H. Coordinate work with all existing utility systems.
- I. Coordinate construction activities to ensure that operations are carried out with due consideration given to energy, water and materials.
- J. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

1.04 COORDINATION MEETINGS

- A. In addition to the meetings referred to in Section 01315, Progress Meetings, the Contractor shall conduct coordination meetings and pre-installation meetings with the Architect and other consultants, supervisory personnel, prime and sub-contractors, suppliers, the Owner and others as necessary and applicable to assure coordination of different trades, disciplines, hardware and specialty systems.

1.05 COORDINATION OF SUBMITTALS

- A. Coordinate use of Project space and sequence of installation of equipment, walks, parking areas, mechanical, electrical, plumbing, or other Work that is indicated diagrammatically on the Drawings and/or contained in the Technical Specifications. Utilize space efficiently to maximize accessibility for Owner installations, maintenance and repairs.
- B. In finished areas, except as otherwise shown, conceal ducts, pipes, wiring, and other non-finish items within construction. Coordinate locations of concealed items with finish elements, and provide as-constructed drawings of the involved location.
- C. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in sequence required to obtain best results.
- D. Make adequate provisions to accommodate items scheduled for later installation, including accepted Bid Alternates, Owner supplied items, sub-subcontractor installed items, work by others, and installation of products purchased with allowances.

1.06 COORDINATION OF MECHANICAL, ELECTRICAL, & OTHER INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of mechanical, electrical, and other systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical and electrical systems, equipment and materials installation with other building components.
2. Verify all dimensions by field measurements, and advise the Owner of any dimensional conflicts.
3. Arrange and coordinate for chases, slots, and openings in other building components during progress of construction.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, prior to placement of concrete and/or other structural components.
5. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible and advise the Owner prior to completion of such installations.
6. Coordinate connection of systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchise service (utility) companies, and controlling agencies. Coordinate and provide required connection for each service.
7. Install systems, materials, and equipment to confirm with approved submittal data, include coordination drawings. Confirm to arrangements indicated by the Contract Documents, recognizing that portions of the Work may be shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, immediately refer conflict to the Owner
8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components. Elements restricting such installation will be referred to the Owner
9. Install systems, materials, and equipment to facilitate servicing, maintenance, and repair or replacement of disconnecting, with minimum of interference with other locations and ease of access.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used.

END OF SECTION 01310

SECTION 01315

PROGRESS MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Division 0, Bidding and Contract Documents apply to this Section.
- B. Division 1, General Requirements of the Contract Documents apply to this Section.

1.2 SUMMARY

- . This Section specifies administrative and procedural requirements for all project meetings including but not limited to the following:
 - 1. Field / Site Coordination Meetings.
 - 2. Construction Progress Meetings.
 - 3. Project Coordination / Information Response Meetings (By Owner)

1.3 PROGRESS MEETINGS

- A. Conduct Field / Site Work Coordination meetings at a location and at appropriate times to be determined by the Owner. Notify the Owner no less than 48 hours prior to scheduled meeting date.

Conduct Construction Progress meetings at the Project site, or at such location designated by the Owner at regularly scheduled intervals. At the onset of the project these meeting shall be held on a weekly basis until such time as the frequency is changed by the Owner. Notify the Owner of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.

Conduct Project Coordination / Information Response Meetings at such times as may be required and at a location to be approved by the Owner. Notify the Owner no less than 48 hours prior to scheduled meeting date.

- B. Agenda: Agendas and minutes for Field and Project Coordination meetings will be prepared by whoever (Contractor or Owner) requests the meeting. Agenda for regularly scheduled Construction Progress Meetings will be prepared by the Owner; minutes of those meetings will be prepared by the Contractor.. Review and provide comment on minutes of the previous (Field/Site Coordination, Progress or Project Coordination meetings. Review other items of significance that could affect progress. Include topics for discussion as appropriate in the current status of the Project.
 - 1. Contractor's construction schedule: Review progress since the last meeting. Determine where each activity is in relation to the construction progress schedule,

whether on time or ahead or behind schedule. Determine how schedule can be improved if behind..

- C. Reporting: After each Construction Progress meeting date the Contractor will prepare and forward to the Owner, minutes of the meeting for review and comment. The Owner will distribute (corrected) copies of minutes of the meeting to each party present and to other parties who should have been present. Contractor shall include a brief summary, in narrative form, of progress since the previous meeting and report.
 - 1. Schedule Updating: Contractor will revise / update the construction schedule after each Construction Progress Meeting where revisions to the schedule have been made or recognized. Contractor will Issue the revised schedule, to the Owner, concurrently with the report / minutes of each meeting.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01315

SECTION 01320

CONSTRUCTION PROGRESS AND DOCUMENTATION

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Schedule for Submittals
- B. Scheduling Personnel (NIC)
- C. Contract Milestones
- D. Submittal Schedule.
- E. Material Procurement Schedule.
- F. Construction Activities Schedule
- G. Construction Activities Schedule Revisions and Updates.
- H. Short Interval Schedule.
- I. Adjustments of Time for Completion.

1.02 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents in the Project Manual, more specifically Section 00750, Summary Schedule and Key Milestones apply to this Section.
- B. Division 1, General Requirements in the Project Manual, more specifically Section 01100, Summary of Work, Section 01330, Submittal Procedures and Section 01770, Close Out Procedures apply to this Section.

1.03 SCHEDULE FOR SUBMITTALS

- A. Allow ten (10) calendar days for review and turnaround of any submittals as may be required in the Drawings and / or Technical Specifications. All required Submittals shall be forwarded directly to the Architect / Engineer of record with sufficient time to allow for review, approval, fabrication and delivery to support the Schedule as outlined. Copy of the transmittal only must be sent to the Owner.
- D. The Contractor shall submit the following as may be appropriate and acceptable to the Owner:
 - 1. Schedule of Submittals and Product Data: To be submitted within ten (10) calendar days from Notice to Proceed (NTP). Schedule shall show submittals commencing within ten (10) calendar days from NTP and completing within sixty (60) calendar days from NTP.
 - 2. Material Procurement Schedule: To be submitted within ten (10) calendar days from NTP.
 - 3. Construction Activities Schedule: To be submitted within ten (10) calendar days from NTP.
 - 4. Short Interval Schedule: To be submitted within seven (7) calendar days from NTP.
 - 5. Inspection and Material Testing Schedule: To be submitted within twenty-one (21) calendar days from NTP.

6. Hot Laid Asphalt and Portland Cement Concrete Pour Schedules: To be submitted no less than five (5) calendar days prior to the date scheduled for the activity.

1.04 SCHEDULING PERSONNEL

- A. Not Included (NIC)

1.05 CONTRACT MILESTONES

- A. Key Milestones developed by the Owner and provided for in Division 0, Section 00750, Summary Schedule and Key Milestones in the Project Manual, are to be incorporated into the Contractor's Construction Schedule.
- B. Key Milestones: Key Contract Milestones (the "Milestones") are significant interim dates on the Critical Path of the Work and within the Contract Time at which certain portions of the Work must be either partially or totally complete in order for the Work to be in compliance with the Contract Documents
- C. Identify all Milestones in the Schedule Submittals, whether or not the Owner has identified those dates in the Bidding and Contract Documents.
- D. Milestones will be clearly identified in all Contractor submitted schedules and will serve as an essential instrument of measurement, by the Owner, of the Contractor's compliance with the Contract Documents.
- E. Failure by the Contractor to achieve Milestones by the Contract Dates may result in Owner implementing contractual remedies, as required, in order to regain the Contract Schedule.

1.06 SUBMITTAL SCHEDULE

- A. Within ten (10) calendar days after NTP, develop and submit a Schedule of Submittals on a form acceptable to the Owner. At a minimum, the Submittal Schedule shall be in the form of: (i) a hard copy; and, (ii) an electronic version (PDF) to be approved by the Owner.
- B. Incorporate all submittals required by the Contract Documents for the duration of the Contract Time.
- C. Integrate the Submittal Schedule into the Contract Schedule and link material and equipment deliveries as appropriate to construction work activities.
- D. Submit status of the Submittal Schedule with the monthly Contract Schedule Status Submission.
- E. Indicate changes from the previous report with an asterisk.
- F. The Owner's review of the Submittal Schedule does not constitute it to be a complete listing of all submittals required by the Contract.

1.07 MATERIAL PROCUREMENT SCHEDULE

- A. Within ten (10) calendar days after the NTP, develop and submit a Material Procurement Schedule on a form acceptable to the Owner. At a minimum, the Submittal Schedule shall be in the form of (i) a hard copy and (ii) an electronic version (PDF) to be approved by the Owner.
- B. Incorporate all material required by the Contract Documents for the duration

- of the Contract Time.
- C. Integrate the Material Procurement Schedule with the Schedule of Submittals and the Contract Schedule.
- D. Review the Material Procurement Schedule at the weekly scheduled Construction Progress Meeting.
- E. Submit status of the Material Procurement Schedule with the monthly Contract Schedule Status Submission.
- F. Indicate changes from the previous report with an asterisk.

1.08 CONSTRUCTION ACTIVITIES SCHEDULE

- A. Within ten (10) calendar days following NTP and prior to submission of the first Application for Payment, submit the Construction Activities Schedule (Project Schedule) both in (i) a hard copy and (ii) electronic version (PDF). The Project Schedule shall employ the Critical Path Method (CPM) and may utilize Microsoft Project or equal.
- B. Incorporate all Key Milestones as designated by the Owner in the Contract Documents, Division 0, Section 00750, as well as other Milestones the Contractor identifies as significant points in time.
- C. At a minimum, the Construction Activities Schedule (Project Schedule) shall include the following:
 1. A computer-generated bar chart, based upon the CPM logic, organized by discipline and resource and sorted by early start, early finish.
 2. No work activity shall exceed fifteen (15) working days in duration, unless agreed upon by the Owner.
 3. Each activity shall be cost loaded to reflect the estimated value of performing the work. Activity cost shall consist of the sum of labor, materials, equipment, supervision and allocated overhead. The sum of all activity cost shall equal the Contract Sum.
 4. All Milestones, submittal dates and completion dates for all shop drawing activities, material procurement, fabrication and delivery dates shall be in support of the Construction Activities Schedule. Anticipated types and durations of usage for major equipment, and any other scheduling data relevant to the Work shall be included.
 5. Activities required for Project Closeout shall include appropriate activities for obtaining Substantial Completion, Punch List, Punch Work, Final Inspections (including pre-inspections and system checkouts), Closeout Submittals (Certificates, Warranties, Manuals, Release of Liens, As-Constructed drawings etc.). Show Milestones for Substantial Completion, Temporary Certificate of Occupancy (where appropriate), Certificate of Occupancy, and Final Completion.
 6. Weather conditions, such as high or low ambient temperatures, wind, and/or precipitation, can influence progress of the work shall be considered and allowed for in the planning and scheduling of work. This is to ensure completion of the work within the Contract time. Weather conditions shall be determined by an assessment of average historical climatic conditions based upon the preceding ten

(10) year records published for the locality by the U.S. Weather Bureau Service. Weather must be unusually severe and beyond the 10-year average to even be considered as having impacted the Project Schedule.

7. The Project Schedule shall indicate holidays and any non-work days applicable to the schedule.

D. Joint Review, Revision, and Acceptance of the Construction Activities Schedule:

1. Within five (5) calendar days of receipt of Contractor's proposed Construction Activities Schedule (Project Schedule), the Owner and the Contractor shall meet for joint review of the Project Schedule to address corrections or adjustments needed. Any areas that conflict with timely completion of the Work of the Project shall be subject to revision by the Contractor at no cost to the Owner.
2. Within five (5) calendar days after joint review, the Contractor shall revise and resubmit the Project Schedule in accordance with agreements reached during review. Within five (5) calendar days of resubmission of the revised proposed Project Schedule, the Owner and Contractor shall again meet for joint review.
3. Any areas of the schedule still not in compliance shall be corrected and the Project Schedule resubmitted for acceptance within three (3) calendar days of the joint review.
4. If the Contractor fails to define any element of work, activity or logic, and the Owner's review does not detect this error or omission, such error or omission when discovered shall be corrected at the next monthly update without change to Contract Time, and at no cost to the Owner.
5. If the Owner questions Contractor's proposed logic, activity duration or cost, Contractor shall provide satisfactory revisions or adequate justification, within five (5) calendar days of receipt of written request. Any changes to the Project Schedule shall be at the Contractor's sole cost and expense.

- E. The Project Schedule shall become the basis for tracking and measuring progress once the Owner has provided written acceptance of the Contractor's submittal. Acceptance of the Project Schedule by the Owner does not relieve Contractor of any responsibilities for the accuracy or feasibility of the schedule, or the Contractor's ability to meet Substantial Completion, Contract Completion and/or Key Milestones – Intermediate dates. Also, acceptance does not warrant, acknowledge or admit the reasonableness of logic, activity duration or cost loading of the Project Schedule.

1.09 CONSTRUCTION ACTIVITIES SCHEDULE REVISIONS AND UPDATES

- A. The Construction Activities Schedule (Project Schedule) shall be updated monthly to show progress and submitted for the Owner's review. The Contractor shall provide the updated Project Schedule with each payment application. This shall include two (2) schedule hard copies and reports along with one electronic version using Microsoft Project or equal software. Non-submittal of the update will be grounds to withhold the Application for Payment.
- B. Updating of the Project Schedule to reflect actual progress shall not be considered revisions to the Schedule. The accepted Project Schedule cannot be changed (revised) without review and acceptance, by the Owner of the Contractor's proposed

- change.
- C. After the monthly Schedule Update, if the Project Schedule no longer represents actual progress of the Work, Contractor shall revise the Project Schedule to properly reflect progress and resubmit to the Owner. Any costs determined as a product of the Schedule Update shall be borne solely by the Contractor
 - D. If Contractor desires to make changes in the Project Schedule to reflect revisions in method(s) of operating and scheduling of Work, Contractor shall notify the Owner in writing, stating the reason for the proposed revision. After the Owner accepts the proposed revision, the Contractor shall implement the revision within three (3) calendar days and submit the Project Schedule to the Owner for review and final approval. Any costs determined as a product of the Project Schedule changes shall be borne solely by the Contractor
 - E. In addition, revisions to the Project Schedule that are requested by the Owner shall be made by the Contractor within three (3) calendar days of the requested revision.
 - F. All revisions to the Project Schedule shall be identified by an appropriate activity code. The Contractor shall submit the proposed code structure to the Owner for approval. Approval of the codes and requested revision(s) are required prior to revising the accepted Project Schedule.
 - G. If the Contractor defaults by failing to submit a Project Schedule, or provide the required updates or revisions, the Owner reserves the right to prepare the Project Schedule, update, or revision back-charging the Contractor for the cost of this work. In such an event:
 1. The Owner will request the Contractor's participation in the development of the Project Schedule, update or revision to assure the Project Schedule produced accurately reflects Contract requirements and progress of the Work. The Contractor shall respond and participate in this effort within three (3) calendar days of the Owners request.
 2. If the Contractor refuses to participate or cooperate with the Owner, then the Owner will develop the status of the Project Schedule to the best of its ability with the information available.
 3. Whether the Contractor participates or not, the Project Schedule shall be issued for the use of a unilateral Change Order to the Contract as may be appropriate and determined by the Owner.

1.10 SHORT INTERVAL SCHEDULE

- A. Within seven (7) calendar days from receipt of Notice to Proceed (NTP) the Contractor shall submit to the Owner a Short Interval Schedule.
- B. The Short Interval Schedule shall be a time-scaled, hand-drawn or computer-generated schedule and be consistent with the timing and sequencing of the Construction Activities Schedule (Project Schedule). It is not required to be in a CPM format.
- C. The Short Interval Schedule shall depict all activities planned to occur within the next four (4) weeks from the data date and show status for activities, which have occurred within the prior one (1) week from the data date.
 1. Generally, no activity presented in the Short Interval Schedule shall have a duration greater than five (5) working days.
 2. The Owner, from time to time, may require the Contractor to further define

- activities on the Short Interval Schedule that have a duration greater than one (1) day.
- D. The Contractor shall update the Short Interval Schedule at a minimum of once a week for the duration of the project. It shall be submitted to the Owner at regularly scheduled Progress and Coordination meetings. The data date shall be within one (1) workday of the aforesaid meeting.
 - E. The Short Interval Schedule shall be utilized with Contractor's prime and sub-contractors and other project parties for the near-term coordination of the Work.
 - F. All Milestones identified in the Contract and scheduled to take place within the calendar time frame of the Short Interval Schedule shall be included in the Schedule.

1.11 ADJUSTMENT OF TIME FOR COMPLETION

- A. Time for Completion will be adjusted only in accordance with this Clause and the Contract Documents.
- B. Any request for adjustment of time for completion because of changes or alleged delays shall be accompanied by a complete and comprehensive **Time Impact Analysis Proposal**, which shall be submitted for approval within five (5) calendar days of the event causing delay. Failure to provide the proper notice within this time frame shall be construed as the Contractor's acceptance that the event causing delay can be absorbed into the Construction Activities Schedule (Project Schedule) without causing a delay to the project completion or any Key Contract milestone date.
- C. Each **Time Impact Analysis Proposal** shall provide information justifying the request and stating the extent of the adjustment requested. Each Analysis shall be in a form and content acceptable to the Owner and shall include, but not be limited to, the general information set forth in this section appropriate to the type of request (change or alleged delay) including the following:
 1. A fragnet (a detailed sub-level schedule) CPM Schedule illustrating how Contractor proposes to have the change or alleged delay incorporated into the current Updated Project Schedule.
 2. Identification of activities in current updated Project Schedule, which are proposed to be amended due to the change or alleged delay, together with engineering estimates and other appropriate data justifying the proposal.
 3. **Time Impact Analysis Proposals** shall be based upon the dates when the change or changes were issued, or dates when alleged delay or delays began, status of work at that time, and shall include time computations for affected activities.
 4. Activity delays shall not automatically mean that an extension of the Contract Time is warranted or due to the Contractor. *It is the Owner's intention to own and control all float time indicated in the Project CPM Schedule.*
 5. Contract Time Extensions or Key Contract Milestone Adjustments will only be considered when a Critical Path activity or activities are affected and a resulting delay extends the Contract Completion Date or Key Contract Milestone date(s).
 6. Adjustment of a Key Contract Milestone date(s) may not necessarily result in an adjustment to the Contract Completion Date.
 7. As an alternative to extending the Contract Completion Date or adjusting Key Contract Milestones, the Owner may require the Contractor to adjust the Project Schedule. This shall be accomplished by revising logic, adding resources,

working crews on overtime, working additional shifts, and any other mitigating measures that the Owner determines is in the best interest of the project and the Public. Contractor agrees to fully cooperate with the Owner in finding the most effective (least cost) means to accomplish this task when requested.

8. Should the Owner find, after review of the **Time Impact Analysis**, that the Contractor is entitled to an extension of time for completion, the time extension for completion will be considered for approval by the Owner.
9. **Time Impact Analysis** related to Change Order Work and/or Contract Time Extensions shall be incorporated into and attached to the applicable Change Order to be prepared by the Owner.

1.12 RAIN DELAYS

Rain Day: For rain delays, the Contractor shall be entitled to a one-day extension of time for each day in any given month that the actual rain days measured at Georgetown, South Carolina (NOAA Station 383470), or an otherwise mutually agreed upon location, exceed the NOAA average monthly rainfall for the month (rounded to the day). In order to qualify as a rain day, there must be at least one-hundredth of an inch precipitation on the date in question. The average number of days (rounded to the full day) in each month receiving one-hundredth of an inch or more of rain in Georgetown, South Carolina, according to NOAA are as follows:

<u>Month</u>	<u>Days</u>	<u>Month</u>	<u>Days</u>
January	10	July	11
February	8	August	12
March	9	September	10
April	7	October	6
May	8	November	8
June	10	December	9

The rain gauge (NOAA 383470), or an otherwise mutually agreed upon location, shall be used as the determinate for daily rain measurement. The Contractor shall submit any request for rain days by the tenth day of the following month. Rain and weather delay extensions of time are non-compensable delays and the Contractor shall be entitled to no additional compensation as consequence of rain and weather-related extensions hereunder.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01320

SECTION 01322

PHOTOGRAPHIC DOCUMENTATION

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual, without exception.
- B. Construction progress record photographs shall be taken by the Contractor, taken at commencement of Work and at completion of the Work, and shall be provided to owner.
- C. Furnish construction photographs taken at commencement of Work and at monthly intervals until completion of the Work.
- D. Views and quantities required:
 - 1. At each specified time, take photographs from numerous different views to show the progress of the Work. Indicate date photo was taken on all photographs.
 - 2. Furnish one (1) digital copy in a mutually acceptable format to the Owner.
 - 3. The Owner shall have the right to request fewer photographs be taken at certain intervals so more photographs may be taken at other times, providing the total number of photographs remains unchanged.
- E. Do not display photographs in publications, contests or other public or private forums without the express written consent of Owner.
- F. Assemble construction photographs at project closeout in accordance with requirements stipulated in Section 01781, Project Record Documents.

1.02 RELATED REQUIREMENTS

- A. Division 1, General Requirements of the Project Manual. .
- B. Section 01781, Project Record Documents.

1.03 COST OF PHOTOGRAPHY

- A. Contractor shall pay all costs for specified photography and prints.

PART 2 – EXECUTION

3.01 VIEWS REQUIRED

- A. Consult with the Owner for instructions concerning views required at each specified visit to Site.

- B. Photographs from locations to adequately illustrate conditions of construction and progress status.

3.02 DELIVERY

- A. Deliver digital photos to the Owner as soon as available.

END OF SECTION 01322

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit shop drawings, product data, samples, coordination drawings and certifications concurrently as required in the applicable Drawings and / or Technical Specifications.
- B. Prepare and submit to the Architect / Engineer no later than ten (10) calendar days after receipt of Notice to Proceed (NTP), a list of submittals required by each applicable Section of the Technical Specifications. Submit in accordance with this Section and the requirements of Section 01310, Project Management and Coordination.
- C. Designate in schedule data dates for submission and review of shop drawings, product data and samples and the date of return.

1.02 RELATED REQUIREMENTS

- A. Division 1, General Requirements of the Project Manual.

1.03 SHOP DRAWINGS

- A. Present drawings in a clear and thorough manner. Prepare original, project specific documents- do not reproduce Construction Documents.
- B. Identify details by reference to sheet and detail, schedule or room numbers shown on Contract Drawings or as may be referred to in the Technical Specifications..
- C. Consecutively number shop drawings for each section of Work. Retain numbering system throughout all revisions.
- D. Show detail, material, dimensions, thickness, methods of assembly, attachments and relationship to adjoining Work and other pertinent data and details.
- E. Verify dimensions and field conditions. Clearly indicate field dimensions and field conditions.
- F. Check and coordinate shop drawings of any Section or trade with requirements of other Sections or trades as related and as required for proper and complete installation of Work.
- G. Prepare composite shop drawings and installation layouts when necessary or requested to depict proposed solutions for tight field conditions. Coordinate in field with affected trades for proper relationship to work of other trades based on field conditions.

1.04 PRODUCT DATA

A. Preparation

1. Annotate each sheet to clearly identify specific product or part installed, and specific data applicable to installation.
2. Show performance characteristics and capacities.
3. Show dimensions and clearances required.
4. Show wiring or piping diagrams and controls.
5. Indicate specified finish.
6. Indicate only those sheets, which are pertinent to specific product(s) with product clearly identified.

B. Manufacturer's standard schematic drawings and documents.

1. Modify drawings and diagrams to delete information which is not applicable to the Work.
2. Supplement standard information to provide information which is applicable to the Work.

1.05 SAMPLES

A. Provide a minimum of two (2) samples, or as otherwise indicated in the Technical Specifications, of sufficient size to clearly illustrate:

1. Functional characteristics of the product, with integrally related parts and attachment devices.
2. Full range of color, texture, and pattern.
3. Samples shall be referenced to the applicable section of the Technical Specifications.

1.06 MANUFACTURER'S CERTIFICATION OF MATERIALS AND EQUIPMENT

A. Before shop drawings or manufacturer's data for equipment are submitted for approval, a duly authorized manufacturer's representative of the proposed equipment shall review the design of the system relative to the proper operation of his/her equipment and material.

1. Shop drawings and/or manufacturer's data submitted shall include letter from manufacturer's representative certifying that his/her equipment and materials will operate and function satisfactorily under the proposed design conditions. If required by the jurisdiction having authority, data shall be signed and sealed by a South Carolina Registered Engineer in the respective discipline.

B. Before the work is accepted, a duly authorized manufacturer's representative of the installed equipment shall inspect the installation and operation of his/her equipment and materials to determine that they are properly installed and properly operating in accordance with the manufacturer's recommendations.

- C. Systems requiring certification will be specified in each of the applicable Sections of the Technical Specifications.

1.07 CONTRACTOR REVIEW

- A. Contractor shall review all submittals prior to transmittal to the Architect / Engineer of record and the Owner.
 - 1. The Contractor shall consecutively number all shop drawings and product data transmittals. Re-submittals would have the same number of the previous submittal followed by the suffix "A, B, C etc."
 - 2. The transmittal is to contain the Owner's RFP / Bid number and the applicable specification section for each product represented on the transmittal.
- B. Apply Contractor's stamp to submittals, initialed or signed by authorized person and dated, certifying: review of submittal, verification of products, field measurements and field construction criteria, and coordination of information within submittal with requirements of Work and the Construction Contract Documents.
- C. Submittals without Contractor's stamp or submittals which, in the Owner's and the Architect / Engineer of record opinion are incomplete, contain numerous errors, or have not been checked or have only been checked superficially, will be returned without comments. Delays resulting therefrom shall be solely the Contractor's responsibility.
- D. Clearly note proposed deviations from the Contract Documents on submittals. Submit listing identifying deviations in a format acceptable to the Architect / Engineer of record and the Owner.
- E. Contractor shall be responsible to ensure quantities and dimensions shown on submittals comply with the requirements of the applicable Drawing and Technical Specifications.

1.08 SUBMISSION REQUIREMENTS

- A. Make submittals promptly to the Architect / Engineer of record and the Owner in accordance with approved Submittal and Project Progress Schedule and in such sequence as to cause no delay in the Work.
- B. Number of submittals required:
 - 1. Shop Drawings: Submit two (2) full size, hard copies and one (1) electronic version (PDF) in addition to what the Contractor will require back; submit one (1) additional electronic version (PDF) each for civil, structural, mechanical, electrical or landscaping work.
 - 2. Product Data: Submit two (2) originals that will be retained by the Architect / Engineer of record and the Owner..
 - 3. Samples: Submit the number stated in each of the respective Technical Specifications, with a minimum of two (2) samples, or as otherwise noted in the applicable Technical Specifications, for each item.

C. Submittals shall contain:

1. Date of submission and dates of any previous submissions.
2. Owner RFP / Bid number.
3. The names of:
 - a. Contractor.
 - b. Subcontractor.
 - c. Supplier.
 - d. Manufacturer.
4. Identification of the product, with the applicable Specification Section number.
5. Field dimensions, clearly identified as such.
6. Relation to adjacent or critical features of the Work or Materials.
7. Applicable standards, such as ASTM or Federal Specification numbers.
8. Identification of deviations from Contract Documents and justification.
9. Identifications of revisions on re-submittals.
10. Additional information as required by Contract Documents.
11. An 8 in. x 3 in. blank space for Contractor and Architect/Engineer stamps.

D. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by the Architect / Engineer of record or Owner review of submittals

E. Numbering system established by the Contractor. shall be agreeable to the Owner

1.09 RESUBMISSION REQUIREMENTS

A. Contractor will make any corrections or changes in the submittals required by the Architect / Engineer of record or the Owner, mark number of submission, and resubmit as required until approved; none of this shall be of any cost to the Owner.

B. Shop Drawings and Product Data:

1. Contractor will revise initial drawings and data, and resubmit as specified for the initial submittal.
2. Contractor will indicate any changes which have been made other than those requested by the Architect / Engineer of record or the Owner.
3. Mark number of submission and resubmit until accepted.

C. Samples: Contractor will submit new samples as required for initial submittal. Remove samples, which are "rejected" or designated "resubmit."

1.10 REVIEW RESPONSIBILITIES – ARCHITECT / ENGINEER OF RECORD

A. The Architect / Engineer shall review submittals, when applicable, with responsible promptness in accordance with the requirements of the Project Manual.

B. The Architect / Engineer will affix stamp and initials or signature, and indicate requirements for revisions and re-submittal, if any.

- C. The Architect / Engineer will return submittals to Contractor, with copy of transmittal to Owner, for distribution, or for resubmission within five (5) days of original receipt.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used.

END OF SECTION 01330

SECTION 01331

SCHEDULE OF VALUES

PART 1 – GENERAL

1.01 RELATED REQUIREMENTS

- A. Contractor shall submit to the Owner a Schedule of Values with line items allocated to various portions of the Work for the purpose of monitoring the progress of the work and administration of the Application for Payment Process with their response (Bid) to the RFP.
- B. Provide Owner, after receipt of the Notice to Proceed (NTP) and upon request by the Owner, including support values and data substantiating their accuracy and correctness.
- C. Division 0, Bidding and Contract Documents in the Project Manual.
- D. Division 1, General Requirements in the Project Manual.

1.02 FORM AND CONTENT

- A. The Schedule of Values shall be tabulated to correspond with the Contractor's Application for Payment form, and shall be identified with:
 - 1. Title of Project, Location and Owner RFP or Bid Number.
 - 2. Project Manager for Contractor
 - 3. Name and Address of Contractor
 - 4. Contract Designation
 - 5. Date of Submission
- B. Schedule of Values shall be presented in accordance with the CSI format on a line item basis

Listing of Component Items:

- 1. Identify each line item with the number and title of the respective major section of the Technical Specifications.
- 2. Provide breakdown of Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and Progress Reports. Break principal subcontract amounts down into several line items by completed task in various locations.
- 3. Round off amounts to nearest whole dollar, total of all listed values shall equal total Contract Sum.
- 4. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on Schedule of Values for initial cost of materials, for each subsequent state of completion, and for total installed value of that part of the Work.
- 5. Costs of actual work-in-place may be shown as separate line items in Schedule of Values, such as:
 - a. Bonds
 - b. Insurance

- c. Temporary facilities, services and controls.
 - d. Field supervision and layout
 - e. Testing
- 6. Separate material cost and labor cost as directed or requested by the Owner

- C. For each major line item whose value is larger than five thousand dollars (\$5,000.00) list sub-values of major products or operations under the item.

- D. For various portions of the Work:
 - 1. Each item shall include a directly proportional amount of overhead and profit.
 - 2. For items on which progress payments will be requested for stored materials, break down the value into:
 - a. Cost of materials, delivered and unloaded, with taxes paid.
 - b. Total installed value.

- E. The sum of all values listed in the Schedule of Values must equal the total Contract Sum.

1.03 SUB-SCHEDULE OF UNIT MATERIAL VALUES

- A. Not Included (NIC)

1.04 RESUBMITTAL

- A. After review by the Owner, the Contractor may be requested to revise and resubmit Schedule of Values as may be determined appropriate by the Owner.

- B. Revised and approved Schedule of Values shall be resubmitted as part of monthly Application for Payment.

1.05 MATERIALS STORED OFF - SITE

- A. Payment for materials and equipment stored off – site, and not on the property of Georgetown County shall be subject to, and comply with the following:
 - 1. Prior written approval from the Owner, of materials and equipment to be stored, and location of facilities to be used for storage.
 - 2. Storage of materials and equipment will be in a bonded warehouse. Proof of insurance shall be provided to the Owner in the name of Georgetown County.
 - 3. Contractor shall furnish an inventory, including invoices, for all stored materials and equipment that are included in the Application for Payment using a form acceptable to and approved by the Owner.
 - 4. Contractor shall issue a Bill of Sale to the Owner for all items.

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01331

SECTION 01400

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Contractor's Quality Control (QC), in addition to customary testing and control requirements and those included in the Construction Contract Documents.
- B. Manufacturer's field services, coordinated by the Contractor.

1.02 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents of the Project Manual.
- B. Division 1, General Requirements of the Project Manual.

1.03 GENERAL QUALITY CONTROL

- A. Maintain Quality Control over construction activities, suppliers, manufacturers, products, services, site conditions, and workmanship of all personnel to assure Work is of specified quality.
- B. Quality inspections:
 - 1. Contractor shall be the first line of quality control and shall review all items for compliance with the Drawings and Technical Specifications reviewed and approved by the Owner. Prior to Owner's Testing Laboratory inspectors performing Quality Assurance (QA) review and inspections such as rebar placement, asphalt and concrete, piling inspection, soil compaction, etc., the Contractor shall have verified conformance to the requirements of the Construction Contract Documents, plans and technical specification prepared by the Architect / Engineer of record and reviewed and approved by the Owner.
 - 2. Maintain a written Quality Assurance / Control Program establishing the methods of assuring compliance to the contract documents. The Program shall be submitted to, reviewed and approved by the Owner. Quality Control personnel shall be identified at the initiation of the Project and shall be adequate to monitor the Work effectively and to enforce the Quality Assurance / Control procedures.
 - 3. Inspect each phase of Work for compliance with Contract Documents, plans and specification prepared by the Architect / Engineer of record and reviewed and approved by the Owner.
 - 4. Contractor shall have defective conditions corrected before calling for inspections and starting subsequent operations which would cover or are dependent upon the Work in question.

5. Where visual inspection is not sufficient, such as in verifying slope of pavement or depth of retention / detention ponds for proper drainage, use instruments with qualified operators to inspect work.
6. Secure the services of a testing laboratory when necessary to assist in evaluating quality.

1.04 WORKMANSHIP

- A. Comply with industry standards, except when more restrictive tolerances or specified requirements are called for in Construction Contract Documents, plans and specifications prepared by the Architect / Engineer of record and reviewed and approved by the Owner.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stress, vibration and other forces such as, but not limited to hurricane force winds.

1.05 MANUFACTURER'S INSTRUCTIONS

- A. When required by the Technical Specifications, submit manufacturer's current printed instructions, in the quantity required for product data, for delivery, storage, assembly, installation, startup, adjusting and finishing, as necessary.
- B. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Construction Contract Documents, plans and technical specifications prepared by the Architect / Engineer of record and reviewed and approved by the Owner, Contractor shall re-submit and provide written clarification and explanation to the Architect / Engineer of record and the Owner.

1.06 MANUFACTURER'S CERTIFICATES

- A. When required by the Technical Specifications, supplier/manufacturer shall provide qualified personnel to observe field conditions, conditions of the surfaces and installation, quality of workmanship, start-up of equipment, testing, adjusting and balancing of equipment as applicable, and to make appropriate recommendations.

1.07 MANUFACTURER'S FIELD SERVICES

- A. When specified in the respective Technical Specification Sections, the supplier/manufacturer will provide qualified personnel to observe field conditions, conditions of the surfaces and installation, quality of workmanship, start-up of equipment, testing, adjusting and balancing of equipment as applicable, and to make appropriate recommendations.
- B. Manufacturer's Representative shall submit written report to Architect / Engineer of record and the Owner listing observations and recommendations.

1.08 CONTRACTOR'S CERTIFICATION

- A. Contractor shall supply written certification that the Work, as installed, has been reviewed by him/her for compliance with the Contract Documents, applicable Drawings and Technical Specifications.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01400

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Unless otherwise required by a Section of the Technical Specifications, the Owner shall employ and pay for the services of an Independent Testing Laboratory to perform specified testing of work and materials at the Project Site or at point of manufacture. This is intended to provide Quality Assurance (QA) of the work performed and material provided by the Contractor.
 - 1. Contractor shall cooperate with the testing laboratory to facilitate the execution of its required services.
 - 2. Contractor shall incorporate recommendations from Owner's testing results.
 - 3. Contractor shall obtain testing prior to Owner's testing as may be necessary.
 - 4. Owner's testing shall not be a substitute for Contractor's own Quality Control (QC) measures.
- B. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual, without exception.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract: Contractor shall conduct, or have performed all inspections and testing required by laws, ordinances, rules, regulations, orders, or approvals of public authorities and as may be specified in the Construction Contract Documents.
- B. Each specification section listed: Contractor shall perform each inspection and laboratory test required, and standards for testing as specified in the Construction Contract Documents..
- C. Division 1, General Requirements of the Project Manual.

1.03 QUALIFICATIONS OF LABORATORY

- A. Meet "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories.
- B. Comply with the following requirements:
 - 1. ANSI/ASTM D3740: Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

2. ANSI/ASTM E329: Standard Recommended Practice for Inspection and Testing for Concrete, Steel, and Bituminous Materials as Used in Construction.
- C. Authorized to operate in the State of South Carolina
- D. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during the most recent tour of inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- E. Testing Equipment:
 1. Calibrated at reasonable intervals by devices of accuracy traceable to either:
 - a. National Bureau of Standards.
 - b. Accepted values of natural physical constants.
- F. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform Work in accordance with requirements of the Construction Contract Documents.
- G. Failure on part of Owner to perform any tests of materials shall in no way relieve the Contractor of responsibility of furnishing materials or performing work conforming to the Construction Contract Documents.

1.04 LABORATORY DUTIES

- A. Cooperate with the Owner, Architect / Engineer of record and Contractor; provide qualified personnel after due notice from the Owner or Contractor.
- B. Perform specified inspections, sampling and testing of materials and methods of construction:
 1. Comply with specified standards.
 2. Ascertain compliance of materials with requirements of Contract Documents.
- C. Promptly notify Owner, Architect / Engineer of record and Contractor of observed irregularities or deficiencies of work or products.
- D. Promptly submit written report of each test and inspection: one (1) copy each to Owner , Architect / Engineer of record and Contractor. Each report shall include:
 1. Date issued.
 2. Project title and location
 3. Owner RFP or Bid Number
 4. Testing laboratory name, address and telephone number.
 5. Name and signature of laboratory inspector.
 6. Date and time of sampling or inspection.

7. Record of temperature and weather conditions.
 8. Date of test.
 9. Identification of product.
 10. Location of sample or test in the Project.
 11. Type of inspection or test.
 12. Results of tests and compliance with Contract Documents.
 13. Interpretation of test results, when requested by Owner
- E. Perform additional tests as may required by the Owner.

1.05 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
1. Release, revoke, alter or enlarge on requirements of Construction Contract Documents.
 2. Approve or accept any portion of the Work.
 3. Perform any duties of the Contractor.
 4. Stop the Work.

1.06 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate, together with laboratory personnel; provide access to the point/location of the Work, and to manufacturer's operations.
- B. Secure and deliver to laboratory at designated location(s) adequate quantities of representational material proposed to be used and which require testing.
- C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes which required control by the testing laboratory.
- D. Furnish copies of Products test reports to the Architect / Engineer of record and Owner as required.
- E. Furnish incidental labor and facilities:
1. To provide access to Work to be tested.
 2. To obtain and handle samples at the Project Site or at the source of the product to be tested.
 3. To facilitate inspections and tests.
 4. For storage and curing of test samples.
- F. Notify laboratory twelve (12) hours in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to

Contractor's negligence or inability to perform the prescribed Work at the scheduled time.

- G. Make arrangements with laboratory and pay for services to perform inspections, sampling and testing required:
 - 1. For the Contractor's convenience.
 - 2. When the initial tests or inspections indicate Work does not comply with Construction Contract Documents (i.e., re-tests).

1.07 SOURCE OF MATERIALS

- A. Source of supply of each of materials required shall be acceptable to the Architect / Engineer of record and Owner before delivery is started.
- B. Representative samples shall be submitted for inspection or tests.
- C. Results obtained from testing samples will be used for preliminary approval, but will not be used as final acceptance of materials.
- D. The Owner may test materials proposed to be used at any time during preparation and use.
- E. If it is found that sources of supply, which have been approved, do not furnish product of uniform quality, or if product from any source proves unacceptable at any time, Contractor shall furnish approved material from another source without additional cost to Owner or delay in Substantial Completion date.

1.08 IDENTIFICATION

- A. Required samples submitted by Contractor shall be properly labeled for identification.
- B. Materials and/or equipment that have been inspected and/or tested shall be stored in a controlled area with suitable identification referencing tests and certifications.
- C. Continuous inventory shall be kept of all items in this area controlled by log in and log out with receiving and disbursing signatures.
- D. Copies of receiving or disbursing actions shall be sent to the Owner on a daily basis.
- E. Disbursing records shall show final destination and installation.

1.09 MATERIAL STORAGE

- A. Materials shall be stored so as to ensure preservation of their quality and fitness for Work, in accordance with requirements of Section 01620, Storage and Protection and as may be required in the applicable Technical Specifications.

1.10 SCHEDULE OF INSPECTIONS AND TESTS

- A. Refer to each individual Section of the Project Manual for specific testing requirements, or as otherwise required by the Drawings, Technical Specifications of the Construction Contract Documents or appropriate regulatory and approval agency.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION 01410

SECTION 01500

TEMPORARY FACILITIES AND UTILITIES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual and the Construction Contract Documents.
- B. Furnish, install and maintain temporary utilities required for construction, to be removed at completion of Work.
- C. Provide and maintain methods, equipment, and temporary construction required to control environmental conditions at construction site and other areas under Contractor's control. Remove evidence of temporary facilities at completion of Work.
- D. Furnish and pay for installation of all temporary utilities, permanent utilities except as provided by Owner, or fuel required for testing of installed equipment and systems.

1.02 RELATED REQUIREMENTS

- A. Division 1, General Requirements of Project Manual.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with National Electric Code (NEC), federal, state, and local codes and regulations and with utility company requirements.
- B. Comply with State of South Carolina regulatory agencies having judicial authority.
- C. All affected Utility Organizations should be contacted by the Contractor to arrange temporary utilities. The appropriate Utility Organization, as well as other Contacts are listed on the cover sheet of the construction contract drawings.

PART 2 – PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

- A. Arrange with Santee Cooper for temporary service.
- B. Contractor will pay all electrical consumption charges.
- C. Furnish and install circuit and branch wiring, transformers, temporary meters, weatherproof area distribution boxes, and any other devices necessary, located so that power and lighting is available throughout the construction by the use of construction-type power cords.
- D. Provide adequate artificial lighting for day and night operations, minimum 35-foot candle power for finish work within all areas of the Project.

2.03 TEMPORARY HEAT AND VENTILATION

Not Used.

2.04 TEMPORARY TELEPHONE SERVICE

Not Used.

2.05 TEMPORARY WATER

- A. Furnish and install temporary water line and distribution from a point designated by the Owner, if determined to be necessary.
- B. Contractor will pay all water consumption charges.

2.06 TEMPORARY SANITARY FACILITIES

- A. Provide portable chemical-type sanitary facilities in compliance with applicable health laws, and state, county and local regulations and ordinances.
- B. Service, clean and maintain facilities and enclosures.
- C. Facilities shall be fitted with approved sanitary holding capacity and shall be emptied periodically to prevent overflow. Legal disposal of sanitary waste must be off-site and is Design/Builder's responsibility.
- D. Construction workers and project staff shall not use permanent plumbing facilities
- E. Sanitary facilities failing to meet required standards or maintenance methods shall be corrected immediately.
- F. Contractor will pay all costs for installation, maintenance and removal.

2.07 TEMPORARY FIRE PROTECTION

- A. During construction, provide temporary fire protection and life safety provisions in accordance with local jurisdiction requirements, the International Code and / or NFPA Standards.
- B. A “Hot Work” permit may be required when welding or cutting operations are to take place. Take necessary precautions in welding or cutting operations to keep work area free of combustible materials. Do not use welding equipment around flammable liquids or vapors.
- C. Keep welding and cutting equipment outdoors wherever possible. Remove welding and cutting equipment from any structure daily, wherever practical.
- D. At completion of welding or cutting operations, inspect work and adjacent area for hazards. When operations are near any building opening, inspect areas above, below or adjacent to work area hazards.
- E. Do not open, turn off, interfere with, attach any pipe or hose to, or connect anything to any fire hydrant, stop valves, or stop cock, or tap any water main without prior written permission of proper authority or the Owner.

PART 3 – EXECUTION

3.01 GENERAL

- A. Comply with local jurisdiction and all other applicable requirements as stated in this Section.
- B. Contractor shall obtain and pay for all required permits for the Work.

3.02 REMOVAL

- A. Completely remove from the project site temporary materials and equipment when their use is no longer required.
- B. Clean and repair damage caused by temporary installations or use of temporary facilities immediately after removal.
- C. Restore existing facilities used for temporary services to specified, or to original, condition.
- D. Restore permanent facilities used for temporary services to specified condition.
 - 1. Prior to final inspection, remove temporary lamps and install new lamps where appropriate.

END OF SECTION 01500

SECTION 01510

TEMPORARY CONSTRUCTION CONTROLS

PART 1- GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual, without exception.
- B. Furnish, install and maintain temporary controls required for construction.
- C. Remove all temporary controls at completion of Work.

1.02 RELATED REQUIREMENTS

- A. Division 1, General Requirements of the Project Manual.

1.03 CONSTRUCTION SITE CLEANING

- A. Maintain areas within limits of the Project Work Site free of extraneous debris and litter.
- B. Initiate and maintain specific program to prevent accumulation of debris at construction site, storage and parking areas, or along access roads and off site hauls routes.
 - 1. Furnish on-site containers for collection of waste materials, debris and rubbish.
 - 2. Prohibit overloading of trucks to prevent spillage on access and haul routes.
 - 3. Provide periodic inspection of traffic areas to enforce requirements.
 - 4. Remove waste material, debris and rubbish from site and building area daily, or sooner as otherwise needed.
 - 5. Do not drop or throw materials from heights. Lower waste material in a controlled manner and with as few handlings as possible.
 - 6. During entire construction period, and at all times, keep the site access entry road, parking areas free from accumulation of waste materials, debris and rubbish caused by the Work of this Project.
 - 7. Dirt and debris shall be removed from all surfaces prior to closure of all areas (walls, ceilings, chases, etc.).
- C. Hazards Control:
 - 1. Store volatile wastes in covered metal containers.
 - 2. Remove containers from premises daily.
 - 3. Prevent accumulation of wastes, which create hazardous conditions.
 - 4. Provide adequate ventilation during use of volatile or noxious substances.

- D. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws:
 - 1. Do not burn or bury rubbish and waste materials on project site.
 - 2. Do not dispose of wastes into streams or waterways.
 - 3. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.

1.04 DUST CONTROL

- A. Provide positive methods and apply dust control materials to minimize raising dust from construction operations and provide positive means to prevent air-borne dust from dispersing into atmosphere.
- B. Clean interior building areas to prevent accumulation of dirt and debris and execute prior to start of finish painting, special coatings, and/or other finish material installations.
- C. Wet down materials and rubbish to prevent blowing dust.
- D. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
- E. Continue cleaning on an as-needed basis until building and/or site is ready for beneficial occupancy.

1.05 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation. Wetland areas shall be protected as well.
 - 1. Hold areas of bare soil exposed at one time to minimum.
 - 2. Provide temporary control measures such as berms, dikes, and drains.
 - 3. Comply with federal, state and local regulations.
- B. Construct fills and soil waste areas by selective placement to eliminate surface soils or clay, which will erode.
- C. Periodically inspect earthwork to detect any evidence of start of erosion, apply corrective measures as required for erosion control.

1.06 POLLUTION CONTROL

- A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by discharge of noxious substances from construction operations.

- B. Contractor is responsible only for pollution control of the immediate Work of the Contract, the actions and operations of the Contractor, and the workers employed or contracted to Contractor. Provide equipment and personnel to perform emergency measures required to contain spillage, and to remove contaminated soil or liquids.
- C. Take special measures to prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals or other such substances adjacent to basins, or in sanitary or storm sewers.
- D. Provide systems for control of atmospheric pollutants. Prevent toxic concentrations of chemicals. Prevent harmful disposal of pollutants into atmosphere.

WATER CONTROL

- A. Provide methods to control surface water to prevent damage to project site or adjoining properties. Control fill, grading, and ditching to direct surface drainage away from excavations, pits, tunnels and other construction areas. Direct drainage to proper runoff.
- B. Provide, operate, and maintain hydraulic equipment of adequate capacity to control surface and water.
- C. Dispose of drainage water in manner to prevent flooding, erosion or other damage to any portion of site or adjoining areas.
- D. Dewater areas in accordance with applicable local and state requirements and accepted professional practice.

1.07 EARTH CONTROL

- A. Contractor shall, at his/her sole cost, remove excess soil, pier spoils, etc., at time of generation.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTIONS

3.01 REMOVAL

- A. Contractor shall, at his/her sole cost, remove temporary construction controls at the completion of the Work, or as required by execution of the Work or as may be directed by the Owner.

END OF SECTION 01510

SECTION 01520

TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
- B. Related Sections:
 - 1. Section 311000 "Site Clearing" for removing existing trees and shrubs.

1.2 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape at 6 inches above the ground for trees up to, and including, 4-inch size; and 12 inches above the ground for trees larger than 4-inch size.
- B. DBH: Diameter of a trunk measured by a diameter tape at breast height, 4'-6" above the ground, for specimen trees.
- C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings as Selective Clearing Areas.
- D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings as Tree Protection Fencing.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For qualified arborist and tree service firm.
- C. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- D. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- E. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.4 QUALITY ASSURANCE

- A. Arborist Qualifications: Certified Arborist as certified by ISA.
- B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
- C. Preinstallation Conference: Conduct conference at Project site.
 1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
 - a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
 - b. Enforcing requirements for protection zones.
 - c. Arborist's responsibilities.
 - d. Field quality control.
 - e. Fines for damaged trees to remain or unauthorized removal of trees to remain.
- D. Flagging for Clearing Limits and Selective Clearing Limits.
 1. Contractor may opt to provide a different or alternate flagging color scheme if he chooses.
 - a. Red – Designating areas where all vegetation including trees shall be removed.
 - b. White & Striped Blue – Designating areas of selective clearing; removing all vegetation less than 6” caliper and retaining all vegetation 6” caliper and greater.
 - c. Blue – Designating tree protection areas where all vegetation is to be retained and protected.

1.5 PROJECT CONDITIONS

- A. The following practices are prohibited within protection zones:
 1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

- B. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements.
 - 1. Wood Protection-Zone Fencing: Constructed of two 2-by-4-inch horizontal rails, and preservative-treated wood posts spaced not more than 8 feet apart, and lower rail set halfway between top rail and ground.
 - a. Height: 4 feet.
 - b. Where indicated on plans.
 - 2. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft.; remaining flexible from minus 60 to plus 200 deg F; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi; secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by wood posts and rails posts spaced not more than 8 feet apart.
 - a. Height: 4 feet.
 - b. Color: High-visibility orange, nonfading.
 - c. Where indicated on plans.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Flag each tree trunk at 54 inches above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.3 TREE- AND PLANT-PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
- B. Enclosures: Construct protective fencing where indicated on the Construction Drawings. Protective fencing shall be installed 1'- 6" per 1" diameter DBH or 1' beyond drip line of tree.
- C. Maintain protection zones free of weeds and trash.
- D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
- E. Maintain protection-zone fencing in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.
 - 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
 - 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving."
- B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.
- C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.
- D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

- A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:
 - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 - 2. Cut Ends: Coat cut ends of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other coating formulated for use on damaged plant tissues and that is acceptable to arborist.
 - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 4. Cover exposed roots with burlap and water regularly.
 - 5. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."
- B. Root Pruning at Edge of Protection Zone: Prune roots 12 inches inside of the protection zone, by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.6 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
 - 1. Submit details of proposed root cutting and tree repairs.
 - 2. Have arborist perform the root cutting, branch pruning, and damage repair of trees.
 - 3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
 - 4. Perform repairs within 24 hours.
 - 5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Trees: Remove and replace trees indicated to remain that are more than 66 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern. Refer to FINES and MITIGATION in this section for loss of specimen trees.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 01520

SECTION 01530

BARRIERS

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall comply with and be responsible for all the requirements of Division 1, General Requirements of the Project Manual, without exception.
- B. Provide and maintain barriers for the protection of personnel and materials in accordance with the requirements of applicable state and local codes.
- C. Install barriers, if necessary, at the start of construction.

1.02 RELATED WORK

- A. Section 01510, Temporary Construction Controls

1.03 REGULATORY AGENCIES

- A. Comply with federal, state, and local, municipal regulations and with utility company and insurance agencies' requirements.

PART 2 – PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials and equipment must be adequate in capacity for the required usage, and not violate applicable codes and standards.
- B. Provide warning signs to help prevent damage and injury.
- C. Should it become necessary to remove safety items it shall be the Contractor's responsibility to replace the item immediately in conformance with applicable codes, standards and regulations.
- D. Wood materials used in barricades and barriers within any building and in material storage areas shall be fire-retardant.

2.02 BARRICADES

- A. Cover trenches and holes when not in use. Erect barriers at sharp changes in plane of more than 3 feet.
- B. Protect all building openings with safe, temporary railings adequately braced.

2.03 CONSTRUCTION FENCE

- A. Prior to starting Work at Project Site, the Contractor shall install fence between construction area and school building / facilities areas, as shown on Drawings.
- B. Provide fence around material storage and construction areas to prevent unauthorized access. Comply with local, municipal, school district and / or Georgetown County requirements for construction barriers.
- C. Utilize construction fence gates, if necessary, to provide controlled entry into construction area.

2.04 CONSTRUCTION LIGHTING

- A. Provide construction lighting throughout construction areas as may be required and necessary to maintain safety and security.
- B. Maintain lighting on a daily basis, including weekends, holidays, and foul-weather days so that the Project Site is adequately lighted, if necessary, in the interest of safety and security.

PART 3 – EXECUTION

301 REMOVAL

- A. Contractor shall, at his/her sole cost, completely remove barricades and fences when construction has progressed to a point that they are no longer required, or when requested by the Owner.

302 CLEANING

- A. Clean and repair damage caused by the Work of this Section. Fill and grade the areas of the Site to required elevations and slopes, and clean the area.

END OF SECTION 01530

SECTION 01550

ACCESS ROADS AND PARKING AREAS

PART 1 – GENERAL

1.01 REQUIREMENT INCLUDED

- A. The Contractor shall comply with and be responsible for all the requirements of Division 1, General Requirements of the Project Manual without exception.
- B. Access to and egress from the Project Site will be gained only via routes as shown on the Plans and approved by Owner. Equipment weight and height limits will be strictly enforced. Contractor is responsible for providing access roads capable of supporting construction traffic. Contractor and trade contractors of all tiers shall be responsible to comply with these requirements.
- C. Install barriers and necessary traffic controls at start of construction to protect public and leave in place throughout construction. Remove at end of construction.
- D. Contractor is responsible for assessing risk to public and providing lights, flagmen, traffic signals, stop signs or other necessary controls, as needed and approved by the Owner and / or the South Carolina Dept. of Transportation (SCDOT).
- E. Contractor shall be responsible to repair all damage to off-site street, roads, curbs along haul routes and any existing site elements damaged by construction related traffic.

1.02 RELATED WORK

- A. NIC

1.03 REGULATORY AGENCIES

- A. Comply with federal, state and local codes and regulations, and with utility company and insurance agencies' requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. If repair to public or private roadways is necessary due to damage by construction traffic, materials and methods used for repairs are to be acceptable to the applicable jurisdictional authority and are to match existing conditions. Contractor shall perform such work at his/her sole cost and expense.
- B. Provide warning signs to help prevent damage and injury and to promote safety.

- C. Should it become necessary to remove safety items, it shall be Contractor's responsibility to replace them immediately, in conformance with applicable regulations. Contractor shall perform such work at his/her sole cost and expense.

2.02 PARKING

- A. Contractor's vehicles and employee parking shall be confined to an area within the Project Limit Line, as defined on Drawing Sheet G000, except that no vehicles or parking shall be allowed in existing school parking lots, bus loading areas or Cochran Rd. Access to existing school building and facilities, as well as existing single-family homes, shall be maintained at all times.

2.03 STAGING

- A. Staging shall be confined to an area within the Project Limit Line, as defined on Drawing Sheet G000. Access to existing school building and facilities, as well as existing single-family homes, shall be maintained at all times.

PART 3 – EXECUTION

3.01 REMOVAL

- A. Temporary construction access roads, drives, walks, and parking areas shall be removed at completion of Work or as required by execution of Work at the Contractor's sole cost and expense.
- B. Areas shall be returned to original condition unless otherwise required by the Owner.

END OF SECTION 01550

SECTION 01563

HANDLING OF INCIDENTAL FUEL SPILLAGE DURING CONSTRUCTION

PART 1 – GENERAL

1.01 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents in the Project Manual.
- B. Division 1, General Requirements in the Project Manual.
- C. South Carolina Dept. of Health and Environmental Controls (SCDHEC)

1.02 SCOPE

- A. This section consists of procedures to be followed in handling material contaminated with petroleum fuel products (hydrocarbons including petroleum, petroleum derivatives, hydraulics and like products) caused by incidental spillage (including leaks) from the Contractor's or his/her prime and sub-contractor's equipment.

Incidental spillage shall mean spillage of a quantity not greater than 25 gallons per incident, of vehicular or mechanical equipment fuel products, onto open ground and absorbed or not absorbed by the soils.

Spillage or leakage of petroleum fuel products in quantities in excess of 25 gallons shall be immediately remediated by the Contractor using applicable and appropriate procedure(s). Whenever such spillage or leakage occurs, the Contractor shall immediately implement the appropriate corrective actions as required.

- B. The provisions of this Section are limited to incidental petroleum fuel spillage on ground surfaces and it excludes fuel spillage onto surface waters.

1.03 APPLICABLE CODES

- A. The Contractor shall comply with all prevailing federal, state, and local environmental protection ordinances and codes governing and having application to and any discharges, intentional or accidental, which may cause water pollution and constitute a nuisance, and sanitary nuisance.
- B. Leaks and spillage may occur when using mechanical equipment. Equipment generated or lubricated with petroleum products, is prone to leaks or spillages, therefore proper management of "spillage incidents" is essential.

PART 2 – PRODUCTS

2.01 ABSORBENT MATERIALS

Contractor shall equip crews and/or provide machinery with the most efficient type of petroleum absorbent materials. These materials are available at petroleum equipment suppliers and must be readily accessible so that spillages can be quickly contained and prevented from becoming greater incidents. Fiber material, sand or cat litter may be used as an absorbent material. Sufficient quantity of absorbent material capable of absorbing up to 25 gallons of petroleum fuel products shall be stocked at the job site at all times.

PART 3 - EXECUTION

3.01 PROCEDURES

- A. Personnel handling waste materials must have a minimum of 40 hours training as defined in 29 CFR 1910.120 and in accordance with the certified OSHA course.
- B. Perform work as specified herein and in accordance with the applicable provisions of South Carolina Dept. of Transportation (SCDOT) and South Carolina Dept. of Health and Environmental Controls (SCDHEC). No payment will be made to the Contractor for the cost of handling and disposing of leaks, spillages and materials, soils and environment contaminated by such leaks or spillages.

The procedure for the proper handling and disposal of contaminated soils and absorbent materials is readily available through the aforementioned agencies:

- C. The steps outlined below are minimum requirements and are merely presented as guidelines. They do not constitute a complete compliance procedure.

STEP 1:

If a fuel contamination to open ground has been discovered, check for the origin of that leak or spillage. Then stop the spillage or leak and positively contain it, and then use absorbents to collect the discharged liquid. Immediately notify the Owner.

STEP 2:

Sand may be used to absorb ground surface spills while absorbent materials may be used to absorb ground spills as well as surface water spills. Once absorption of spilled fuels is complete the impacted (contaminated) absorbent materials shall be stored in 55-gallon steel drums (100-150 lbs.). If leaked or spilled fuel has been absorbed into the soils, excavate and containerize the impact (contaminated) soils. Soils may be stored in 55-gallon steel drums.

STEP 3:

The contaminated materials must be collected, containerized and otherwise properly stored and labeled prior to transport to a pre-approved storage, disposal or treatment facility. All drums used to store impacted (contaminated) absorbent material and/or contaminated soils shall be properly sealed and labeled with the following information.

Name of Company (Contractor)

RFP / Bid No.:

Location of origin:

Type of contents:
Type of containment:
Quantity: (e.g. 1 of 1)
Date:
Containerized by:
Labeled by:

END OF SECTION 01563

SECTION 01570

TRAFFIC REGULATION

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual, without exception.
- B. Construction parking control, flagmen, flares and lights, haul routes, traffic signs and signals, and removal.
- C. The Contractor shall comply with and be responsible for traffic control planning and implementation as may be directed and approved by SCDOT and the Owner.
- D. Maintenance of safety and convenience of public.

1.02 RELATED WORK

- A. Division 1, General Requirements of the Project Manual.

1.03 PUBLIC SAFETY AND CONVENIENCE

- A. Materials and equipment shall be stored and Work conducted to minimize obstruction to pedestrian movement and vehicular traffic. Materials and equipment stored in or near path of traffic shall be protected with appropriate warning signs and barricades. At night, or as otherwise required, equipment not in use shall be stored in such manner and location to not interfere with safe passage of pedestrians and vehicles. Contractor shall provide and maintain flagmen at points and for periods of time required to provide safety and convenience of traffic, and as may be required by the SCDOT and as directed by the Owner
- B. Contractor shall not close traffic to any bridge, culvert, or any other portion of public road except as designated in the Construction Contract Documents. Prior to closing any access way and/or structure coordinate Work schedule with the Owner and the SCDOT if applicable.
- C. Contractor shall provide the Owner with notice at no less than 48 hours prior to movement of heavy equipment and/or wide or slow moving vehicles to or from Project Site. Contractor shall strictly adhere to vehicular routes established or as may be directed by the Owner and / or the SCDOT if applicable.

1.04 HAUL ROUTES

- A. Based on regulations prescribed by the South Carolina Dept. Transportation (SCDOT), Georgetown County or any other agency having jurisdiction, use only established roadways or use temporary roadways constructed by Contractor when and as

authorized by the Owner. When materials are transported in executing the Work vehicles shall not be loaded beyond loading capacity recommended by manufacturer of vehicle or prescribed by federal, state, or local law or regulation. When it is necessary to cross curbs or sidewalks, Contractor shall protect them from damage, and shall repair or pay for repair of all damaged curbs, sidewalks, roads and/or paving.

1.05 TRAFFIC SIGNS AND SIGNALS

- A. At approaches to site and on-site, install signs or signals at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public vehicular and pedestrian traffic. This should be included in the Contractor's approved Traffic Control Plan.
- B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.
- C. Relocate traffic control signs and signals as Work progresses, to maintain safe and effective traffic control.
- D. Coordinate with construction signs described in Section 01580, Project Identification and Signs.

1.06 FLAGMEN

- A. Provide trained and equipped flagmen to regulate traffic when construction operations and/or traffic encroach on public vehicular or pedestrian traffic lanes.

1.07 FLARES AND LIGHTS

- A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic in landside areas only.

PART 2 – PRODUCTS

2.01 SIGNS, SIGNALS AND DEVICES

- A. Post-mounted and wall-mounted at parking areas to indicate spaces designated for use by construction personnel.
- B. Traffic control signals, as required, and as approved by SCDOT and the Owner.
- C. Traffic cones and drums and lights, as approved by SCDOT and the Owner.
- D. Flagmen equipment as required by SCDOT and the Owner.

PART 3 – EXECUTION

3.01 REMOVAL

A. Contractor shall remove equipment and devices, at his/her sole cost, when no longer required. Repair damage caused by installation. Remove post settings to depth of three (3) feet.

END OF SECTION 01570

SECTION 01580

PROJECT IDENTIFICATION AND SIGNS

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all requirements of the Project Manual, without exception.
- B. The Contractor shall comply with applicable requirements in this Section and more specific requirements of Section 00800, Special Project Conditions and Section 01100, Summary of Work.
- C. Furnish, install and maintain Project Identification Sign, as provided in drawings.
- D. Provide temporary, on site informational signs to identify key elements of the construction facilities.
- E. Remove Project Identification Signs upon completion of the construction Work of this contract.
- F. Allow no other signs to be displayed.
- G. Submit Shop Drawings of the proposed Project Identification Sign within fifteen (15) calendar days of the Notice to Proceed (NTP).

1.02 RELATED REQUIREMENTS

- A. Division 1, General Requirements of the Project Manual.

PART 2 – PRODUCTS

2.01 SIGN MATERIALS

As shown on Drawings.

2.02 TEMPORARY SIGNAGE

Furnish and install Project Identification Sign, as shown on Drawings. Contractor shall install temporary site signage, as needed to direct employees and visitors within the construction limits.

PART 3 – EXECUTION

3.01 PREPARATION

Contractor shall be responsible for the cost of preparing and installing all signage.

3.02 MAINTAINANCE

The Contractor shall be responsible for the cost of maintaining the Sign.

3.03 REMOVAL

The Contractor shall be responsible for the cost of removing the Sign.

END OF SECTION 01580

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SECTION 01590

FIELD OFFICE

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Contractor shall comply with and be responsible for all requirements of the Project Manual without exception.
- B. Contractor shall comply with applicable requirements in this section and more specifically the requirements in Division 1, Section 01100, Summary of Work.

1.02 SCOPE

- A. Furnish, install and maintain temporary construction offices throughout duration of the Construction Work of this contract; remove at completion of Work.
- B. Restore Site to original condition, unless otherwise required by the Contract Documents.

1.03 RELATED WORK

- A. Division 1, General Requirements of the Project Manual are applicable.

PART 2 – PRODUCTS

2.01 FIELD OFFICE

- A. Furnish, install and maintain temporary field office during entire construction period for Contractor use and separate, but attached, office and plan room for Owner field representative.
- B. Field office shall be structurally sound, weather tight, with floors raised above ground meeting requirements of the local and applicable building Code. At Contractor's option, portable or mobile buildings may be used. Do not use mobile buildings for living quarters.
- C. Contractor shall provide his own janitorial services.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Construct or locate construction offices and sheds on proper foundation, with utility connections, provide steps and landing at entrances.
- B. Locate a thermometer in a convenient outdoor location, out of direct sunlight. Maintain record of a daily weather conditions to include temperature range, wind conditions, time and amount of rainfall, and sky conditions.
- C. Contractor to provide proposed location of field office, subject to Owner

3.02 MAINTENANCE

- A. Provide daily janitorial cleaning and maintenance of construction office, sheds, furnishings, and equipment as required or requested.

3.03 REMOVAL

- A. Remove construction office and sheds including foundations and contents at completion of project, when no longer needed, or as directed by the Owner
- B. Grade site to required elevation and clean the area upon the removal of the temporary offices and sheds.

END OF SECTION 01590

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents of the Project Manual without exception.
- B. Division 1, General Requirements of the Project Manual without exception.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Construction Contract.
- B. Procedural requirements governing the Contractor's selection of products and product options are included under Section 01610, Materials and Equipment.

1.3 DEFINITIONS

- A. Definitions used in this Section are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "Substitutions." The following are not considered substitutions:
 - 1. Substitutions requested by Bidders during the bidding period, and accepted prior to award of Contract, are considered as included in the Construction Contract Documents and are not subject to requirements specified in this Section for substitutions.
 - 2. Revisions to Construction Contract Documents requested by Georgetown County
 - 3. Specified options of products and construction methods included in Contract Documents.
 - 4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

- A. Substitution Request Submittal: Requests for substitution will be considered if received within thirty (30) calendar days after commencement of the Work. Requests received more than thirty (30) calendar days after commencement of the Work may be considered or rejected at the discretion of the Owner.

1. Submit three (3) copies of each request for substitution for consideration. Submit requests in the form to be provided by the Owner and in accordance with procedures required for Change Order proposals to be established by the Owner
2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Technical Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable or requested.
 - c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - d.. A statement indicating the substitution's effect on the Contractor's Construction Progress Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
 - e. Cost information, including a proposal of the net change, if any in the Contract Sum.
 - f. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Construction Contract Documents. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
3. Owner's Action: Within one (1) week of receipt of the request for substitution, the Owner may request additional information or documentation necessary for evaluation of the request. Within two (2) weeks of receipt of the request, or one (1) week of receipt of the additional information or documentation, whichever is later, the Owner will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance will be in the form of a Change Order.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Conditions: The Contractor's substitution request will be received and considered by the Owner when one or more of the following conditions are satisfied, as determined by the Owner, otherwise requests will be returned without action except to record noncompliance with these requirements.
 1. Extensive revisions to Construction Contract Documents are not required.
 2. Proposed changes are in keeping with the general intent of the Construction Contract Documents.
 3. The request is timely, fully documented and properly submitted.

4. The request is directly related to an "or equal" clause or similar language in the Construction Contract Documents.
 5. The specified product or method of construction cannot be provided within the Contract time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
 6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 7. A substantial advantage is offered the Owner in terms of cost, time, energy conservation or other considerations of merit after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect / Engineer of record for redesign, increased cost of other construction elements by the Owner or other separate Contractors, and similar considerations.
 8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
 9. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
 10. The specified product or method of construction cannot provide a warranty required by the Construction Contract Documents and where the Contractor certifies that the proposed substitution will provide the required warranty.
- B. The Contractor's submittal and the Owner's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.
- C. Substitution request constitutes a representation that the Contractor:
1. Has investigated the proposed product and determined that it meets or exceeds, in all respects, the product specified.
 2. Will provide the same warranty for substitution as for the product specified.
 3. Will coordinate installation and make other changes, which may be required for work to be complete in all respects.
 4. Waives claims for additional costs, which may subsequently become apparent. All costs associated with the substitution will be paid for by the Contractor regardless of approvals given, and regardless of subsequent difficulties experienced as a result of substitutions.

PART 3 - EXECUTION

Not Used

END OF SECTION 01600

SECTION 01610

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all requirements of the Project Manual, without exception.
- B. The Contractor shall comply with the applicable requirement in this Section, and the requirements of Division 1, Section 01100 Summary of Work.
- C. Division 1, Section 01600, Product Requirements.
- D. Division 1, Section 01770, Closeout Procedures

1.02 RELATED WORK

- A. Division 1, General Requirements of the Project Manual.

1.03 SCOPE

- A. General storage and protection of project materials and equipment.
- B. Furnish, install and maintain storage sheds as required for protection of materials and equipment. Remove at completion of Work.
- C. Exterior storage requirements for all specified materials and equipment requiring protection.

1.04 MATERIAL AND EQUIPMENT INCORPORATED INTO WORK

- A. Comply with applicable specifications, manufacturer's recommendations and standards.
- B. Comply with size, make, type and quality specified or as specifically accepted in writing by the Owner.
- C. Design, fabricate, assemble deliver and install products in accordance with engineering and shop practices normal to trade.
- D. Manufacture like parts of duplicate units to standard interchangeable sizes and gauges. Two or more items of same kind shall be identical by same manufacturer.
- E. Products shall be suitable for intended purpose.

- F. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically accepted in writing.
- G. Do not use material or equipment for any purpose other than for which it is designed or is specified.

1.05 IDENTIFICATIONS AND NAMEPLATES

- A. Nameplates, trademarks, and other identifying marks on manufactured and fabricated items are not permitted on surfaces exposed to view in public spaces, including elevators and escalators except as noted otherwise in the Construction Contract Documents. This does not apply to UL labels.

1.06 QUALITY ASSURANCE

- A. Materials specified are to define standard of quality or performance and to establish basis for evaluation of proposals.
- B. Comply with individual Technical Specification Sections and referenced standards as minimum requirements.
- C. Components required to be supplied in quantity within a Technical Specification Section shall be of same manufacturer and shall be interchangeable, unless otherwise required.

1.07 PRODUCT OPTIONS

- A. For Products specified only by reference standard, select Product meeting that standard by any manufacturer.
- B. For Products specified by naming only one Product and manufacturer, select any one of the products and manufacturers named which complied with the Technical Specifications.
- C. For products specified by naming only one Product and manufacturer, there is no option and no substitution will be allowed.

1.08 PRODUCTS LIST

- A. Within twenty (20) calendar days after award of Contract, submit to the Owner three (3) copies of complete list of major Products, which are proposed for installation.
- B. Tabulate Products by Technical Specification Section number and title.
- C. For products specified only by reference standards list for each such Product:
 - 1. Name and address of manufacturer.
 - 2. Trade name.

3. Model or catalogue designation.
 4. Manufacturer's data:
 - a. Reference standards.
 - b. Performance test data.
- D. The Owner will coordinate with the Architect / Engineer of record and reply in writing stating whether there is reasonable objection to listed items. Failure to object to a listed item shall not constitute a waiver of the requirements of the Construction Contract Documents.

1.09 MANUFACTURER'S INSTRUCTIONS

- A. When Construction Contract Documents require installation of work to comply with manufacturers printed instructions, obtain and distribute copies of instructions to parties involved in installation, including two (2) copies to the Owner, prior to commencing work.
- B. Maintain one (1) set of complete instructions at job site during installation and until work is complete.
- C. Maintain copies for Project Record Documents.
- D. Handle, install, connect, clean, condition and adjust products in strict accord with manufacturer's instructions and in conformity with specified requirements.
- E. Should job conditions or specified requirements conflict with manufacturer's instructions, notify the Owner in writing for further instructions. Do not proceed with Work without clear instructions.
- F. Perform Work in accordance with manufacturer's instructions. Do not omit preparatory steps on installation procedures unless specifically modified or exempted by the Contract Documents.

1.10 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of materials and equipment in accordance with construction schedules. Coordinate to avoid conflict with Work and conditions at Site. Avoid congesting traffic.
- B. Deliver materials and equipment in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
- C. Immediately upon delivery, inspect shipments to assure compliance with requirements of the Construction Contract Documents and accepted submittals, and that products are properly protected and undamaged.
- D. Promptly remove unsatisfactory materials from Site.

- E. Furnish equipment and personnel to handle products by methods necessary to prevent soiling or damage to products or packaging.

1.11 STORAGE

- A. Store materials subject to damage from exposure to weather in weather tight storage facilities of suitable size with floors raised above ground. Materials not subject to weather damage may be stored on blocks off ground.
- B. Store fabricated products in accordance with manufacturer's instructions, seals and labels intact and legible. Store product subject to damage by elements in weather tight enclosures. Maintain temperature and humidity within ranges required by manufacturer's instructions.
- C. Cover materials, which are subject to deterioration with breathable, impervious sheet covering to provide adequate ventilation to avoid condensation.
- D. Store loosed granular materials in well-drained area on solid surfaces to prevent mixing with foreign matter and cover during inclement weather. Store cementitious and clay products clear of earth or concrete floors, away from walls.
- E. Arrange storage in manner to permit easy access for inspections.
- F. Protect metal from damage, dirt or dampness. Furnish flat, solid support for sheet products during storage.
- G. Make periodic inspections of stored materials to verify that products are maintained under specified conditions and are free from damage or deterioration.
- H. Do not use materials in work that have deteriorated, become damaged or are otherwise unfit for use.
- I. Store paints in assigned room or area kept under lock and key. Prevent mixing of refuse or chemically injurious materials or liquids with stored materials.
- J. Remove oil, rags and other combustible materials daily and take precautions to prevent fire hazard.
- K. Do not load structure during construction by storing materials with load greater than structure is calculated to support safely. Such storage is subject to approval by the Owner.
- L. Provide substantial platforms, blocking, or skids to support fabricated products above ground; slope to provide drainage. Provide surface drainage to prevent erosions and pounding of water.
- M. Pipe and conduit stored outdoors shall have open ends sealed to prevent entrance of dirt, moisture, etc.

1.12 PROTECTION AND MAINTENANCE

- A. Furnish protection against weather. Cover building openings and penetrations to protect interior of building from weather.
- B. Maintain work, materials, apparatus and fixtures free from damage, accumulation of debris, and protected from dust and dirt.
- C. Protect items having factory finish to prevent damage to finish and equipment.
- D. At end of day's work, cover new work likely to be damaged or otherwise protect and necessary.
- E. After installation, secure substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations.
- F. Remove protection where no longer needed. Upon completion of Work, remove storage facilities from site.
- G. Contractor shall replace, at no additional cost to the Owner, stored items damaged by inadequate protection and environmental control.
- H. For mechanical and electrical equipment in long-term storage, provide manufacturer's service instructions shown on exterior of package.
- I. Service equipment on a regular basis as recommended by manufacturer. Maintain log of maintenance services; submit log as Project Record Document in accordance with requirements of Section 01781, Project Record Documents.
- J. After cabinets and boxes are installed, cover openings to prevent entrance of water and foreign materials. Close conduit openings with temporary metal or plastic cap, including those terminated in cabinets.
- K. Provide temporary enclosures for equipment such as substations and motor control centers. Provide and maintain heat in closures until equipment is energized, to avoid condensation damage.

1.13 MANUFACTURER CERTIFICATION

- A. Prior to Final Acceptance of Work, for items designated in Technical Specifications Sections, an authorized representative of each manufacturer of materials and/or equipment installed under the work of that Section, shall personally inspect installation and operation of his/her materials, system and equipment to determine they are correctly installed and operating properly as follows:
 - 1. Inspection and testing shall be accomplished:

- a. For Work which will be concealed during execution of Work, after completion of installation and prior to concealment.
 - b. For Work which will not be concealed, at completion of Work.
2. Each representative shall submit a signed statement to the Owner through the Contractor certifying to his personal inspection and to the correct installation and proper operation of materials, systems and/or equipment. Their certification shall list all items included.
 3. Contractor shall transmit all such certifications to the Owner at or prior to Final Acceptance Inspection. Transmittal shall include a list of all certifications included.

PART 2 - PRODUCTS

2.01 MATERIALS, EQUIPMENT & FURNISHINGS

- A. Materials and equipment intended for use in Project must be new. Equipment and furnishings utilized for installation of material and equipment in the Project may be new or used, but must be serviceable, must be adequate for intended purpose, and must not violate applicable codes and/or regulations.

PART 3 - EXECUTION

3.01 GENERAL

- A. Store products immediately upon delivery at location acceptable to the Owner, in accordance with manufacturer's storage instructions, with seals and labels intact. Protect until uninstalled.
- B. Arrange storage in manner to provide access for maintenance of stored items and for inspection.

3.02 MAINTENANCE OF STORAGE

- A. Verify that storage facilities comply with manufacturer's product storage requirements.
- B. Verify that manufacturer required environmental conditions are maintained continually.
- C. Verify that surfaces of products to elements are not adversely affected and that any weathering of finishes is within acceptable tolerances under requirements of Construction Contract Documents.

END OF SECTION 01610

SECTION 01620

STORAGE AND PROTECTION

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. General storage and protection of project materials and equipment.
- B. Furnish, install and maintain storage sheds as required for protection of materials and equipment. Remove at completion of Work.
- C. Exterior storage requirements for all specified materials and equipment requiring protection.

1.02 RELATED REQUIREMENTS

- A. Division 1, General Requirements in the Project Manual without exception..

PART 2 – PRODUCTS

2.01 MATERIALS, EQUIPMENT & FURNISHINGS

- A. Materials and equipment intended for use in Project must be new. Equipment and furnishings utilized for installation of material and equipment in the Project may be new or used, but must be serviceable, must be adequate for intended purpose, and must not violate codes or regulations.

PART 3 – EXECUTION

3.01 GENERAL

- A. Store products immediately upon delivery at location acceptable to the Owner, in accordance with manufacturer's storage instructions, with seals and labels intact. Protect until installed.
- B. Arrange storage in manner to provide access for maintenance of stored items and for inspection.

3.02 ENCLOSED STORAGE

- A. Store products subject to damage by elements in substantial weather tight enclosures or storage sheds of adequate dimensions.
- B. Maintain temperature and humidity within ranges stated in manufacturer's instruction.

- C. Provide humidity control and ventilation for sensitive products as required by manufacturer's instruction.
- D. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.
- E. Contractor shall replace, at no additional cost to the Owner, store items damaged by inadequate protection or environmental control.
- F. Provide substantial platforms, blocking, or skids to support fabricated products above ground; slope to provide drainage.
- G. For products subject to dislocation or deterioration from exposure to elements, cover with impervious sheet materials. Provide ventilation to prevent condensation below covering.
- H. Store loose, granular materials on clean, solid surfaces, or on rigid sheet materials, to prevent mixing with foreign matter.
- I. Provide surface drainage to prevent erosion and pounding of water.
- J. Prevent mixing of refuse or chemically injurious materials or liquids with stored material.
- K. Pipe and conduit stored outdoors shall have open ends sealed to prevent entrance of dirt, moisture, etc.

3.03 MAINTENACE OF STORAGE

- A. Periodically inspect stored products on a scheduled basis.
- B. Verify that storage facilities comply with manufacturer's product storage requirements.
- C. Verify that manufacturer required environmental conditions are maintained continually.
- D. Verify that surfaces of products exposed to elements are not adversely affected and that any weathering of finishes is within acceptable tolerances established by the applicable manufacturer.

3.04 MAINTENACE OF EQUIPMENT STORAGE

- A. For mechanical and electrical equipment in long-term storage, provide manufacturer's service instructions shown on exterior of package.
- B. Service equipment on a regular basis as recommended by manufacturer. Maintain log of maintenance services; submit log in accordance with requirements of Section 01781, Project Record Documents

3.05 PROTECTION OF INSTALLED EQUIPMENT

- A. After cabinets and boxes are installed, cover openings to prevent entrance of water and foreign materials. Close conduit openings with temporary metal or plastic cap, including those terminated in cabinets.
- B. Provide temporary enclosures for equipment such as substations and motor control centers. Provide and maintain heat in closures until equipment is energized, to avoid condensation damage.

END OF SECTION 01620

SECTION 01700

EXECUTION REQUIREMENTS

PART 1- GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Contractor shall comply with and be responsible for all of the requirements of the Project Manual without exception.
- B. Contractor shall provide field engineering and general layout services required on the project as follows:
 - 1. Civil, structural or other professional engineering services specified, or required to execute construction methods consistent with the requirements of the Construction Contract Documents..
 - 2. Survey work required for execution of the total Work. of the Project.
 - 3. Continuous horizontal and vertical control regarding layout and execution of Work. of the Project.
 - 4. Coordinate field engineering services with the Owner.

1.02 RELATED REQUIRMENTS

- A. Division 1, General Requirements of the Project Manual without exception.
- B. The Technical Specifications, Sections 0200 through 1900, as may be applicable.

1.03 CONTROLS

- A. Contractor will establish primary controls, horizontal and vertical control points at various locations at the Site. These will be described and indicated on the Contractor's approved Drawings and will be coordinated in the field by the Contractor.
- B. Existing control points and property line markers will be shown on the Owner's survey drawings.

1.04 QUALIFICATIONS OF SURVEYOR OR ENGINEER

- A. For Surveying, a qualified engineer or registered land surveyor, registered in the State of South Carolina and acceptable to the Owner.
- B. For engineering, a registered professional engineer of a discipline required for this Project licensed in the State of South Carolina and acceptable to the Owner.

1.05 SURVEY REFERENCE POINTS

- A. Existing horizontal and vertical control points for the Project are those designated on Owner's survey drawings or as determined from investigation of the existing conditions.
- B. Verify property, grades, lines, levels and dimensions indicated.
- C. Locate and protect control points prior to starting Site Work and preserve permanent reference points during construction.
 - 1. Make no changes or relocations without prior approval of the Owner
 - 2. Report to the Owner when a reference point is lost, destroyed or requires relocation because of necessary changes in grades or locations.
 - 3. Require surveyor to replace Project control points, which may be lost or destroyed.

1.06 PROJECT LAYOUT REQUIREMENTS

- A. Establish a sufficient number of permanent bench marks on Site, as may be required, referenced to data established by survey control points. Record locations of benchmarks with horizontal and vertical data on Project Record Documents, Section 01781.
- B. From established control points, Contractor shall layout all Work by establishing all lines and grades at Site necessary to control Work, and shall be responsible for all measurements that may be required for execution of Work.
- C. Furnish, at own expense, all such stakes, steel pins, equipment, tools and material and labor that may be required in laying out Work control points.
- D. Establish lines and levels, locate and layout by instrumentation and similar appropriate means:
 - 1. Site Improvements
 - a. Stakes for grading, fill, and topsoil placement.
 - b. Utility slopes and invert elevations.
 - c. Limits of pavement (concrete and asphalt).
 - 2. Batter boards for structures.
 - 3. Building foundation column locations, piling and floor levels.
 - 4. Controlling lines and levels required for mechanical and electrical trades.
- E. Verify and coordinate in field all existing and proposed underground components including civil, structural, utilities and other components prior to initiation of the Work. Advise the Owner of any conflicts or discrepancies.

1.07 SUBMITTALS AND DOCUMENTS

- A. Submit name and address of Surveyor and Professional Engineer assigned to the Project to the Owner.
- B. On request of the Owner, submit documentation to certify accuracy of field engineering work and compliance with Construction Contract Documents.
- C. Submit certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance, or non-conformance, with Construction Contract Documents.
- D. Standards and Availability: Data and other measurements shall be recorded in accordance with standard and approved methods. All field notes, sketches, recordings, and computation in establishing above horizontal and vertical control points shall be available at all times during progress of Work for ready examination by the Owner
- E. Maintain complete and accurate record data on underground utilities and obstructions, new and existing, encountered in execution of Work. Record data on Project Record Documents in accordance with requirements of Section 01781, Project Record Documents.
- F. On completion of all foundation walls, pavement and other major site improvements, prepare certified survey showing dimensions, locations, angles, and elevations of construction.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01700

SECTION 01710

FINAL CLEANING

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Contractor shall comply with and be responsible for all requirements of the Project Manual, without exception.
- B. Contractor shall comply with applicable requirements in this Section and more specific requirements in Section 00800, Special Project Conditions, and Section 01100, Summary of Work.
- C. Execute final cleaning at completion of the Work as required by the Construction Contract Documents.

1.02 RELATED REQUIREMENTS

- A. Divisions 1, General Requirements in the Project Manual without exception..

1.03 DISPOSAL REQUIREMENTS

- A. Conduct cleaning and disposal operations to comply with all applicable codes, ordinances, regulations, and anti-pollution laws.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Using cleaning materials only on surfaces recommended by cleaning material manufacturer.
- D. Refer to applicable manufacturer's recommendations for specific products and materials.

PART 3 – EXECUTION

3.01 FINAL CLEANING

- A. Execute prior to inspection at Substantial Completion.

- B. Employ skilled workmen or professional cleaners for the final cleaning.
- C. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces, and clean as follows:
 - 1. Remove grease, dust, dirt stain, labels, fingerprints, and other foreign materials from site-exposed interior and exterior surfaces; wash and polish surfaces so designated to shine finish.
 - 2. Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.
- D. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- E. Clean roof areas of debris; flush roof drainage system(s) with water until clear.
- F. Prior to final completion, or Owner occupancy, Contractor and Owner shall conduct an inspection of sight-exposed interior and exterior surfaces, and all work areas, to verify that the entire Project Work area is clean.
- G. Leave Project Work area clean and ready for use and occupancy.

END OF SECTION 01710

SECTION 01731

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Requirements and limitations of cutting and patching associated with the Work of this Contract.
- B. Cutting, fitting and patching, including attendant excavation and backfill required completing the Work of this Contract.
- C. Assume that concealed or previously unknown conditions may be encountered during the execution of the Work. No consideration whatsoever will be given to any claim for additional cost and/or time resulting from such conditions that can reasonably be expected, which are ordinarily encountered or which are generally recognized as inherent in the character of the Work anticipated for this Project.

1.02 RELATED REQUIREMENTS

- A. Division 1, General Requirements in the Project Manual without exception.
- B. The Technical Specifications, which may be applicable and incidental to the Work of the respective Sections.

1.03 DESCRIPTION AND SCOPE

- A. Execute cutting, fitting and patching, including attendant excavation and backfill required to complete the Work or to:
 - 1. Make all parts of the Work fit together.
 - 2. Uncover portions of the Work to provide for installation of ill-timed work.
 - 3. Remove and replace defective work, products and/or equipment.
 - 4. Remove and replace work not conforming to the requirements of the Construction Contract Documents, approved Drawings and Technical Specifications.
 - 5. Remove samples of installed work as specified for testing.
 - 6. Provide routine penetrations of non-structural surfaces for installation of mechanical, electrical and plumbing work.
 - 7. Uncover work that has been covered prior to a required observation by the Owner

1.04 SUBMITTALS

- A. The Contractor shall submit a written request to the Owner seventy two (72) hours in advance of any cutting or alteration work. The written request/notice shall state the location, date and time the work will be accomplished. The preceding will apply to instances that affects:

1. Work of other Contractors engaged by the County on the site.
 2. The structural value or integrity of any element of the Work of the Project.
 3. The integrity or effectiveness of weather exposed or moisture resistant elements of, or systems within the Work of the Project.
 4. Efficiency, operational life, maintenance and/or safety of the operational elements of, or systems within the Work of the Project.
 5. The visual and esthetic qualities of sight exposed elements of the Work of the Project.
- B. The Contractor's requests / notices shall include, at a minimum:
1. Owner RFP / Bid Number.
 2. Location and description of the affected work to be performed.
 3. The necessity for cutting, patching, alteration or excavation.
 4. Effect of the work on the Owner and / or its Contractors and abutting property.
 5. Effect of the work on the integrity of the structural and/or weatherproof elements of the Work of the Project.
 6. Description of the proposed work:
 - a. Scope of cutting, patching, alteration or excavation.
 - b. Contractor's prime or sub-contractors who will execute the work.
 - c. Products proposed to be used.
 - d. Extent of refinishing to be done.
 7. Alternatives to cutting, patching, alteration or excavation.
 8. Written permission of any affected entity other than the Contractor's prime and sub-contractors.
- C. Should the conditions and schedule of the work to be performed indicate a change of products from the original installation, the Contractor shall submit a written request to the Owner for substitution pursuant to the stipulations in Section 01600, Product Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Contractor shall comply with the final, approved Technical Specifications and standards for each specific product involved.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Contractor shall examine existing conditions in the area of the work, including any elements subject to damage or to movement during cutting, patching, alteration or excavation.
- B. After uncovering the work, Contractor shall inspect the conditions affecting installation of products, or performance of the work.

- C. Contractor shall report unsatisfactory or questionable conditions to the Owner in writing. No work is to proceed until a written response is received from the Owner.
- D. Beginning of cutting, patching, alterations or excavation operations shall be considered as acceptance, by the Contractor of the existing conditions.

3.02 PREPARATION AND PROTECTION

- A. Contractor shall provide adequate temporary support as necessary to assure structural value or integrity of the affected portion of the work.
- B. Contractor shall provide devices and methods to protect adjacent work and other portions of the Work of the Project from any damage.
- C. Contractor shall provide protection from the elements of weather for that portion(s) of the Work of the Project that may be exposed by cutting, patching, alteration or excavation.
- D. Contractor shall maintain excavations free from water and comply with the requirements of state and local agencies having jurisdiction.

3.03 DUST CONTROL

- A. Contractor shall obtain approval of the means and method by which dust and debris will be controlled from the Owner.
- B. Contractor shall provide and maintain positive methods of dust control and apply dust control materials to minimize raising and spreading of dust from cutting, patching and alteration operations.
- C. Contractor shall conform to the requirements of Section 01510, Temporary Construction Controls.

3.04 PERFORMANCE

- A. Open flame torch cutting operations require a “Hot Work” permit in compliance with current state and local codes and regulations. Contractor shall exercise all fire and safety precautions as required.
- B. Contractor shall execute all cutting, patching, alteration and demolition by methods that will prevent damage to other work, and will provide proper surfaces to receive installation of repairs or alterations.
- C. Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- D. Contractor shall cut, remove and legally dispose of selected mechanical equipment, components and materials as indicated, including but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the modified work.
- E. Contractor shall restore work that has been cut or removed, and shall install new products to provide completed work in accordance with the requirements of the Construction Contract Documents.
- F. Contractor shall fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through vertical and/or horizontal surfaces. Where fire rated separations are penetrated, fill space around pipe or insert penetration with material having physical characteristics equivalent to fire resistant requirements of

penetrated surfaces in accordance with state or local codes and acceptable construction practices.

G. Contractor shall refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:

1. For continuous surfaces, refinish to nearest intersection.
2. For an assembly, refinish entire unit.

H. Contractor shall employ the Original Installer or Fabricator of Work performed under this Contract to execute cutting and patching for:

1. Weather exposed or moisture resistant elements to maintain warranty and/or bonds.
2. Sight exposed specialty finished surfaces.

END OF SECTION 01731

SECTION 01770

CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual, without exception.
- B. The Contractor shall comply with applicable requirements in this Section and more specific requirements in Division 1, Section 01100, Summary of Work.
- C. The Contractor shall comply with the requirements stated in the Construction Contract and in approved and permitted Drawings and Technical Specifications for the Work.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Construction Contract: fiscal provisions, legal submittals and additional administrative requirements.
- B. Division 1, General Requirements in the Project Manual without exception.
- C. Closeout submittals required of trades as may be indicated in various sections of the approved Technical Specifications.

1.03 DAMAGES

- A. If the Contractor neglects, fails, or refuses to complete the work by the Substantial Completion Date, Final Completion Date, or any portion of the Work by an Interim Completion Date, subject to any proper extension granted by the Owner, then the Contractor will pay, or cause the Contractor's Surety to pay damages to the Owner as defined in Summary of the Work, Section 01100.

1.04 PHASED COMPLETION

- A. In addition to Substantial Completion (Beneficial Occupancy) and Final Completion as defined below, the Contractor shall complete and make available to the Owner certain portions of the Work set forth on the Summary Schedule and Key Milestones in Section 00750 no later than the dates indicated on said Schedule ("Interim Completion Date")
- B. The Contractor acknowledges that such Interim Completion Dates are essential to the Owner's plans and use and, therefore, time is of the essence in meeting said Interim Completion Dates.

1.05 SUBSTANTIAL COMPLETION

1. When Contractor considers the Work is substantially complete, he shall submit to the Owner the following: A written certification that the Work, or designated portion thereof, is substantially complete. All items not complete shall be listed and deficient items noted.
 2. Owner will review the Contractor's certification and examine the Work for conformance to the Certification and the Construction Contract Documents.
 3. Owner will inform the Contractor of non-compliance or incomplete items.
 4. Contractor shall remedy the deficiencies in the Work within seventy-two (72) hours, and send a second written notice of substantial completion to the Owner.
 5. The Owner will re-examine the Work.
- B. When the Owner determines that the Work is substantially complete, the Owner will:
1. Prepare a Certificate of Substantial Completion, accompanied by Contractor's list of items to be completed or corrected, as verified and amended.
 2. Send to Contractor for his/her written acceptance of the responsibilities assigned to them in the Certificate.
- C. After Work is substantially complete, Contractor shall:
1. Obtain and submit Certificate of Occupancy. Owner shall, in detail, list the status of the area affected by partial acceptance and occupancy to establish the existing conditions prior to such acceptance or occupancy.
 2. Complete Work listed for completion or correction within designated form.
 3. Perform all cleaning in accordance with Section 01710, Final Cleaning.

1.06 FINAL COMPLETION

- A. Within ten (10) calendar days after substantial completion, the Contractor shall submit to the Owner written certification that:
1. Construction Contract Documents have been reviewed.
 2. Work has been examined for compliance with Construction Contract Documents.
 3. Work has been completed in accordance with Construction Contract Documents.
 4. Equipment and systems have been tested in the presence of the Owner and the appropriate County personnel, and are operational.
 5. Work is completed and ready for final examination.

6. Submittal of Closeout Documents as stipulated in paragraph 1.07 below.
- B. The Owner will make an examination to verify the status of completion within ten (10) calendar days after receipt of such certification.
- C. Should the Owner consider the Work incomplete or defective, or the Contractor has not demonstrated to the Owner that a “good faith” effort has been made within the time (72 hours) allotted in paragraph 1.05 A above, any Damages and/or Liquidated Damages, will be charged against the Contractor as defined and explained in Section 01100, Summary of Work
 1. The Owner will promptly notify the Contractor in writing of all deficiencies listing the incomplete or defective work.
 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written Certification to the Owner that the Work is complete.
 3. The Owner will re-examine the Work.
- D. When the Owner concludes that the Work is complete, the Owner shall determine the number of days for which Liquidated Damages will be assessed and request the Contractor to prepare closeout submittals.
- E. Acceptance of the entire project shall commence after all contract work is complete, final inspections are made, corrective actions completed, the Work re-examined, and after final acceptance by the Owner
- F. The date established by the Owner as the Final Completion Date shall initiate the guarantee and the warranty periods for all system components and the construction of the Project. The Project shall not be considered Final Complete until all Close Out Documents are properly completed and transmitted to the Owner.
- G. The Owner shall review the status of the Work and compare it to the request for final payment and compare it with the Project records for conformance to the final settlement requirements.
- H. The Owner shall receive from the Contractor, and maintain, the permit drawings and specification package, copy of all shop drawings and submittals, the “as-built” set of drawings and specifications, maintenance manuals as required by the contract and submitted by the Contractor. In addition, the Contractor shall provide spare parts and supplies, stored materials, special tools, filters, and other pertinent items as required under the Construction Contract Documents to the Owner for transmittal to the appropriate County department(s)

1.07 CLOSEOUT SUBMITTALS

- A. Evidence of compliance with requirements of governing authorities:
 1. Certificate(s) of Inspection:
- B. Project Record (Permit) Documents, in accordance with Section 01781

- C. Operating and Maintenance Data, in accordance with Section 01782 (if applicable).
- D. Warranties and Bonds, in accordance with Section 01790 (if applicable).
- E. Spare Parts and Maintenance Materials, in accordance with Section 01785.
- F. Certificate of Insurance for Products and Completed Operations.

1.08 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS

- A. Contractor's Affidavit of Release of Liens.
 - 1. Consent of Surety to Final Payment. Use form acceptable to the Owner
 - 2. Contractor's Release or Waiver of Liens. Standard Form "Affidavit and Partial Lien Waiver". Use form acceptable to Owner.
 - 3. Separate releases of waivers of liens from prime and subcontractors, suppliers and others with lien rights against property of the Owner together with a list of those parties, in accordance with Standard Form "Affidavit and Final Lien Waiver". Use form acceptable to Owner.
- B. All submittals shall be duly executed and notarized before delivery to the Owner.

1.09 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final Statement of Accounting to the Owner.
- B. Statement shall reflect all adjustments to the Contract Sum:
 - 1. The original Contract Sum.
 - 2. Additions and deductions resulting from:
 - a. Previous Change Orders.
 - b. Allowances.
 - c. Unit Prices.
 - d. Deductions for uncorrected Work.
 - e. Deductions for liquidated damages.
 - f. Other adjustments.
 - 3. Total Contract Sum, as adjusted.
 - 4. Previous payments.
 - 5. Sum remaining due.
- C. The Owner will prepare a final Change Order reflecting approved adjustments to the Contract Sum, which was not previously made by Change Orders.

1.10 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit final Application for Payment in accordance with procedures and requirements stated in the Construction Contract and Section 01290, Payment Procedures of the Project Manual.

1.11 ADDITIONAL ADJUSTMENT

- A. No adjustments to the Construction Contract requested by the Contractor will be allowed if asserted after execution of Final Payment of Contract.

1.12 POST-CONSTRUCTION INSPECTION

- A. Prior to expiration of one (1) year from the Date of Final Completion, the Owner, or its designated representative, will make visual inspection of the Project Work in the company of the Contractor to determine whether further correction of Work is required in accordance with the provisions of the Construction Contract. The Contractor shall be responsible for contacting the Owner and scheduling and coordinating the one (1) year inspection.
- B. The Owner will notify the Contractor, in writing, of any observed deficiencies.
- C. Contractor shall contact the Owner to arrange convenient time and establish schedule for correction of deficiencies.

PART 2 – PRODUCTS
Not Used

PART 3 – EXECUTION
Not Used

END OF SECTION 01770

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SECTION 01781

PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 REQUIRED INCLUDED

- A. Contractor shall comply with and be responsible for all requirements of the Project Manual without exception.
- B. Contractor shall comply with the applicable requirements in this Section and more specific requirements in: Section 00800, Special Project Conditions; Section 01100, Summary of Work; Section 01330, Submittal Procedures; Section 01322, Photographic Documentation; and Section 01770, Close Out Procedures.
- C. Contractor shall conform to the requirements of the Owner, Georgetown County, and such other federal, state and municipal agencies having jurisdiction.

1.02 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents, in the Project Manual without exception.
- B. Division 1, General Requirements in the Project Manual without exception.

1.03 MAINTENACE OF DOCUMENTS AND SAMPLES

- A. For duration of Project, maintain at job Site the following:
 - 1. One copy of the Drawings, Technical Specifications, Addenda, shop drawings, products data, miscellaneous requested submittal data, Change Orders and other modifications to Contract, field orders, field test or written instructions.
 - 2. One copy of transmittal letters.
 - 3. One set of construction photographs.
 - 4. One set of samples.
 - 5. One copy of Permit Drawings as may be required by the appropriate governing agency having jurisdiction.
- B. Store documents and samples in Contractor's field office apart from documents used for construction.
 - 1. Provide files and racks for storage of documents.
 - 2. Provide locked cabinets or secure storage space for storage of samples.
- C. File documents and samples in accordance with CSI 16-division format.

- D. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- E. Make documents and samples available at all times for inspection by the Owner.
- F. Incomplete or out of order documents and samples will be grounds for not approving the Design/Builder's Application for Payment.
- G. Provide felt tip marking pens for recording information in color code designated by the Owner.
- H. Label each document "PROJECT RECORD" in neat large printed letters. Keep record documents current. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.

1.04 RECORD DRAWINGS

- A. Electronic data "As-Built" record drawings shall be required. The Owner will select electronic format and software to be used by Contractor.
- B. Permanent and Accurate Record Drawings shall be created on full size sheets (24 in. x 36 in. ft.) capable of being reproduced. These shall be made from the approved, original drawings, which shall be provided to a commercial reprographics service at an appropriate time. All of the aforementioned shall be at the Contractor's sole cost and expense.
- C. Legibly mark in color code designated by the Owner to record actual construction on designated Record Drawing prints:
 - 1. Depths of various elements of structure(s) foundations in relation to finish first floor datum.
 - 2. Horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements.
 - 3. Location of all internal utilities and appurtenances and features of the structure(s), including dimensional locations of underground activities and other work
 - 4. Dimensional locations, vertical and horizontal, of site work, including utilities.
 - 5. Dimensional location, vertical and horizontal, of asphalt and concrete pavement.
 - 6. Dimensional location, vertical and horizontal, of storm water drainage system including pipe invert elevations.
- D. Indicate the following installed conditions:
 - 1. All electrical systems, plumbing and mechanical systems and such other units installed requiring periodic maintenance or repair.
 - 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.

3. Approved substitutions, contract modifications, and actual equipment and materials installed.
 4. Field modifications with dimensions and details.
 5. Modifications made by addenda, clarifications, Field Orders or Change Orders.
 6. Details not on original, approved Construction Contract drawings.
 7. Record information on a daily basis, or as often as necessary.
 8. Include references to related shop drawings and modifications.
- E. Contractor shall retain competent drafting services, as necessary, for transfer of “mark-up notations” from information recorded during construction.
- F. Contractor shall submit Record Documents drawings to the Owner for review and acceptance thirty (30) days prior to final closeout.
- G. Make revisions and additions as may be indicated by the Owner.
- H. Do not use these Drawings for reference or construction, nor allow them to leave the field office.

1.05 RECORD SPECIFICATIONS AND ADDENDA

- A. Legibly mark up in color code designated by the Owner each Specification Section to record the following:
1. Manufacturer, trade name, catalog name and supplier (with address and phone number) of each product and item of equipment actually installed.
 2. Modifications made by Change Order.
 3. Other matters not originally specified.

1.06 RECORD SAMPLES

- A. Record in transmittal, if not indicated, manufacturer, trade name, catalog number.

1.07 SUBMITALLS

- A. At Contract closeout, Contractor shall sign each final Record Drawing and cover of Record Specifications stating documents are complete and accurate, deliver project Record Documents to the Owner.
- B. Accompany submittal with transmittal letter in duplicate, containing:
1. Date.
 2. Owner RFP / Bid Number.
 3. Contractor’s name and address.
 4. Title and number of each Record Document.
 5. Signature of Contractor or his/her authorized representative.
- C. Submit the following quantities of Record Documents:

1. A complete set of Project Record Drawings in electronic format to be determined by Owner.

1.08 BURDEN OF ACCURACY

- A. Contractor shall bear all costs of damages of any nature incurred by the Owner due to inaccuracies or incompleteness of the submitted Project Record Documents.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01781

SECTION 01790

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents of the Project Manual without exception.
- B. Division 1, General Requirements of the Project Manual without exception.
- C. Approved Technical Specifications, as applicable and required.

1.02 SUMMARY

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Construction Contract Documents, including manufacturer's standard warranties on products and special warranties.
 - 1. Refer to the applicable requirements of Division 0 and Division 1 for Contractor's special warranty of workmanship and materials.
 - 2. General closeout requirements are included in Section 01770, Closeout Procedures.
 - 3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual and applicable Sections of the Technical Specifications.
 - 4. Certifications and other commitments and agreements for continuing services to the Owner, Georgetown County, South Carolina are specified elsewhere in the Construction Contract Documents.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products.

1.03 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Construction Contract Documents. The Contractor is responsible for the cost of

replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

- D. **Owner Recourse:** Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
- E. **Rejection of Warranties:** The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Construction Contract Documents.
- F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to counter sign such commitments are willing to do so.

1.04 SUBMITTALS

- A Submit written warranties to the Owner prior to the date certified for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Owner.
- B When a designated portion of the Work is completed and occupied or used by the Owner by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within ten (10) calendar days of completion of that designated portion of the Work.
- C When a special warranty is required to be executed by the Contractor, or the prime and a subcontractor, supplier or manufacturer prepare a written document that contains appropriate terms and identification, ready for execution by the required parties, Contractor shall submit a draft to the Owner for approval prior to final execution.
- D **Form of Submittal:** At Final Completion, the Contractor shall compile two (2) copies of each required warranty and bond properly executed by the Contractor, or by the prime, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- E Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
- F Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.

- G Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS, the Project title or name and location, Owner RFP / Bid number and the name of the Contractor.

- H When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01790

PROJECT MANUAL - Volume II

Waverly Park

Bid #22-018

SGA | PROJECT NO. 19-004-04

SGA|NW DESIGN

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PHONE: 843-237-3421 | FAX: 843-237-1992 | WEBSITE: sganwdesign.com

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MECHANICAL, PLUMBING, ELECTRICAL

BEST Engineering, LLC
24 Bobcat Drive
Pawley's Island, SC 29585
(843) 235-8280

SITE ELECTRICAL

Charleston Engineering, LLC
125 B Wappoo Creek Drive
Charleston, SC 29412
(843) 762-4242

IRRIGATION

SiteOne Landscape Supply

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SECTION 023000 - SUBSURFACE INVESTIGATION

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This section includes subsurface data logs for information only.

1.2 SOIL INVESTIGATION DATA

- A. Subsurface data logs are available for information only. Actual conditions may vary. If bidders are not satisfied with accuracy and completeness of all available data, they are at liberty to make borings or perform soil investigation work for their own use at its expense. If Contractor chooses to perform their own investigation, work shall be coordinated with the Engineer. Any results from Contractor's investigation shall be shared promptly with the Engineer. Owner reserves the right to share Contractor's investigation data with other potential bidders if information could affect bidding process.
- B. The boring logs and test results are for information of the Contractor. Owner and Engineer assume no responsibility for the information.

PART 2 – PRODUCTS

See attached report.

PART 3 – EXECUTION

None this Section.

END OF SECTION

SECTION 024113 - SELECTIVE SITE DEMOLITION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of selective demolition work is indicated on drawings. Contractor shall remove existing ballfield fence, dugout, lights, poles and other vertical elements and turn over to Owner. Coordinate with Owner for removal of these features from the site.

1.3 SUBMITTALS

- A. Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's representative for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection. Include schedule and location for return of items identified on plans to be delivered to Owner of property.

1.4 JOB CONDITIONS

- A. Condition of Structures: Owner assumes no responsibility for actual condition of items to be demolished.
- B. Partial Demolition and Removal: Items indicated to be removed but of value to Contractor may be removed as work progresses. Transport salvaged items from site as they are removed.

Storage or sale of removed items on site will not be permitted.
- C. Protections: Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.

Protect from damage existing finish work to remain in place and becomes exposed during demolition operations. Remove protections at completion of work.

1.5 DAMAGES

- A. Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

1.6 TRAFFIC

- A. Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

Do not close, block or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways.

1.7 EXPLOSIVES

- A. Use of explosives will not be permitted.

1.8 UTILITY SERVICES

- A. Contractor shall be responsible for removal of all underground utilities in the way of work. Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

1.9 ENVIRONMENTAL CONTROLS

- A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 – PRODUCTS

None in this section

PART 3 – EXECUTION

3.1 PREPARATION

- A. Prior to commencement of selective demolition work, check areas in which work will be performed. Photograph or video existing conditions of surfaces, equipment, or surrounding properties that could be misconstrued as damage resulting from selective demolition work. File with Owner's representative prior to starting work.
- B. Cover and protect equipment and fixtures to remain from soiling or damage when demolition work is performed in areas from which such items have not been removed.

3.2 DEMOLITION

- A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with demolition schedule and governing regulations.

Demolish concrete in small sections. Cut concrete at junctures with construction to remain using power-driven masonry saw or hand tools. Do not use power-driven impact tools.

Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel and sand, free of trash and debris, stones over 2" diameter, roots or other organic matter.

If unanticipated mechanical, electrical, or structural elements, which conflict with intended function or design, are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's representative in written, accurate detail. Pending receipt of directive from Owner's representative, rearrange selective demolition schedule as necessary to continue overall job progress without delay.

3.3 SALVAGE MATERIALS

Any articles of historic significance will remain the property of the Owner. Notify Owner's representative if such items are encountered and obtain acceptance regarding method of removal and salvage for Owner.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove debris, rubbish and other materials resulting from demolition operations from site. Transport and legally dispose of materials off site.

If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.

Burning of removed materials is not permitted on project site.

3.5 CLEAN-UP AND REPAIR

- A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave site clean.

Repair demolition performed in excess of required work. Return structures and surfaces to remain to the condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

Fill in all voids created by selective demolition and grade site to drain. Grass all disturbed areas for erosion control.

END OF SECTION

SECTION 030000 – SITE CONCRETE

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Concrete sidewalks, curbs

1.2 RELATED SECTIONS

- A. Section 310000 – Earthwork: Preparation of site for paving [and base].

1.3 REFERENCES (LATEST REVISION)

- A. ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 301 – Specifications for Structural Concrete.
- C. ACI 304R – Guide for Measuring, Mixing, Transporting and Placing Concrete.
- D. ACI 318 – Building–Code Requirements for Structural Concrete and Commentary.
- E. ACI 330R – Guide for the Design and Construction of Concrete Parking Lots.
- F. ASTM A 185 – Steel Welded Wire Reinforcement, Plain, for Concrete.
- G. ASTM A 497 – Steel Welded Wire Reinforcement, Deformed, for Concrete.
- H. ASTM A 615 – Deformed and Plain Carbon–Steel Bars for Concrete Reinforcement.
- I. ASTM C 31 – Making and Curing Concrete Test Specimens in the Field.
- J. ASTM C 33 – Concrete Aggregates.
- K. ASTM C 39 – Compressive Strength of Cylindrical Concrete Specimens.
- L. ASTM C 94 – Ready–Mixed Concrete.
- M. ASTM C 150 – Portland Cement.
- N. ASTM C 172 – Sampling Freshly Mixed Concrete.
- O. ASTM C 260 – Air–Entraining Admixtures for Concrete.
- P. ASTM C 309 – Liquid Membrane–Forming Compounds for Curing Concrete.
- Q. ASTM C 494 – Chemical Admixtures for Concrete.
- R. ASTM C 920 – Elastomeric Joint Sealants.
- S. ASTM E 1155 – Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.

- T. ASTM C 1116 – Fiber–Reinforced Concrete.
- U. ASTM D 1751 – Preformed Expansion Joint Filler for Concrete Paving and Structural Construction. (Nonextruding and Resilient Bituminous Type).
- V. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- W. ASTM E 329 – Agencies Engaged in Construction Inspection and/or Testing.

1.4 PERFORMANCE REQUIREMENTS

- A. Paving: Designed for movement of trucks up to 60,000 lbs.

1.5 SUBMITTALS FOR REVIEW

- A. Section 01330 – Submittals Procedures.
- B. Product Data: Provide data on joint filler, admixtures, and curing compounds.
- C. Concrete Design Mix.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301, ACI 318, and ACI 330R.
- B. Obtain cementitious materials from same source throughout.
- C. Conform to ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.
- D. Method of measurement for accessible route with a 24" digital smart–level will be used to measure points along the accessible route. Line of measurement shall be parallel to the long edge of ramp or accessible route, whether straight or curved. Longitudinal measurement lines shall be spaced 3 feet apart, but in no case shall fewer than two lines be used. The horizontal measurement [cross–slope] will be measured every [6] feet. Engineer reserves the right to gather additional measurements if further investigation is necessary. The 24" Smart–level slope readings greater than specified tolerance within contract documents will be identified as non–compliant and not accepted.
- E. Engineer reserves the right to mark and reject portions of concrete not within tolerance as specified.
- F. Accessible Route Tolerance by measuring Floor Flatness and Levelness. Traffic floors [All Accessible Routes] shall conform to the following surface profile tolerances:
 - a. Floor Designation: All floor areas not specified to be part of the "defined traffic floor" [Accessible Routes] shall be part of a "random traffic floor" [Non–accessible Route]. Any floor slab comprising part of the traffic floor shall be designated a "traffic slab" [Accessible Route].
 - b. Flatness and Levelness Tolerances: A traffic floor shall conform to the following surface profile tolerances:

Floor Flatness Number: F_F
Specified Overall Value = [38]
Minimum Local Value = [25]
Floor Levelness Number: F_L
Specified Overall Value = [25]
Minimum Local Value = [17]

- c. Floor Tolerance Measurements: F_F and F_L tolerances shall be tested in accordance with ASTM E 1155. Actual overall F–numbers shall be calculated using the inferior / superior area method.
 - d. Timeliness of Floor Profile Tests & Reports: All floor tolerance measurements shall be made within [48] hours after slab installation. In all cases, tolerance measurements shall precede the removal of shores and forms. Results of all floor profile tests (including a running tabulation of overall F_F and F_L values for all traffic slabs installed to date) shall be provided to the Contractor within [72] hours after each slab installation.
 - e. Remedy for Out-of-Tolerance Work: For purposes of flatness and levelness control, minimum floor section boundaries shall coincide with the control joints. Profile test compliance requirements apply to the time period specified above only. Contractor shall remedy any floor section measuring below either the minimum local F_F , or F_L number. Any floor section measuring at or above both the minimum local F_F and F_L number shall be accepted. If actual overall F_F or F_L number for entire random–traffic floor installation measures less than its specified value, then Contractor shall undertake remedial measures acceptable to the Engineer.
- G. Defined random traffic floors [Non–accessible Routes] shall conform to the following surface profile tolerances:
- a. Floor Designation: All floor areas specified as “defined random traffic floor” include only the [Non–accessible route].
 - b. Flatness and Levelness Tolerances: The defined traffic floor shall conform to the following surface profile tolerances: $F_{min} = [25]$
 - c. Floor Tolerance Measurements: F_{min} tolerances shall be tested in accordance with ASTM E 1486.
 - d. Timeliness of Floor Profile Tests & Reports: All floor tolerance measurements shall be made by the Contractor within [24] hours after slab installation and before saw cutting of control joints. In all cases, tolerance measurements shall precede the removal of shores and forms. Results of all floor profile tests including a running tabulation of overall F_{min} values for all of defined–traffic slabs installed to date shall be provided to the Contractor within [48] hours after each slab installation.
- H. Remedy for Out-of-Tolerance Work: For purposes of flatness and levelness control, minimum floor section boundaries shall coincide with the construction joints. Profile test compliance requirements apply to time period specified above only. Contractor shall remedy any floor section measuring below the F_{min} number, in accordance with recommendations of the Engineer. Any floor section measuring at or above the F_{min} number shall be accepted. If actual overall F_{min} number entire defined–traffic floor installation measures less than its specified value, then Contractor shall undertake remedial measures acceptable to the Engineer.

If a portion of a floor does not meet specified F-number, the following remedies are recommended:

- a. Local value is out of spec – grind or replace floor.
- b. Overall value is out of spec – Contractor shall pay the Owner per square foot for portion of floor not meeting F-number spec. This can be obtained by specifying a figure in project specifications in conjunction with square footage obtained from reading taken in the field.

1.7 REGULATORY REQUIREMENTS

- A. Conform to SCDOT standards for paving work on public property.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

1.9 GUARANTEE

- A. Contractor shall guarantee the quality of materials and workmanship for a period of 12 months after acceptance. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

1.10 TESTING

- A. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- B. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours' notice prior to taking any tests.
- C. Owner shall select and engage the testing laboratory. Testing laboratory shall be responsible to the Owner and Owner's Engineer. Payment for laboratory and all tests shall be by Owner, except Owner specifically reserves the right to deduct from Contractor's payment, expense, and charges of testing laboratory when:
 1. Contractor gives notice work is ready for inspection and testing, and fails to be ready for the test, and/or
 2. Testing of the Contractor's work, products, or materials fail, and retesting is required, and/or
 3. Contractor abuses services or interferes with the work of testing laboratory in conduct of this work.
- D. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

2.1 FORM MATERIALS

- A. Wood or steel form material, profiled to suit conditions.

- B. Joint Filler: ASTM D1751 type; 1/2 inch thick.

2.2 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615, Grade 60 billet steel deformed bars; uncoated finish.
- B. Welded Steel Wire Fabric: Plain type, ASTM A 185; uncoated finish.
- C. Fiber reinforcement: Shall conform to ASTM C 1116 as manufactured by Fibermesh Company or equivalent. Concrete mix design shall utilize between 0.5% and 1.0% fiber content.

2.3 CONCRETE MATERIALS

- A. Cement: ASTM C 150, Type I – Normal.
- B. Fine and Coarse Mix Aggregates: ASTM C 33. Coarse aggregate shall consist of granite stone.
- C. Water: Potable, not detrimental to concrete.
- D. Air Entrainment: ASTM C 260.
- E. Chemical Admixture: ASTM C 494, Type A – Water Reducing.

2.4 ACCESSORIES

- A. Curing Compound: ASTM C309, clear with fugitive dye.
- B. Sealant: Joints shall be sealed per detail on project drawings, conforming to ASTM C 920, Type S or M, Grade P or NS, Class 25.

2.5 CONCRETE MIX – BY PERFORMANCE CRITERIA

- A. Provide concrete to the following criteria:
 - 1. Flexible Strength: 700 psi.
 - 2. Compressive Strength: 3,500 psi @ 28 days.
 - 3. Slump: 4 to 5 inches.
- B. Use accelerating admixtures in cold weather only when acceptable to Engineer. Use of admixtures will not relax cold weather placement requirements.
- C. Use calcium chloride only when accepted by Engineer.
- D. Use set retarding admixtures during hot weather only when accepted by Engineer.

2.6 SOURCE QUALITY CONTROL AND TESTS

- A. All sampling and testing services shall be performed, at Owner's expense, by a testing agency operating in accordance to ASTM D 3740 and E 329 latest edition and acceptable to the Engineer.

- B. Contractor shall submit to the Engineer a design mix on each class of concrete proposed for use. The mix shall be prepared by an acceptable testing laboratory. Compressive strength of at least four specimens of the design mix shall indicate 15% higher than 28 days strengths specified. During the work, Contractor shall make three test cylinders for each 50 cubic yards, or fraction thereof, of concrete placed each day. One cylinder shall be tested at 7 days and the other two at 28 days in accordance with ASTM C 39. Copies of all test reports shall be furnished to the Engineer.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify subgrade conditions under provisions of Section 31 00 00 – Earthwork.
- B. Verify compacted subgrade is acceptable and ready to support concrete and imposed loads.
- C. Verify slopes and elevations of subgrade are correct.

3.2 CONSTRUCTION OBSERVATION

- A. Engineer or Project Representative will have the right to require any portion of work be completed in their presence and if work is covered up after such instruction, it shall be exposed by Contractor for observation. However, if Contractor notifies the Engineer such work is scheduled, and Engineer fails to appear within 48 hours, Contractor may proceed. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

3.3 SUBGRADE

- A. Prepare subgrade in accordance with Section 31 00 00 – Earthwork.

3.4 PREPARATION FOR PLACING

- A. Water shall be removed from excavations before concrete is deposited. Hardened concrete debris and other foreign materials shall be removed from the interior of forms and inside of mixing and conveying equipment. The reinforcement shall be made secure in position and shall be subject to examination and acceptance.
- B. Moisten subgrade to minimize absorption of water from fresh concrete.
- C. Coat surfaces of manhole, inlet, and catch basin frames with oil to prevent bond with concrete pavement.
- D. Notify Engineer minimum 48 hours prior to commencement of concreting operations.

3.5 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.

- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler in position, in straight lines. Secure to formwork during concrete placement.
- D. Forms shall be constructed to the shape, line, and grade required and shall be maintained sufficiently rigid to prevent deformation under load. Form work and details of construction joints shall conform to ACI-318, Chapter 6.

3.6 REINFORCEMENT

- A. Place reinforcement as indicated.
- B. Interrupt reinforcement at expansion joints.

3.7 PLACING CONCRETE

- A. Placing of concrete shall conform to Chapter 5 of the American Concrete Institute Standard A.C.I. 318. Concrete having attained initial set or having contained water for more than 45 minutes shall not be used in the work. Concrete shall not be dropped freely more than 5 feet. Concrete shall be mixed and placed only when the temperature is at least 40 degrees F and rising. Concrete shall be placed only upon surfaces free from frost, ice, mud and other detrimental substances or conditions. When placed on dry soil or pervious material, water proof paper or polyethylene sheeting shall be laid over surfaces to receive the concrete.
- B. Ensure reinforcement, inserts, embedded parts, formed joints and forms are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of panel and between predetermined construction joints. Do not break or interrupt successive pours so cold joints will not occur.
- D. Place concrete to elevations indicated on the contract drawings.

3.8 JOINTS

- A. Place expansion joints at 50 foot intervals and radius points.
- B. Place contraction joints at 10 foot intervals. Align curb, gutter, and sidewalk joints.
- C. Place joint filler between paving components and building or other appurtenances. Recess top of filler 1/8 inch.
- D. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.9 FINISHING

- A. Curbs and Gutters: Light broom parallel to gutter.
- B. Inclined Vehicular Ramps: Broomed perpendicular to slope.

- C. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.
- G. Accessible Routes: Surfaces shall be stable, firm, and slip resistant. Slab Finish Tolerances – Unless otherwise called out in the contract documents, finishes shall be true planes within 3/16 inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction. Maximum variation in elevation for a level slab shall not exceed quarter of an inch (1/4") over the entire slab.

3.10 JOINT SEALING

- A. Separate pavement from vertical surfaces with 1/2-inch-thick joint filler.
- B. Place joint filler in pavement pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- C. Extend joint filler from bottom of pavement to within 1/8 inch of finished surface.

3.11 TOLERANCES

- A. Section 01 45 00 – Quality Control.
- B. General Site Concrete:
 - 1. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.
 - 2. Maximum Variation from True Position: 1/4 inch.
- C. Accessible Routes: Variation from design elevation shall not exceed 1/4 inch; however, accessible routes shall not exceed maximum ADA allowable slopes. Contractor shall remove and replace any and all portions of the accessible route exceeding maximum ADA allowable slopes.

3.12 CURB AND GUTTER SECTIONS

- A. Shall be constructed as shown on the drawings and in accordance with applicable details. Subgrade below the curb and gutter sections shall be compacted to 98% density. Curb and gutter sections shall be constructed in sections of uniform length and shall not exceed 10 feet or be less than 5 feet in length. Straight edging along the edge of gutter and top of curb shall conform to those requirements for adjacent pavement but with no irregularities to exceed 1/4 inch in 10 feet.
- B. If slip-form or extruded construction is used, contraction joints shall be located at intervals no greater than 10 feet by sawing hardened concrete at the proper time. Joints shall be sawed between 4 to 8 hours after placing of concrete. Depth of saw-cut shall be one-fourth thickness of the curb and gutter section. The maximum width of cut shall be 1/4 inch. All joints shall be sawed in succession.
- C. Half inch thick premolded expansion joints shall be installed completely through the joints at spaces not to exceed 50 feet and at all structures and walks.
- D. When curb forms are removed, backfill shall be immediately placed, tamped, and graded behind the new curb to help protect line and grade. Machine methods of placing and forming may be used provided finished product is satisfactory to the Engineer.

- E. Contractor shall place a concrete depressed curb at all driveways shown on the drawings or where a driveway is in use.
- F. Cracked curb and gutter will not be accepted.

3.13 CONCRETE CURING

- A. Immediately after placement and finishing, concrete shall be protected from moisture loss for not less than 7 days. For surfaces not in contact with forms, curing compound shall be uniformly applied after water sheen disappears from the concrete. Formed surfaces shall receive an application of curing compound if forms are removed during the 7 day curing period. Curing compound shall not be applied during rainfall.
- B. Curing compound shall be applied under pressure at the rate of 1 gallon per 150 square feet by mechanical sprayers. The spraying equipment shall be of the fully atomizing type. At time of use, curing compound shall be thoroughly mixed with a fugitive dye uniformly dispersed throughout the sprayer. Care shall be taken to prevent application to joints where concrete bond is required, to reinforcement steel and to joints where joint sealer is to be placed. The compound shall form a uniform continuous coherent film which will not crack or peel and shall be free from pinholes and other imperfections. Concrete surfaces subjected to heavy rainfall within 3 hours after curing compound has been applied shall be resprayed by above method and at above coverage at no additional expense to the Owner.
- C. No pedestrian or vehicular traffic shall be allowed over the surface for seven days unless surface is protected by planks, plywood, or sand. Protection shall not be placed until at least 12 hours after application of the curing compound.
- D. Protect concrete by suitable methods to prevent damage by mechanical injury or excessively hot or cold temperatures.

3.14 FIELD QUALITY CONTROL

- A. Field quality control tests specified herein will be conducted by the Owner's Independent Testing Laboratory at no cost to Contractor in accordance with Section 01 45 23. Contractor shall perform additional testing as considered necessary by the Contractor for assurance of quality control. Retesting required as a result of failed initial tests shall be at the Contractor's expense.
- B. Field testing, frequency, and methods may vary as determined by and between the Owner and Owner's Testing Laboratory.
- C. Review the Contractor's proposal materials and mix design for conformance with specifications.
- D. Perform testing in accordance with ACI 301 and testing standards listed herein.
- E. Strength Tests
 - 1. Secure composite samples in accordance with ASTM C 172. Sample at regularly spaced intervals from middle portion of the batch. Sampling time shall not exceed 15 minutes.

2. Mold and cure specimens in accordance with ASTM C31.
 - a. A minimum of four concrete test cylinders shall be taken for every 50 cubic yards or less of each class of concrete placed each day and not less than once for each 5,000 square feet of paved area.
 - b. During initial 24 hours (plus or minus 8 hours) after molding, the temperature immediately adjacent to specimens shall be maintained in a range of 60 to 80 degrees F. Control loss of moisture from specimens by shielding from direct rays of the sun and from radiant heating devices.
 - c. Specimens transported prior to 48 hours after molding shall not be demolded, but shall continue initial curing at 60 – 80 degrees F until time for testing.
 - d. Specimens transported after 48 hours age shall be demolded in 24 hours (plus or minus 8 hours). Curing shall then be continued but in saturated limewater at 73.4 degrees (plus or minus 3 degrees F) until the time of testing.
 - e. Wet cure cylinders under controlled temperature until testing.
3. Test cylinders in accordance with ASTM C 39.
 - a. Date test cylinders and number consecutively. Give each cylinder of each set an identifying letter (i.e. A, B, C, and D). Prepare a sketch of the building plan for each test set identifying location of placed concrete.
 - b. Test on cylinder (A) at 7 days for information. If compressive strength of concrete sample is equal to or above the 28 day specified strength, test another cylinder (B) at 7 days. The average of breaks shall constitute compressive strength of concrete sample.
 - c. Test two cylinders (B and C) at 28 days and the average of breaks shall constitute compressive strength of concrete sample.
 - d. Retain fourth cylinder (D) for further testing if needed, but do not retain cylinder more than 60 days.
4. Evaluation and Acceptance
 - a. Strength level of concrete will be considered satisfactory if the average of all sets of three consecutive strength tests equal or exceed specified strength and no individual strength test (average of two cylinders) results are below specified compressive strength test by more than 500 psi.
 - b. Completed concrete work will not be accepted unless requirements of ACI 301, have been met, including dimensional tolerances, appearance, and strength of structure.

3.15 PROTECTION

- A. Immediately after placement, protect pavement from premature moisture loss, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit vehicular traffic over pavement or curb for seven days minimum after finishing. Do not permit pedestrian traffic over concrete for three days.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Sections:
 - 1. Division 31 Section 310000 Earthwork.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.
- D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

- D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I.
- B. Normal-Weight Aggregates: ASTM C 33, graded.
 - 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M.

2.4 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.6 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.8 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

- B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
- D. Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: See Structural Drawings.
 - 2. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
 - 3. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.9 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-third of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- C. Cold-Weather Placement: Comply with ACI 306.1.
- D. Hot-Weather Placement: Comply with ACI 301.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces to receive trowel finish.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces exposed to view.
 2. Finish and measure surface so gap at any point between concrete surface and an unveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
- D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION

SECTION 042000 - UNIT MASONRY

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 unit masonry assemblies consisting of the following:
 - 1. Concrete masonry units (CMUs).
 - 2. Face brick.
 - 3. Mortar and grout.
 - 4. Reinforcing steel.
 - 5. Masonry joint reinforcement.
 - 6. Ties and anchors.
 - 7. Embedded flashing.
 - 8. Miscellaneous masonry accessories.
- B. Related Sections include the following:
 - 1. Division 07 Section "Bituminous Dampproofing" for dampproofing of concrete block backup.

1.3 DEFINITIONS

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths (f'_m) at 28 days.
- B. Determine net-area compressive strength (f'_m) of masonry by testing masonry prisms according to ASTM C 1314.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
 - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

- C. Samples for Verification: For each type and color of the following:
 - 1. Face brick, in the form of straps of five or more bricks.
 - 2. Special brick shapes.
 - 3. Accessories embedded in masonry.

- D. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
 - 1. Masonry units.
 - 2. Lightweight aggregates, certifying expanded shale, clay or slate produced by rotary kiln process, conforming to ASTM C 331 and ASTM C 330.
 - 3. Cementitious materials. Include brand, type, and name of manufacturer.
 - 4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 5. Grout mixes. Include description of type and proportions of ingredients.
 - 6. Reinforcing bars.
 - 7. Joint reinforcement.
 - 8. Anchors, ties, and metal accessories.

- E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports, per ASTM C 780, for mortar mixes required to comply with property specification.
 - 2. Include test reports, per ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

- F. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.6 QUALITY ASSURANCE

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
 - 2. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows:
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. Concrete Masonry Units: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
 - 2. Density Classification: Lightweight, unless otherwise indicated.
 - a. Provide lightweight units free of organic impurities that will cause rusting, staining and pop outs, and free of combustible matter. The use of coal cinder aggregate/bottom ash, or similar waste products will not be allowed.
 - b. For lightweight units, use expanded shale, clay or slate aggregate, produced by the rotary kiln process, conforming to ASTM C 331 and graded to ensure constant texture.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 - 4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

2.3 BRICK

- A. General: Provide shapes indicated and as follows:
 - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - 3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - 4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Face Brick: ASTM C 216, Grade SW, Type FBS.
 - 1. Initial Rate of Absorption: Less than 20 g/30 sq. in. per minute when tested per ASTM C 67.
 - 2. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 - 3. Size (Utility): 3-5/8 inches wide by 3-5/8 inches high by 11-5/8 inches long.
 - 4. Color: Waccamaw "Old Lynchburg".

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.
- B. Hydrated Lime: ASTM C 207, Type S.

- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
- D. Mortar Cement: ASTM C 1329.
- E. Aggregate for Mortar: ASTM C 144.
- F. Aggregate for Grout: ASTM C 404.
- G. Colored Cement Product: Packaged blend made from mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Colored Mortar Cement:
 - 1) Cemex – Woodhaven #312A (Basis of Design).
 - 2) Lafarge North America Inc.
 - 3) Holcim, Inc.
 - 2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
- H. Water: Potable.

2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Interior Walls: Hot-dip galvanized, carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized, carbon steel.
 - 3. Wire Size for Side Rods: W1.7 or 0.148-inch diameter.
 - 4. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter.
 - 5. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.
 - 6. Shall meet the Seismic Performing Requirements for seismic design Category "D" per ACI 530 latest addition.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.
- D. Masonry Joint Reinforcement for Multiwythe Masonry:
 - 1. Ladder type with 1 side rod at each face shell of hollow masonry units more than 4 inches wide, plus 2 side rods at each wythe of masonry 4 inches wide or less.
- E. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- diameter, hot-dip galvanized, carbon-steel continuous wire.
 - 1. Shall meet the Seismic Performing Requirements for seismic design Category "D" per ACI 530 latest addition.

2.6 TIES AND ANCHORS, GENERAL

- A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.
- B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M, G60, commercial-quality, steel sheet zinc coated by hot-dip process on continuous lines before fabrication.
- D. Steel Sheet, Galvanized after Fabrication: ASTM A 366/A 366M cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153.
- E. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.7 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
 - 1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch thick.
- B. Flashing Termination Bars: Stainless steel, 22 ga., with mounting holes spaced 16 inches o.c.
- C. Adhesives, Primers, and Tapes for Flashings: Flashing manufacturer's standard products or products recommended by the flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
 - b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
 - c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
 - d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

2.9 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned. Masonry cleaners must be **approved in writing** by both the brick and mortar manufacturers prior to cleaning.
1. Manufacturers: Subject to compliance with requirements, provide appropriate products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. ProSoCo., Inc.
 - c. EaCo Chem, Inc.

2.10 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
 2. Use portland cement-lime or mortar cement mortar unless otherwise indicated.
 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
1. For masonry below grade, in contact with earth, and where indicated, use Type M.
 2. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; use Type S.
 3. For masonry veneer, for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 5 of ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.
 3. All reinforced cells shall be filled with 3,000 psi grout, at a minimum.
 4. All lintels shall be filled with 3,000 psi grout.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity walls and other masonry construction to full thickness shown. Build singlewythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.
- F. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
 - 3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.
- B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
 - 3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes, including epoxy paint.

3.6 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.

- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in- plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
 - 4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.
- C. Form expansion joints in brick as follows:
 - 1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
 - 2. Build flanges of factory-fabricated, expansion-joint units into masonry.
 - 3. Build in compressible joint fillers where indicated.
 - 4. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."
- D. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.8 LINTELS

- A. Provide concrete or masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.9 FLASHING

- A. General: Install embedded flashing in masonry obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

F. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.12 REPAIRING AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 - 6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.13 MASONRY WASTE DISPOSAL

- A. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes structural steel and grout.

1.2 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.
 - 2. Use LRFD or ASD; data are given at service-load level.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Mill test reports for structural steel, including chemical and physical properties.
- C. Source quality-control reports.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

- C. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 572/A 572M, Grade 50.
- B. Channels, Angles: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M, unless noted otherwise.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
- B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- C. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
 - 1. Finish: Plain.
- D. Threaded Rods: ASTM A 36/A 36M.
 - 1. Finish: Plain.

2.3 PRIMER

- A. Primer: Comply with Division 09 painting Sections.
- B. Primer: SSPC-Paint 25, Type I or Type II, zinc oxide, alkyd, linseed oil primer.
- C. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.4 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
- B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedment's for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base, Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION

SECTION 055000 - METAL FABRICATIONS

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:
 - 1. Miscellaneous steel framing and supports.

1.3 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Paint products.
 - 2. Metal nosings.
 - 3. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Verification: For each type and finish of extruded nosing.
- D. Welding certificates.
- E. Qualification Data: For professional engineer.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.2, "Structural Welding Code--Aluminum."
 - 3. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.

1.7 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Steel Tubing: ASTM A 500, cold-formed steel tubing.

- E. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- F. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.

2.3 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
- D. Anchor Bolts: ASTM F 1554, Grade 36.
 - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Lag Bolts: ASME B18.2.1.
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1.
- J. Lock Washers: Helical, spring type, ASME B18.21.1.
- K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Prime interior miscellaneous framing and supports with universal shop primer.
- E. Prime exterior miscellaneous framing and supports with epoxy zinc primer.

2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.9 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Epoxy Zinc Primer: SSPC- SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.10 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 061000 - ROUGH CARPENTRY

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:
 - 1. Framing with dimension lumber.
 - 2. Framing with timber.
 - 3. Framing with engineered wood products.
 - 4. Wood blocking, cants, and nailers.
- B. Related Sections include the following:
 - 1. Division 06 Section "Sheathing."
 - 2. Division 06 Section "Shop-Fabricated Wood Trusses."

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 6 inches nominal in least dimension.
- C. Timber: Lumber of 6 inches nominal or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NLGA: National Lumber Grades Authority.
 - 2. SPIB: The Southern Pine Inspection Bureau.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

- B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - 1. Wood-preservative-treated wood.
 - 2. Engineered wood products.
 - 3. Power-driven fasteners.
 - 4. Powder-actuated fasteners.
 - 5. Expansion anchors.
 - 6. Metal framing anchors.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece. In DOC PS 20, dressed sizes of green lumber are larger than dry lumber.
 - 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA C2.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

2.3 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 19 percent.
- B. Non-Load-Bearing Interior Partitions: Construction or No. 2.
- C. Exterior and Load-Bearing Walls: No.1grade and any of the following species:
 - 1. Spruce-pine-fir; NLGA.
- D. Ceiling Joists (Non-Load-Bearing): Construction or No. 2 grade of any species.
- E. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade and any of the following species:
 - 1. Southern pine; SPIB.

2.4 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Boise Cascade Corporation.
 - b. Finnforest USA.

- c. Georgia-Pacific.
 - d. Louisiana-Pacific Corporation.
 - e. Weldwood of Canada Limited; Subsidiary of International Paper Corporation.
 - f. Weyerhaeuser Company.
- 2. Extreme Fiber Stress in Bending, Edgewise: 2900 psi.
 - 3. Modulus of Elasticity, Edgewise: 2,000,000 psi.
- B. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Weyerhaeuser Company.
 - 2. Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal-depth members.
 - 3. Modulus of Elasticity, Edgewise: 2,200,000 psi.

2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
- 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.
 - 6. Grounds.
 - 7. Utility shelving.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content and any of the following species:
- 1. Mixed southern pine; SPIB.
 - 2. Spruce-pine-fir; NLGA.
- C. For exposed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
- 1. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
- 1. Mixed southern pine, No. 2 grade; SPIB.
 - 2. Spruce-pine-fir (south) or spruce-pine-fir, Construction or 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

- E. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- F. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.6 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
- H. Screw Anchors: Anchors indicated on drawings as "LDT" anchors to be hot-dip galvanized or stainless steel, one piece heavy duty anchor with hex head. Use one of the following products:
 - 1. ITW Buidex – Ramset/Redhead LDT Anchor
 - 2. Simpson Titon HD Anchor
 - 3. Powers Wedge Anchor

2.8 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Alpine Engineered Products, Inc.
 2. Cleveland Steel Specialty Co.
 3. Harlen Metal Products, Inc.
 4. KC Metals Products, Inc.
 5. Simpson Strong-Tie Co., Inc.
 6. Southeastern Metals Manufacturing Co., Inc.
 7. USP Structural Connectors.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
- D. Joist Hangers: U-shaped joist hangers with 2-inch- long seat and 1-1/4-inch- wide nailing flanges at least 85 percent of joist depth.
1. Thickness: 0.062 inch.
- E. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
1. Strap Width: 1-1/2 inches.
 2. Thickness: 0.062 inch.
- F. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.
- G. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.
- H. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. Tie fastens to side of rafter or truss, face of top plates, and side of stud below.
- I. Rafter Tie-Downs (Hurricane or Seismic Ties): As indicated
- J. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.
1. Bolt Diameter: As indicated
 2. Width: As indicated
 3. Body Thickness: As indicated
 4. Base Reinforcement Thickness: As indicated

2.9 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- E. Do not splice structural members between supports, unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

- J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
- K. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with indicated fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
 - 2. Use finishing nails, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction, unless otherwise indicated.
 - 1. For exterior walls, provide 2-by-6-inch nominal size wood studs spaced 16 inches o.c., unless otherwise indicated.
 - 2. For interior partitions and walls, provide 2-by-4-inch nominal size wood studs spaced 16 inches o.c., unless otherwise indicated.
 - 3. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.

- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
 - 2. For load-bearing walls, provide jamb studs as indicated. Provide headers of depth indicated.

3.5 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
 - 1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal- size or 2-by-4-inch nominal- size stringers spaced 48 inches o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 - 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 - 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 2-by-6-inch nominal size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.

3.6 TIMBER FRAMING INSTALLATION

- A. Install timber with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members, unless otherwise indicated; tie together over supports as indicated if not continuous.
- B. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide 1/2-inch air space at sides and ends of wood members.
- C. Install wood posts using metal anchors indicated.
- D. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.7 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 061600 - SHEATHING

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:
 - 1. Sheathing.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for plywood backing panels.
 - 2. Division 07 Section "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preserved treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
- B. Oriented Strand Board: DOC PS 2.

- C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- D. Factory mark panels to indicate compliance with applicable standard.

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPA C9.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing. Treat roof and wall sheathing (interior and exterior) at tower.

2.3 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior, Structural I sheathing.
 - 1. Span Rating: Not less than 32/16.
 - 2. Nominal Thickness: Not less than ½-inch.
- B. Oriented-Strand-Board Wall Sheathing: Exterior, Structural I sheathing.
 - 1. Span Rating: Not less than 32/16.
 - 2. Nominal Thickness: Not less than ½-inch.

2.4 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing.
 - 1. Span Rating: Not less than 32/16.
 - 2. Nominal Thickness: As indicated on Drawings.
- B. Oriented-Strand-Board Roof Sheathing: Exterior, Structural I sheathing.
 - 1. Span Rating: Not less than 32/16.
 - 2. Nominal Thickness: As indicated on Drawings.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. For roof and wall sheathing at tower, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.

2.6 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
 - 1. Use adhesives that have a VOC content of 50g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated and as a minimum, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30S, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Roof and Wall Sheathing:

- a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
- b. Screw to cold-formed metal framing.
- c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION

SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

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. Section Includes:

1. Wood roof trusses.
2. Wood girder trusses.
3. Wood truss bracing.
4. Metal truss accessories.

- B. Related Requirements:

1. Division 06 Section "Sheathing" for roof sheathing.

1.3 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.

- B. Shop Drawings: Show fabrication and installation details for trusses.

1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.
3. Indicate locations, sizes, connections, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
5. Show splice details and bearing details.

- C. Delegated-Design Submittal: Metal-plate-connected wood trusses shall comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For metal connector-plate manufacturer, professional engineer and fabricator.
- B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.
- C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss fabricating firm.
- D. Evaluation Reports: For the following, from ICC-ES:
 - 1. Metal-plate connectors.
 - 2. Metal truss accessories.

1.6 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
 - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer in the State of South Carolina.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
 - 1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
 - 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
 - 3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
 - 1. Design Loads: As indicated.
 - 2. Maximum Deflection Under Design Loads:
 - a. Roof Trusses: Vertical deflection of 1/600 of span for Total Load. Vertical deflection of 1/480 of span for Live Load.
- C. Comply with applicable requirements and recommendations of the following publications:
 - 1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
 - 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 - 3. TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Provide dressed lumber, S4S.
 - 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- B. Minimum Chord Size for Roof Trusses: 2 by 6 inches nominal for top chords, 2 by 8 inches nominal for bottom chords.
- C. Minimum Specific Gravity for Top Chords: 0.50.
- D. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section "Rough Carpentry"

2.3 METAL CONNECTOR PLATES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alpine Engineered Products, Inc.; an ITW company.
 - 2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
 - 3. Jager Building Systems, Inc.; a Tembec/SGF Rexfor company.
 - 4. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
- B. Source Limitations: Obtain metal connector plates from single manufacturer.
- C. General: Fabricate connector plates to comply with TPI 1.
- D. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.
 - 1. Use for interior locations unless otherwise indicated.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
 - 2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel].
- B. Nails, Brads, and Staples: ASTM F 1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Phoenix Metal Products, Inc.
 - 2. Simpson Strong-Tie Co., Inc.
 - 3. USP Structural Connectors.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.

2.7 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

2.8 SOURCE QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
 - 1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
 - 2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.
- B. Correct deficiencies in Work that special inspections indicate does not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

- F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
 - 1. Anchor trusses to girder trusses as indicated in shop drawings.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Division 06 Section "Rough Carpentry."
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- L. Replace wood trusses that are damaged or do not meet requirements.
 - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- C. Protective Coating: Clean and prepare exposed surfaces of metal connector plates. Brush apply primer, when part of coating system, and one coat of protective coating.
 - 1. Apply materials to provide minimum dry film thickness recommended by coating system manufacturer.

END OF SECTION

SECTION 064013 - EXTERIOR ARCHITECTURAL WOODWORK

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:
 - 1. Exterior standing and running trim.
 - 2. Exterior frames and jambs.
 - 3. Exterior timber brackets.
 - 4. Exterior railings.
 - 5. Exterior ornamental work.
 - 6. Shop priming exterior woodwork.

1.3 SUBMITTALS

- A. Product Data: For each type of product and process indicated and incorporated into items of exterior architectural woodwork during fabrication, finishing, and installation.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components. Provide shop drawings for entry wood and extended rafters.
 - 1. Show details full size.
 - 2. Show locations and sizes of blocking and nailers, including concealed blocking and reinforcement specified in other Sections.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of products.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of exterior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1.5 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation of exterior woodwork only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.6 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, reinforcements, and other related units of Work specified in other Sections to ensure that exterior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
 - 1. Lumber: DOC PS 20.
 - 2. Softwood Plywood: DOC PS 1, Exterior.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood) and the following:
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - 2. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.
 - 3. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
- B. Extent of Treatment: Treat exterior architectural woodwork by pressure process, where indicated.

2.3 INSTALLATION MATERIALS

- A. Blocking, Shims, and Nailers: Softwood or hardwood lumber, pressure-preservative treated, fire-retardant treated where indicated, kiln dried to less than 15 percent moisture content.
- B. Nails and Screws: Hot-dip galvanized or stainless steel.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts, unless otherwise indicated. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.4 FABRICATION, GENERAL

- A. Wood Moisture Content: 15 to 19 percent.
- B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
 - 2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
- C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- D. Shop cut openings, to maximum extent possible, to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and seal with a water-resistant coating suitable for exterior applications.

2.5 EXTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Grade: Custom.
- B. Backout or groove backs of flat trim members, and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- C. Wood Species: Southern Yellow Pine, pressure preservative treated.
 - 1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches wide.

2.6 EXTERIOR FRAMES AND JAMBS FOR OPAQUE FINISH

- A. Grade: Custom.
- B. Wood Species: Southern Yellow Pine, pressure preservative treated.
 - 1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches wide.

2.7 EXTERIOR RAILINGS

A. Dimension Lumber Railing Members: No. 1 grade, of the following species:

1. Southern pine; SPIB, pressure preservative treated.

A. Railing Boards: Any of the following species and grades:

1. Southern pine, B & B finish; SPIB, pressure preservative treated.

2.8 EXTERIOR ORNAMENTAL WORK FOR OPAQUE FINISH

A. Exterior ornamental work for opaque finish includes, but is not limited to, the following:

1. Rafter extensions.
2. Outriggers.
3. Timber brackets.

B. Grade: Custom.

C. Wood Species: Southern Yellow Pine.

2.9 SHOP PRIMING

A. Woodwork for Opaque Finish: Shop prime woodwork for paint finish with one coat of wood primer specified in Division 09 painting Sections.

B. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Back priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.

C. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.

3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with same grade specified in Part 2 for type of woodwork involved.
- B. Install woodwork true and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
- D. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWWPA M4.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- G. Railings: Secure wall rails with metal brackets. Fasten freestanding railings to newel posts and to trim at walls with countersunk-head wood screws or rail bolts and glue.
- H. Complete finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail and screw holes with matching filler where exposed.
- I. Refer to Division 09 Sections for final finishing of installed architectural woodwork.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; replace woodwork where not possible to repair. Adjust joinery for uniform appearance.
- B. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

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:
 - 1. Stainless steel countertops.
 - 2. Plywood siding for ceiling panels.
 - 3. Standing and running trim.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, including finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for items installed in architectural woodwork.
- C. Samples for Verification:
 - 1. Panel products, with 1/2 of exposed surface finished; 8 by 10 inches for plywood panels.

1.4 QUALITY ASSURANCE

- A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
 - 1. Softwood Plywood: DOC PS 1, Medium Density Overlay.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 316L.

2.2 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Wood Glues: 30 g/L.
 - 2. Contact Adhesive: 250 g/L.

2.3 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide Premium grade interior woodwork complying with the referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

- C. Complete fabrication, including assembly and finishing, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

2.4 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Grade: Custom.
- B. Wood Species: Poplar, any close-grained hardwood or Radiata Pine.
- C. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

2.5 STAINLESS STEEL COUNTERTOPS

- A. Stainless-Steel Countertops: Made from stainless-steel sheet, not less than 0.062-inch nominal thickness, with No. 4 satin finish.
 - 1. Extend top down 1 inch at edges with a 1/2-inch return flange under frame. Apply heavy coating of heat-resistant, sound-deadening mastic to undersurface.
 - 2. Punch holes for service fittings at factory.
 - 3. Weld shop-made joints.
 - 4. Where field-made joints are required, provide hairline butt-joints mechanically bolted through continuous channels welded to underside at edges of joined ends. Keep field jointing to a minimum.
 - 5. After fabricating and welding, grind surfaces smooth and polish as needed to produce uniform, directionally textured finish with no evidence of welds and free of cross scratches. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.

2.6 PLYWOOD SIDING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Georgia-Pacific Corp.
 - 2. Hardel Mutual Plywood Corporation.
 - 3. Hood Industries.
 - 4. K Ply Inc.
 - 5. Roseburg Forest Products Co.
 - 6. SDS Lumber Company; Bingen Plywood Division.
 - 7. Swanson Group; Plywood Division.
 - 8. Textured Forest Products, Inc.
- B. Plywood Type: APA-rated siding in panel sizes indicated.
 - 1. Face Grade: 303-NR.
- C. Thickness: 19/32 inch.
- D. Face Species: Southern pine.

- E. Patterns and Texture: Texture 1-11; grooves 4 inches o.c.
 - 1. Vertical Plywood: Smooth plywood with vertical battens.
 - 2. Horizontal Plywood: Texture 1-11; grooves 4 inches o.c. on underside of joists; smooth plywood above joists.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.

3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- E. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Caulk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
- F. Plywood Siding: Install panels with edges over framing or blocking. Nail at 6 inches o.c. at panel perimeter and 12 inches o.c. at intermediate supports unless manufacturer recommends closer spacing. Leave 1/16-inch gap between adjacent panels and 1/8-inch gap at perimeter, openings, and horizontal joints unless otherwise recommended by panel manufacturer.
 - 1. Apply battens and corner trim as indicated. Countersink nail heads, fill flush, and sand filler.
 - 2. Conceal fasteners to greatest practical extent by countersinking and filling, by placing in grooves of siding pattern or by concealing with applied trim or battens as detailed. Do not nail through overlapping pieces.

- G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean woodwork on exposed surfaces.

END OF SECTION

SECTION 071113 - BITUMINOUS DAMPPROOFING

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 cold-applied, emulsified-asphalt dampproofing applied to the following surfaces:
 - 1. Exterior, below-finish floor surfaces of masonry foundation walls.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, and coverage or thickness.
- B. Material Certificates: For each product, signed by manufacturers.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has thoroughly cured.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cold-Applied, Emulsified-Asphalt Dampproofing:

- a. Euclid Chemical Company (The).
- b. Meadows, W. R., Inc. – Sealmastic.
- c. Sonneborn, Div. of ChemRex, Inc.
- d. Tamms Industries.

2.2 BITUMINOUS DAMPPROOFING

A. Cold-Applied, Emulsified-Asphalt Dampproofing:

- 1. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.
 - 1. Begin dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.
 - 1. Apply additional coats if recommended by manufacturer or required to achieve coverages indicated.
 - 2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.
- B. Apply dampproofing to footings and foundation walls where opposite side of wall faces building interior, whether indicated or not.
 - 1. Apply from finished-grade line to top of footing, extend over top of footing, and down a minimum of 6 inches over outside face of footing.
 - 2. Extend 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 3. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat required for embedding fabric is in addition to other coats required.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Install dampproofing in accordance with manufacturer's written instructions.

3.5 CLEANING

- A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION 071113

SECTION 072100 - THERMAL INSULATION

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. Section Includes:
 - 1. Glass-fiber blanket insulation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

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

1. CertainTeed Corporation.
 2. Johns Manville.
 3. Knauf Insulation.
 4. Owens Corning.
- B. Kraft faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass-fiber-reinforced asphalt shingles.
2. Underlayment materials.
4. accessories.

B. Related Requirements:

1. Section 077200 "Roof Accessories" for roof ventilators.

1.2 DEFINITIONS

- ##### A. Roofing Terminology: See ASTM D1079 for definitions of terms related to roofing Work in this Section.

1.3 PREINSTALLATION MEETINGS

- ##### A. Preinstallation Conference: Conduct conference at Project site .

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Asphalt shingles.
2. Underlayment materials.
3. Ridge vents.
4. Asphalt roofing cement.
5. Elastomeric flashing sealant.

B. Samples for Initial Selection:

1. For each type of asphalt shingle indicated.
2. For each type of accessory involving color selection.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

- ##### B. Product Test Reports: For each type of asphalt shingle and underlayment product indicated, for tests performed by manufacturer.

C. Sample Warranty: For manufacturer's materials warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For asphalt shingles to include in maintenance manuals.
- B. Materials warranties.
- C. Roofing Installer's warranty.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Asphalt Shingles: 100 sq. ft. of each type and in each color and blend, in unbroken bundles.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture in accordance with manufacturer's written instructions.
- B. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double-stack rolls.
- C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing Work is not in progress.
- D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with installation only when existing and forecasted weather conditions permit product installation and related Work to be performed in accordance with manufacturer's written instructions and warranty requirements.

1. Install self-adhering, polymer-modified bitumen sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.11 WARRANTY

- A. Materials Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.

1. Provide GAF Lifetime warranty Roof System and four (4) qualifying manufacturers accessories and 15-year wind proven limited warranty.

2. Failures include, but are not limited to, the following:

a. Manufacturing defects.

3. Materials Warranty Period: life time years from date of Substantial Completion, prorated, with first 10 years non-prorated.

4. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to for 15 years from date of Substantial Completion.
 5. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 25 years from date of Substantial Completion.
 6. Workmanship Warranty Period: Two years from date of Substantial Completion.
- B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each type of product from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
- B. Wind Resistance: Provide asphalt shingles that comply with requirements of ASTM D3161/D3161M, Class F, and with ASTM D7158/D7158M, Class H.

2.3 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Three-Tab-Strip Asphalt Shingles: ASTM D3462/D3462M; glass-fiber reinforced, mineral-granule surfaced, and self-sealing; with tabs regularly spaced.

1. Basis-of-Design Product: Subject to compliance with requirements, provide GAF; High Definition HDZ or comparable product by one of the following:
 - a. CertainTeed; SAINT-GOBAIN.
 - b. IKO Industries Inc.
 - c. Owens Corning.
 2. Algae Resistance: Granules resist algae discoloration.
 3. Color and Blends: As selected by Architect from manufacturer's full range.
- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.4 UNDERLAYMENT MATERIALS

- A. Synthetic Underlayment: UV-resistant polypropylene, polyolefin, or polyethylene polymer fabric with surface coatings or treatments to improve traction underfoot and abrasion resistance; evaluated and documented to be suitable for use as a roof underlayment under applicable codes by a testing and inspecting agency acceptable to authorities having jurisdiction.
1. Basis-of-Design Product: Subject to compliance with requirements, provide GAF; Timberline HDZ or comparable product by one of the following:

- a. Atlas Polyiso Roof and Wall Insulation.
- b. CertainTeed; SAINT-GOBAIN.
- c. Owens Corning.

2.5 RIDGE VENTS

- A. Rigid Ridge Vent: Manufacturer's standard, rigid-section, high-density, UV-stabilized plastic ridge vent for use under ridge shingles.

1. Basis-of-Design Product: Subject to compliance with requirements, provide GAF; or comparable product by one of the following:

- a. CertainTeed; SAINT-GOBAIN.
- b. Owens Corning.
- c. GAF.

2.6 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D4586/D4586M Type II, asbestos free.

- B. Roofing Nails: ASTM F1667, aluminum, stainless steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- diameter, sharp-pointed, with a 3/8- to 7/16-inch-diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through sheathing less than 3/4 inch thick.

1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

- C. Underlayment Nails: Aluminum, stainless steel, or hot-dip galvanized-steel wire nails with low-profile metal or plastic caps, 1-inch- minimum diameter.

1. Provide with minimum 0.0134-inch- thick metal cap, 0.010-inch- thick power-driven metal cap, or 0.035-inch- thick plastic cap; and with minimum 0.083-inch- thick ring shank or 0.091-inch-thick smooth shank of length to penetrate at least 3/4 inch into roof sheathing or to penetrate through roof sheathing less than 3/4 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.

2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provisions have been made for flashings and penetrations through asphalt shingles.

3. Verify that vent stacks and other penetrations through roofing are installed and securely fastened.

- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT MATERIALS

- A. Comply with asphalt shingle and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.
- B. Asphalt-Saturated Felt: Install on roof deck parallel with and starting at eaves and fasten with roofing nails.
 - 1. Single-Layer Installation:
 - a. Lap sides a minimum of 4 inches over underlying course.
 - b. Lap ends a minimum of 4 inches.
 - c. Stagger end laps between succeeding courses at least 72 inches.
 - 2. Install felt underlayment on roof deck not covered by self-adhering, polymer-modified bitumen sheet unless otherwise specified in this Section or indicated on Drawings.
 - a. Lap sides of felt over self-adhering sheet not less than 4 inches in direction that sheds water.
 - b. Lap ends of felt not less than 6 inches over self-adhering sheet.
 - 3. Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.
- C. Synthetic Underlayment:
 - 1. Install on roof deck parallel with and starting at the eaves.
 - a. Lap sides and ends as recommended in writing by manufacturer, but not less than 4 inches for side laps and 6 inches for end laps.
 - b. Stagger end laps between succeeding courses at interval recommended in writing by manufacturer, but not less than 72 inches.
 - c. Fasten with underlayment nails in accordance with manufacturer's written instructions.
 - d. Cover underlayment within period recommended in writing by manufacturer.
 - 2. Install in single layer on roofs sloped at 4:12 and greater.
 - 3. Install synthetic underlayment on roof deck not covered by self-adhering, polymer-modified bitumen sheet unless otherwise specified in this Section or indicated on Drawings.
 - a. Lap sides of underlayment over self-adhering sheet not less than 4 inches in direction to shed water.
 - b. Lap ends of underlayment not less than 6 inches over self-adhering sheet.
 - 4. Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.
- D. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free, on roof deck.
 - 1. Comply with low-temperature installation restrictions of underlayment manufacturer.
 - 2. Install lapped in direction that sheds water.
 - a. Lap sides not less than 4 inches.
 - b. Lap ends not less than 6 inches, staggered 24 inches between succeeding courses.
 - c. Roll laps with roller.
 - 3. Eaves: Extend from edges of eaves 24 inches beyond interior face of exterior wall.
 - 4. Rakes: Extend from edges of rakes 24 inches beyond interior face of exterior wall.
 - 5. Valleys: Extend from lowest to highest point 18 inches on each side of centerline.
 - 6. Roof-Slope Transitions: Extend 18 inches on each roof slope.
 - 7. Cover underlayment within seven days.

3.3 INSTALLATION OF ASPHALT SHINGLES

- A. Install asphalt shingles in accordance with manufacturer's written instructions and recommendations in ARMA's "Asphalt Roofing Residential Manual - Design and Application Methods" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."

- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 7 inches wide with self-sealing strip face up at roof edge.
 - 1. Extend asphalt shingles 1/2 inch over fasciae at eaves and rakes.
 - 2. Install starter strip along rake edge.
- C. Install first and remaining courses of laminated asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install first and remaining courses of three-tab-strip asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- E. Fasten asphalt shingle strips with a minimum of six roofing nails, but not less than the number indicated in manufacturer's written instructions for roof slope and design wind speed indicated on Drawings and for warranty requirements specified in this Section.
 - 1. Locate fasteners in accordance with manufacturer's written instructions.
 - 2. When ambient temperature during installation is below 50 deg F , hand seal self-sealing asphalt shingles by applying asphalt roofing cement spots between course overlaps after nailing the upper course.
- F. Closed-Cut Valleys: Extend asphalt shingle strips from one side of valley 12 inches beyond center of valley.
 - 1. Use one-piece shingle strips without joints in valley.
 - 2. Fasten with extra nail in upper end of shingle. Install asphalt shingle courses from other side of valley and cut back to a straight line 2 inches short of valley centerline.
 - 3. Trim upper concealed corners of cut-back shingle strips.
 - 4. Do not nail asphalt shingles within 6 inches of valley center.
 - 5. Set trimmed, concealed-corner asphalt shingles in a 3-inch- wide bed of asphalt roofing cement.
- H. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing-shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds.
 - 1. Fasten with roofing nails of sufficient length to penetrate sheathing.
 - 2. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION 073113

SECTION 074113 - METAL ROOF PANELS

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:
 - 1. Standing-seam metal roof panels.
 - 2. Self-adhering roof underlayment.

1.3 DEFINITIONS

- A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight roofing system.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.
- B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at the following test-pressure difference:
 - 1. Test-Pressure Difference: Positive and negative 12.0 lbf/sq. ft.
 - 2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
 - 3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.
- C. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. ft. and not more than 12.0 lbf/sq. ft.
 - 2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
 - 3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.
- D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift resistance class indicated.

- E. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and wind loads as indicated on Structural Drawings, based on testing according to ASTM E 1592.
- F. Seismic Performance: Provide metal roof panel assemblies capable of withstanding the effects of earthquake motions determined according to applicable code.
- G. Thermal Movements: Provide metal roof panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal roof panel and accessory.
 - 1. Provide information for roll-forming equipment and certified operator.
- B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Provide calculations of potential expansion and contraction of panels and indicate details to accommodate movement.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Roof Panels: 12 inches long by actual panel width. Include fasteners, clips, fascias, closures, gutters and other metal roof panel accessories at roof edge.
 - 2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
 - 3. Accessories: 12-inch- long Samples for each type of accessory.
- D. Qualification Data: For Installer.
- E. Field quality-control inspection reports.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for the following:
 - 1. Metal Roof Panels: Include reports for air infiltration, water penetration, and structural performance.
- G. Maintenance Data: For metal roof panels to include in maintenance manuals.
- H. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
 - 1. Installer's responsibilities include fabricating and installing metal roof panel assemblies and providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of data for metal roof panels, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Sole Source Responsibility for Roofing: A single Roofing Contractor shall be responsible for providing, coordinating and installing all types of roofing required for project.
- C. Source Limitations: Obtain each type of metal roof panels through one source from a single manufacturer.
- D. Preinstallation Conference: Conduct conference at Project site. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal roof panel Installer, metal roof panel manufacturer's representative, deck Installer, and installers whose work interfaces with or affects metal roof panels including installers of roof accessories.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays. Ensure that metal roof panel installation schedule will prevent water intrusion which could promote mold growth.
 - 3. Review methods and procedures related to metal roof panel installation, including manufacturer's written instructions.
 - 4. Examine deck substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 5. Review structural loading limitations of deck during and after roofing.
 - 6. Review flashings, special roof details, roof drainage, roof penetrations, and condition of other construction that will affect metal roof panels.
 - 7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
 - 8. Review temporary protection requirements for metal roof panel assembly during and after installation.
 - 9. Review roof observation and repair procedures after metal roof panel installation.
 - 10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
- B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

- D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof panels to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify locations of roof framing and roof opening dimensions by field measurements before metal roof panel fabrication and indicate measurements on Shop Drawings.

1.9 COORDINATION

- A. Coordinate installation of roof curbs and roof penetrations.
- B. Coordinate metal panel roof assemblies with rain drainage work, flashing, trim, and construction of decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal roof panel assemblies that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including rupturing, cracking, or puncturing.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: Ten years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Weathertight Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A755M.
 - 1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
 - 2. Exposed Finishes: Apply the following coating:
 - a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605, except as modified below:
 - a) Humidity Resistance: 1000 hours.
 - b) Salt-Spray Resistance: 1000 hours.
 - 3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
 - 4. Surface: Smooth finish.

2.2 MISCELLANEOUS MATERIALS

- A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating.
 - 1. Fasteners for Roof Panels: Self-drilling or self-tapping 410 stainless or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal roof panels.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
 - 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be field assembled by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and pencil ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Manufacturers:
 - a. AEP-Span.
 - b. CCG Unit of CSi.
 - c. Construction Metal Products.
 - d. Dimensional Metals, Inc.
 - e. IMETCO.
 - f. McElroy Metal, Inc. – “Maxima” (Basis of Design).
 - g. Merchant & Evans.
 - h. Metal Roofing Systems, Inc.
 - i. Metal Sales Manufacturing Corporation.
 - j. Petersen Aluminum Corporation.

2. Material: Aluminum-zinc alloy-coated steel sheet, minimum 0.024 inch thick.
 - a. Exterior Finish: Fluoropolymer.
 - b. Color: As selected by Architect from manufacturer’s full range.

3. Clips: High Floating Clip #17308 by McElroy Metal, Inc. or equal, to allow screw attachment of panels at horizontal laps without penetration of substrate and underlayment.
 - a. Material: 0.028-inch- thick, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.

4. Panel Coverage: 16 inches.
5. Panel Height: 1.5 inches minimum.
6. Uplift Rating: UL 90, or as otherwise required to withstand positive and negative wind loading pressures in accordance with International Building Code for applicable mph wind speed, as verified by structural engineer.

2.4 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: 30 to 40 mils thick minimum, consisting of slip- resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
 - b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.
 - c. Henry Company; Blueskin PE200 HT.
 - d. IMETCO; DryDek.
 - e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

2.5 ACCESSORIES

- A. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- B. Flashing and Trim: Formed from minimum 0.024-inch- thick, aluminum-zinc alloy-coated steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.
- C. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

2.6 FABRICATION

- A. General: Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
1. On-site roll forming is acceptable in order to eliminate end laps in panels. Roll forming machine must be owned, operated and maintained by manufacturer. On-site roll forming by roofing contractor using portable roll forming equipment is NOT acceptable.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Where indicated, fabricate metal roof panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal roof panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal roof panel manufacturer for application but not less than thickness of metal being secured.

2.7 FINISHES, GENERAL

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of work.
 - 1. Examine roof framing to verify that rafters and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
 - 2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Install flashings and other sheet metal to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."

3.3 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under metal roof panels. Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply over entire roof area, in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
- B. Install flashings to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."

3.4 METAL ROOF PANEL INSTALLATION, GENERAL

- A. General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations. Anchor metal roof panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Field cutting of metal roof panels by torch is not permitted.
 - 2. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels.
 - 3. Provide metal closures at peaks, rake edges, rake walls and each side of ridge caps.
 - 4. Flash and seal metal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
 - 5. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 6. Install ridge caps as metal roof panel work proceeds.
 - 7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 8. Lap metal flashing over metal roof panels to allow moisture to run over and off the material.
- B. Fasteners: Use stainless steel fasteners.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.
 - 1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.
 - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.5 FIELD-ASSEMBLED METAL ROOF PANEL INSTALLATION

- A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
 - 1. Install clips to supports with self-tapping fasteners.
 - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 - 3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.6 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - 1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- C. Pipe Flashing: Form flashing around pipe penetration and sheet metal roofing. Fasten and seal to sheet metal roofing as recommended by SMACNA.

3.7 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.8 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.
- C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 074600 - SIDING

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. Section Includes:
 - 1. Fiber-cement siding and trim.
 - 2. Rigid PVC trim.
 - 3. Drainage mat.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type, color, texture, and pattern required.
 - 1. 12-inch- long-by-actual-width Sample of siding.
 - 2. 12-inch- long-by-actual-width Sample of trim.
- C. Product Certificates: For each type of siding, signed by product manufacturer.
- D. Research/Evaluation Reports: For each type of siding required.

1.4 QUALITY ASSURANCE

- A. Source Limitations for Siding: Obtain each type, color, texture, and pattern of siding and soffit, including related accessories, through one source from a single manufacturer.
- B. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in a dry, well-ventilated, weathertight place.

1.6 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with siding installation only if substrate is completely dry and if existing and forecasted weather conditions permit siding to be installed according to manufacturer's written instructions.

1.7 SEQUENCING

- A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace siding that does not comply with requirements or that fails within specified warranty period. Failures include, but are not limited to, cracking, deforming or otherwise deteriorating beyond normal weathering.

1. Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cemplank.
 - b. CertainTeed Corp.
 - c. GAF Materials Corporation.
 - d. James Hardie.
 - e. Nichiha Fiber Cement.
2. Horizontal Pattern Siding: Boards 6-1/4 to 6-1/2 inches wide in plain style, with smooth texture.
3. Panel Siding: 48-inch- wide sheets with smooth texture.
4. Factory Priming: Manufacturer's standard acrylic primer.

2.2 ACCESSORIES

- A. Fiber Cement Accessories: Accessories made from fiber-cement board that does not contain asbestos fibers; complies with ASTM C 1186, Type A, Grade II; classified as noncombustible when tested according to ASTM E 136.

1. Texture: Smooth.

2. Type: Moldings and trim.
3. Thickness: As indicated.

B. PVC Trim: Accessories made from rigid PVC.

1. Texture: Smooth.
2. Profiles: As indicated.
3. Manufacturers: Subject to compliance with requirements, provide PVC trim by one of the following:
 - a. Azek Building Products, Inc. (Basis of Design).
 - b. Kommerling USA.
 - c. Synboard America.

C. Flashing: Provide stainless-steel flashing complying with Division 07 Section "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

D. Elastomeric Joint Sealant: Single-component urethane joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic) and for Uses M, G, A, and, as applicable to joint substrates indicated, O joint substrates.

E. Fasteners:

1. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch or 3 screw-threads into substrate.
2. For fastening fiber-cement siding, use stainless-steel fasteners.

2.3 DRAINAGE MAT

A. Drainage Mat: Manufacturer's standard, compression-resisting, three-dimensional, nonwoven, entangled filament, nylon mat designed to permit air movement and drain incidental moisture by gravity.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Obdyke, Benjamin Incorporated.
 - b. Masonry Technology, Inc.
 - c. Acrocrete.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

- A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply. Center nails in elongated nailing slots without binding siding to allow for thermal movement. Overlap joints to shed water away from direction of prevailing wind.
- B. Fiber Cement Siding: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated, unless more stringent requirements apply. Overlap joints to shed water away from direction of prevailing wind.

3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective siding materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to siding manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

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 sheet metal flashing and trim:
 - 1. Roof edge flashings.
 - 2. Flashing and trim.
 - 3. Gutters and downspouts.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- C. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.
- D. Uniform Wind Load Capacity: Design, size and install components to withstand positive and negative wind loading pressures in accordance with International Building Code and as verified by Structural Engineer.
- E. SPRI Wind Design Standard: Manufacture and install roof-edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:
 - 1. Design Pressure: As indicated on Drawings.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 1. Provide certification that roof edge flashings comply with SPRI ES-1.
- B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identify material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
 - 4. Details of transitions from lower parapets to higher parapet elevations.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Sheet Metal Flashing: 12 inches long. Include fasteners, cleats, clips, closures, and other attachments.
 - 2. Trim: 12 inches long. Include fasteners and other exposed accessories.
 - 3. Accessories: Full-size Sample.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, verifying compliance of roof edge flashings with performance requirements.

1.5 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality; minimum 24 gage thickness.
 - 2. Fluoropolymer 2-Coat Finish: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
- B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 - 1. Two-Coat Fluoropolymer Finish: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - 1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
- C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 1. Seams: Fabricate nonmoving seams in accessories with standing seams. Tin edges to be seamed, form seams, and solder.
- D. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- E. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by SPRI ES-1 for application, but not less than thickness of metal being secured.

2.4 METAL FABRICATIONS

- A. Typical Sheet Metal Flashing and Trim: Fabricate from one of the following materials:
 - 1. Metallic-Coated Steel: Minimum 0.028 inch thick, or thicker as recommended by SMACNA and SPRI ES-1.
 - 2. Aluminum Sheet: Minimum 0.032 inch thick, or thicker as recommended by SMACNA and SPRI ES-1.

2.5 ROOF EDGE DRAINAGE SYSTEMS

- A. Gutters and Downspouts: Manufactured formed gutter in uniform section lengths not exceeding 12 feet, with mitered and welded or soldered corner units, end caps, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front gutter rim. Furnish with flat-stock gutter straps and gutter support brackets and expansion joints and expansion-joint covers fabricated from same metal as gutters.
 - 1. Fabricate gutter from the following exposed metal:
 - a. Aluminum: 0.032 inch thick.
 - 2. Gutter Style: As indicated on Drawings; in accordance with SMACNA's "Architectural Sheet Metal Manual."

3. Downspouts: Square, 4 x 4-inch, closed-face with mitered elbows, manufactured from the following exposed metal. Furnish wall brackets, from same material and finish as downspouts, with anchors.
 - a. Formed Aluminum: 0.032 inch thick.
- B. Exposed Metal Finish: Two-coat fluoropolymer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 1. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
 1. Coat side of lead sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.
- E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or

intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

1. Metallic-Coated Steel: Use stainless-steel fasteners.

H. Seal joints with elastomeric sealant as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

3.4 ROOF EDGE FLASHING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Roof Edge Flashing: Anchor to meet performance requirements. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at NRCA's required spacing that meets performance requirements.

3.5 COUNTERFLASHING INSTALLATION

A. Counterflashings: Coordinate installation of counterflashings with installation of base flashings. Insert counterflashings in reglets or receivers and fit tightly to base flashings. Extend counterflashings 4 inches over base flashings. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric butyl sealant.

3.6 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
 - 1. Fasten gutter spacers to front and back of gutter.
 - 2. Anchor and loosely lock back edge of gutter to continuous cleat.
 - 3. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
- C. Downspouts: Join sections with 1-1/2-inch telescoping joints.
 - 1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.

3.7 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.8 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- C. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 079200 - JOINT SEALANTS

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. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Latex joint sealants.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- D. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.5 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion.
- B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in

repeated contact with food, provide products that comply with 21 CFR 177.2600.

- E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. BASF Building Systems; Omniseal 50.
- b. Dow Corning Corporation; 791.
- c. Tremco Incorporated; Spectrem 2.

- B. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Pecora Corporation; 898.

2.3 URETHANE JOINT SEALANTS

- A. Single-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. BASF Building Systems; Sonolastic SL 1.
- b. Tremco Incorporated; Vulkem 45.

2.4 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. BASF Building Systems; Sonolac.
- b. May National Associates, Inc.; Bondaflex 600.
- c. Tremco Incorporated; Tremflex 834.

2.5 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum

sealant performance.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.

b. Glass.

- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- F. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead 1/4 inch inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

H. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
 - a. Control and expansion joints in unit masonry.
 - b. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 50.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 2. Urethane Joint Sealant: Single component, pourable, traffic grade.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 2. Joint Sealant: Latex.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing silicone.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

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. Section Includes:
 - 1. Standard hollow metal doors frames.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door design.
 - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of moldings, removable stops, and glazing.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.
 - B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
 - C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.
1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Amweld Building Products, LLC.
 2. Ceco Door Products; an Assa Abloy Group company.
 3. Curries Company; an Assa Abloy Group company.
 4. Mesker Door Inc.
 5. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
 - F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
 - G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
 - H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
 - I. Glazing: Comply with requirements in Division 08 Section "Glazing."
 - J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 1. Design: Flush panel.
 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 - 1) Locations: Exterior doors.
 3. Vertical Edges for Single-Acting Doors: Square edge.
 4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
 5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying

with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.

2.6 STOPS AND MOLDINGS

A. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

2.7 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- C. Hollow Metal Doors:
 - 1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 4. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - b. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping.
 - 1. Locate hardware according to ANSI/SDI A250.8.
 - 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
- G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 2. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.8 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer

complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

- B. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - b. Install door silencers in frames before grouting.
 - c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - d. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - e. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 4. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - c. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

- D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

SECTION 083323 - OVERHEAD COILING DOORS

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. Section Includes:

- 1. Counter doors.

1.3 PERFORMANCE REQUIREMENTS

- A. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.4 SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:
 - 1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Curtain Slats: 12 inches long.
- D. Qualification Data: For qualified Installer.
- E. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Regulatory Requirements: Comply with applicable provisions in ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 - 1. Aluminum Door Curtain Slats: ASTM B 209 sheet or ASTM B 221 extrusions, alloy and temper standard with manufacturer for type of use and finish indicated; thickness of 0.050 inch and as required to meet requirements.
- B. End locks for Counter Doors: Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
- C. Bottom Bar for Counter Doors: Manufacturer's standard continuous channel or tubular shape, fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.
- D. Astragal: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
- E. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding wind locks.

2.2 HOOD

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
 - 1. Aluminum: 0.040-inch- thick aluminum sheet complying with ASTM B 209, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.

2.3 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side; door to be lockable in open and closed positions.

2.4 CURTAIN ACCESSORIES

- A. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.
 - 1. Provide pull-down straps or pole hooks for doors more than 84 inches high.

2.5 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.6 MANUAL DOOR OPERATORS

- A. Equip door with manufacturer's recommended manual door operator unless another type of door operator is indicated.
- B. Push-up Door Operation: Design counterbalance mechanism so required lift or pull for door operation does not exceed 25 lbf. Provide lift handles on bottom bar and pole with hook.

2.7 COUNTER DOOR ASSEMBLY

- A. Counter Door: Overhead coiling door formed with curtain of interlocking metal slats.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cookson Company.

- b. Cornell Iron Works, Inc.
- c. McKeon Rolling Steel Door Company, Inc.
- d. Overhead Door Corporation – Model 652 (Basis of Design).
- e. Wayne-Dalton Corp.

- B. Operation Cycles: Not less than 20,000.
- C. Door Curtain Material: Aluminum.
- D. Door Curtain Slats: Flat profile slats.
- E. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
- F. Hood: Match curtain material and finish.
 - 1. Mounting: As shown on Drawings.
- G. Locking Device: Equip door with slide bolt for padlock.
- H. Manual Door Operator: Push-up operation.
- I. Powder-Coated Finish: Color as selected by Architect from manufacturer's full range to match adjacent pass-through lockers.

2.8 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

- A. Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, application, and baking.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrate areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors and hoods at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.

END OF SECTION

SECTION 087100 - DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for hollow metal steel and aluminum.
- B. Hardware for fire-rated doors.
- C. Thresholds.

1.02 RELATED SECTIONS

- A. Section 081113 – Hollow Metal Doors and Frames.
- B. Section 083323 – Overhead Coiling Doors: Cylinders specified in Section 087100.

1.04 REFERENCES

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.
- B. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; current edition.
- C. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; 2007.
- H. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; 2003.
- I. UBC Std 7-2, Part II - Test Standard for Smoke- and Draft-control Assemblies; International Conference of Building Officials; 1997.
- K. State and Local Building Codes as adopted.

1.05 SUBMITTALS

- A. See Section 01330 – Submittal Procedures, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, and detailed Finish Hardware Sets including Key System as Directed by Owner
 - 2. Submit manufacturer's parts lists, templates, and warranties.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and furnish manufacturers' maintenance manuals.
- E. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- F. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- G. Keys: Deliver with identifying tags to The OWNER by security shipment direct from hardware supplier.
- H. Warranty: Submit manufacturer's warranty and ensure that forms have been completed.

1.06 QUALITY ASSURANCE

- A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use

by Architect and Contractor.

- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty years of documented experience.
- C. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with five years of experience.
- D. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) to assist in the work of this section. The Hardware Supplier must be an Authorized Distributor for all products furnished to insure quality standards, service and provision of Warranties.

1.07 PRE-INSTALLATION MEETING

- A. Convene two weeks prior to commencing work of this section.

1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.09 COORDINATION

- A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
- B. Furnish templates for door and frame preparation.
- C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.10 WARRANTY

- A. See Section 01770 - Closeout Procedures, for additional warranty requirements.
- B. Provide ten year warranty for door closers and a minimum of five year locks and exit device. Hinges shall be warranted for the life of the building.

1.11 MAINTENANCE PRODUCTS

- A. Provide special wrenches and tools applicable to each different or special hardware component.
- B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.12 EXTRA MATERIALS

- A. Provide three extra keyed cores for the owner's inventory.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hinges:
 - 1. Bommer Industries, Inc: www.bommer.com.
 - 2. Hager Companies: www.hagerhinge.com.
 - 3. Ives: www.ives.com.
- B. Lock and Latch Sets:
 - 1. Schlage: www.schlage.com.
 - 2. Sargent: www.sargent.com.
 - 3. Best: www.bestaccess.com.
 - 4. Falcon: www.falcon.com

- C. Push/Pulls:
 1. Hager Companies: www.hagerhinge.com.
 2. Ives: www.ives.com.
 3. Rockwood: www.rockwood.com.
- D. Closers:
 1. LCN: www.lcnclosers.com.
 2. Sargent: www.sargent.com.
 3. Norton: www.norton.com.
 4. Falcon: www.falcon.com.
- E. Manual Bolts, Stops:
 1. Ives: www.ives.com.
 2. Hager Companies: www.hagerhinge.com.
 3. Rockwood: www.rockwood.com.
- G. Gasketing, Thresholds:
 1. National Guard Products, Inc: www.ngpinc.com.
 2. Pemko Manufacturing Co: www.pemko.com.
 3. Zero International, Inc: www.zerointernational.com.
- H. Protection Plates:
 1. Hager Companies: www.hagerhinge.com.
 2. Ives: www.ives.com
 3. Rockwood: www.rockwood.com.
- I. Substitutions: See Section 01600 - Product Requirements.

2.02 GENERAL REQUIREMENTS FOR DOOR HARDWARE PRODUCTS

- A. Provide products that comply with the following:
 1. Applicable provisions of Federal, State, and local codes.
 2. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and Facilities.
 3. Applicable provisions of NFPA 101, Life Safety Code.
 4. Fire-Rated Doors: NFPA 80.
 5. All Hardware on Fire-Rated Doors: Listed and classified by UL as suitable for the purpose specified and indicated.
 6. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide hardware that enables door assembly to comply with air leakage requirements of UBC Std 7-2, Part II.
 7. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.
- B. Finishes: Identified in schedule at end of section.

2.03 KEYING

- A. Door Locks: Master keyed as directed in the Keying meeting with Owner.
 1. Include keyed construction cores. Furnish two each construction keys for the contractor's Use during the construction period. Construction cores shall be returned to the Hardware Supplier after the permanent cores are installed. The General Contractor, in the presence of the Owner, shall remove the construction cores and install the permanent cores.
 2. Set up new Master key system for the Waccamaw Region of the Georgetown County Parks and Recreation Department. All locks in each facility shall be keyed alike. The Supplier shall confirm the keying directions with the Owner, and submit a key schedule for approval prior to ordering the locks/cylinders.
- B. Supply keys in the following quantities:

1. Three master keys.
2. Two construction keys.
3. Three change keys per key group (Facility).
4. One control key.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.
- D. Mounting heights for hardware from finished floor to center line of hardware item: As listed in Schedule, unless otherwise noted:
 1. For steel doors and frames: Comply with DHI "Recommended Locations for Architectural Hardware for Steel Doors and Frames."
 2. For steel doors and frames: See Section 081113.
 3. For wood doors: Comply with DHI "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- E. Thresholds: Hardware installer shall field cut and notch thresholds to fit each opening. Verify sill conditions after door and frame is installed, before cutting and notching threshold.

3.03 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. Provide an Architectural Hardware Consultant to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01700.
- B. Adjust hardware for smooth operation.

3.05 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01700.
- B. Do not permit adjacent work to damage hardware or finish.

3.06 SETS:

HW SET: 01

DOOR NUMBER:

101A

EACH TO HAVE:

1	EA	CONTINUOUS HINGE	112HD	628	IVE
1	EA	DEADLOCK	D141HD6	626	FAL
1	EA	IC CORE ONLY, KEYED	C606 X MK	626	FAL
1	EA	PLATE WITH LIP	120L X CUT FOR THUMBTURN	630	HAG
1	EA	DOOR PULL	VR900	630	IVE
1	EA	SURFACE CLOSER	SC71 SS/HO TB	689	FAL
1	SET	SEALS	5050CL 17'	CLR	NGP
1	EA	DOOR SWEEP	C627A	CL	NGP
1	EA	THRESHOLD	425	AL	NGP
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 02 OVERHEAD DOOR

DOOR NUMBER:

101B 101C

EACH TO HAVE:

1	EA	IC CORE ONLY, KEYED	C606 X MK	626	FAL
1	EA	CONSTRUCTION CORE	C606CCA	BLK	FAL
1	EA	MORTISE CYLINDER	C987 HOUSING	626	FAL
1		BALANCE OF HARDWARE BY DOOR MANUFACTURER			

1. THE HARDWARE SUPPLIER SHALL COORDINATE & FURNISH THE CYLINDER HOUSING TYPE REQUIRED BY THE OHD MFGR IF OTHER THAN THE TYPE SPECIFIED.

HW SET: 03

DOOR NUMBER:

103 105

EACH TO HAVE:

1	EA	CONTINUOUS HINGE	112HD	628	IVE
1	EA	DEADLOCK	D111HD6	626	FAL
1	EA	IC CORE ONLY, KEYED	C606 X MK	626	FAL
1	EA	PLATE WITH LIP	120L X CUT FOR LOCK	630	HAG
1	EA	SURFACE CLOSER	SC71 REG TB	689	FAL
1	EA	WALL STOP	WS406CVX	630	IVE
1	SET	SEALS	5050CL 17'	CLR	NGP
1	EA	DOOR SWEEP	C627A	CL	NGP
1	EA	THRESHOLD	425	AL	NGP
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 04
DOOR NUMBER:
104

EACH TO HAVE:

1	EA	CONTINUOUS HINGE	112HD	628	IVE
1	EA	DEADLOCK	D141HD6	626	FAL
1	EA	IC CORE ONLY, KEYED	C606 X MK	626	FAL
1	EA	PLATE WITH LIP	120L X CUT FOR THUMBTURN	630	HAG
1	EA	DOOR PULL	VR900	630	IVE
1	EA	SURFACE CLOSER	SC71 SS TB	689	FAL
1	SET	SEALS	5050CL 17'	CLR	NGP
1	EA	DOOR SWEEP	C627A	CL	NGP
1	EA	THRESHOLD	425	AL	NGP
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 05
DOOR NUMBER:
102

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	STOREROOM LOCK	T581P6D D	626	FAL
1	EA	WALL STOP	WS406CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

END OF SECTION

SECTION 088000 - GLAZING

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 glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Doors.
 - 2. Glazed entrances and storefront.
 - 3. Interior borrowed lites.
- B. Related Sections:
 - 1. Section 085200 "Wood Windows" for factory-glazed windows.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- C. Product Certificates: For glass and glazing products, from manufacturer.
- D. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Glass: Obtain laminated glass and insulating glass from single source from single manufacturer for each glass type.
- C. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and "Glazing Manual."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- D. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- E. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- F. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review temporary protection requirements for glazing during and after installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.8 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes enhanced- protection testing requirements in ASTM E 1996 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.
 - 1. Small-Missile Test: For glazing located more than 30 feet above grade.

- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.

2.2 MONOLITHIC GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 2. For uncoated glass, comply with requirements for Condition A.
 3. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.3 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:
1. Interlayer: Polyvinyl butyral of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
 2. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.
 3. Interlayer Color: Clear unless otherwise indicated.
- B. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
1. Construction: Laminate glass with one of the following to comply with interlayer manufacturer's written recommendations:
 - a. Polyvinyl butyral interlayer.
 - b. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
 - c. Ionoplast interlayer.
 - d. Cast-in-place and cured-transparent-resin interlayer.
 - e. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.4 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
 2. Spacer: Manufacturer's standard spacer material and construction.
 3. Desiccant: Molecular sieve or silica gel, or blend of both.
- B. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article.

2.5 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
 1. Neoprene complying with ASTM C 864.
 2. EPDM complying with ASTM C 864.
 3. Silicone complying with ASTM C 1115.
 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.6 GLAZING SEALANTS

- A. General:
 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

- B. Single-Component, Nonsag, Neutral-Curing Silicone Glazing Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following or equal:
 - a. BASF Building Systems; Omniseal 50.
 - b. Dow Corning Corporation; 995.
 - c. GE Advanced Materials - Silicones; UltraPruf II SCS2900.
 - d. Pecora Corporation; 898.
 - e. Sika Corporation, Construction Products Division; SikaSil-C995.
 - f. Tremco Incorporated; Spectrem 3.

2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 804.3 tape, where indicated.
 - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

- G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.10 MONOLITHIC-GLASS TYPES

- A. Clear Glass (CG): Clear float glass or fully tempered float glass.
 - 1. Thickness: 6.0 mm.

2.11 INSULATING-LAMINATED-GLASS TYPES

- A. Clear, Low-E, Impact Resistant Insulating-Glass Units for Storefront:
 - 1. Overall Unit Thickness: 1-5/16 inch.
 - 2. Thickness of Outdoor Lite: 6.0 mm.
 - 3. Outdoor Lite: Heat-strengthened float glass; fully tempered where indicated on the drawings.
 - 4. Interspace Content: Air.
 - 5. Indoor Lite: Class 1 (clear), **laminated (impact resistant)** glass.
 - 6. Low-E Coating: Pyrolytic on second surface.
 - 7. Visible Light Transmittance: 68 percent minimum.
 - 8. Winter Nighttime U-Factor: 0.28 maximum.
 - 9. Summer Daytime U-Factor: 0.27 maximum.
 - 10. Solar Heat Gain Coefficient: 0.44 maximum.
 - 11. Light to Solar Heat Gain: 1.55 minimum.
 - 12. Basis-of-Design Product: PPG Industries; Solarban 60.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION

SECTION 089100 - LOUVERS

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:
 - 1. Fixed, formed-metal louvers.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide louvers capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act on vertical projection of louvers.
 - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- B. Seismic Performance: Provide louvers capable of withstanding the effects of earthquake motions determined according to applicable code requirement.
- C. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Air-Performance, Water-Penetration, Air-Leakage, and Wind-Driven Rain Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.4 SUBMITTALS

- A. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other Work. Show blade profiles, angles, and spacing.
- B. Samples for Verification: For each type of metal finish required.

- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 zinc coating, mill phosphatized.
- B. Fasteners: Of same basic metal and alloy as fastened metal or 300 Series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.
 - 1. Use types and sizes to suit unit installation conditions.
 - 2. Use Phillips flat-head screws for exposed fasteners, unless otherwise indicated.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 FABRICATION, GENERAL

- A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- C. Maintain equal louver blade spacing to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

1. Frame Type: Channel, unless otherwise indicated.
- E. Include supports, anchorages, and accessories required for complete assembly.
- F. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer, concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 FIXED, FORMED-METAL LOUVERS

A. Horizontal, Nondrainable-Blade Louver:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Airolite Company, LLC (The).
 - b. American Warming and Ventilating, Inc.; a Mestek company.
 - c. Arrow United Industries; a division of Mestek, Inc.
 - d. Cesco Products; a division of Mestek, Inc.
 - e. Construction Specialties, Inc.
 - f. Industrial Louvers, Inc.
 - g. Ruskin Company; Tomkins PLC.
2. Louver Depth: 4 inches, unless otherwise indicated.
3. Blade Profile: Plain blade without center baffle.
4. Frame and Blade Material and Nominal Thickness: Galvanized-steel sheet, not less than 0.052 inch.
5. Louver Performance Ratings:
 - a. Free Area: Not less than 6.5 sq. ft. for 48-inch- wide by 48-inch- high louver.
 - b. Point of Beginning Water Penetration: Not less than 700 fpm.
 - c. Air Performance: Not more than 0.10-inch wg static pressure drop at 550-fpm free-area intake velocity.

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior louver louvers indicated.

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: Insect screening.

B. Secure screens to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same kind and form of metal as indicated for louver to which screens are attached.
2. Finish: Same finish as louver frames to which louver screens are attached.
3. Type: Non-rewirable, U-shaped frames for permanently securing screen mesh.

D. Louver Screening:

1. Insect Screening: Aluminum, 18-by-16 mesh, 0.012-inch wire.

2.5 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.6 GALVANIZED-STEEL SHEET FINISHES

- A. Finish louvers after assembly.
- B. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair according to ASTM A 780.
- C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard 2-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
- B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
- F. Set sill members in watertight sill flashing pan. Utilize manufacturer's best recommended practices for provision of weeping water to the exterior. Where architectural metal pans are provided in addition to the manufacturer's pan assembly, do not penetrate this pan flashing with any fasteners. Contractor shall submit louver details and specifically note any variation from the Architect's details.
- G. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION

SECTION 099100 - PAINTING

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 surface preparation and field painting of exposed exterior and interior items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
- D. Related Requirements:
 - 1. Division 09 Section "Staining and Transparent Finishing" for surface preparation and the application of wood stains on wood substrates.

1.3 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
- B. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
- C. Paint Color Schedule: Prior to requesting inspection for Substantial Completion, submit schedule indicating all paint manufacturers, product numbers and colors for all painted surfaces.

1.4 QUALITY ASSURANCE

- A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
- B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 2. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
1. Product name or title of material.
 2. Product description (generic classification or binder type).
 3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.6 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equivalent MPI listed manufacturer:
 - 1. Benjamin Moore & Co.
 - 2. Duron, Inc.
 - 3. ICI Paints.
 - 4. PPG Industries, Inc.
 - 5. Rose Talbert Paints.
 - 6. Sherwin-Williams Co.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the specified limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop.
- C. Colors: As selected by Architect from manufacturer's full range.

2.3 BLOCK FILLERS

- A. Interior/Exterior Latex Block Filler: MPI #4.
- B. Block Filler, Epoxy: MPI #116.

2.4 EXTERIOR METAL PRIMERS

- A. Cementitious Galvanized-Metal Primer: MPI #26.

2.5 EXTERIOR LATEX PAINTS

- A. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).
- B. Exterior Latex (Gloss): MPI #119 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).

2.6 WOOD PRIMERS

- A. Exterior Latex Wood Primer: MPI #6.
- B. Primer, Latex, for Interior Wood: MPI #39.

2.7 INTERIOR PRIMERS/SEALERS

- A. Interior Latex Primer/Sealer: MPI #50.

2.8 INTERIOR METAL PRIMERS

- A. Primer, Quick-Dry for Shop Application: MPI #275.
- B. Waterborne Galvanized-Metal Primer: MPI #134.

2.9 INTERIOR LATEX PAINTS

- A. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).
- B. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).

2.10 EPOXY COATINGS

- A. Water-Based Epoxy (Interior and Exterior): MPI #115.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:
 - 1. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying

paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. CMU Substrates:
 - 1. Latex System: MPI EXT 4.2A.
 - a. Prime Coat: Interior/exterior latex block filler.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (semigloss).
- B. Dimension Lumber Substrates, indicated to be painted:
 - 1. Latex System: MPI EXT 6.2M.
 - a. Prime Coat: Exterior latex wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (gloss).
- C. Galvanized-Metal Substrates:
 - 1. Latex System: MPI EXT 5.3A.
 - a. Prime Coat: Cementitious galvanized-metal primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (gloss).
- D. Fiber Cement Siding and PVC Trim:
 - 1. Latex System: MPI EXT 3.3A, over shop primer.
 - a. Intermediate Coat: Exterior latex matching topcoat.
 - b. Topcoat: Exterior latex (semigloss).

3.7 INTERIOR PAINTING SCHEDULE

- A. CMU Substrate:

1. Epoxy System:
 - a. Block Filler: Block filler, epoxy, MPI #116.
 - b. Intermediate Coat: Epoxy, gloss, MPI #77.
 - c. Topcoat: Epoxy, gloss, MPI #77.

- B. Steel Substrates:
 1. Latex Over Alkyd Primer System: MPI INT 5.1Q.
 - a. Prime Coat: Quick-drying alkyd metal primer.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex (semigloss).

- C. Galvanized-Metal Substrates:
 1. Latex Over Waterborne Primer System: MPI INT 5.3J.
 - a. Prime Coat: Waterborne galvanized-metal primer.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex (semigloss).

- D. Wood Substrates: Including wood trim, architectural woodwork and wood-based panel products indicated to be painted.
 1. Latex System:
 - a. Prime Coat: Primer, latex, for interior wood.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, (Gloss Level 3).

END OF SECTION

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

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 surface preparation and the application of wood finishes on the following substrates:

- 1. Exterior Substrates:

- a. Exposed dimension lumber (rough carpentry).
 - b. Dressed lumber (finish carpentry).
 - c. Exposed wood panel products.

- 2. Interior Substrates:

- a. Exposed dimension lumber (rough carpentry).
 - b. Dressed lumber (finish carpentry).
 - c. Exposed wood panel products.

- B. Related Sections include the following:

- 1. Division 09 Section "Painting" for surface preparation and application of standard paint systems.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Samples for Verification: For each type of finish system and in each color and gloss of finish indicated.

- 1. Submit Samples on representative samples of actual wood substrates, 8 inches square.
 - 2. Label each Sample for location and application area.

- C. Product List: For each product indicated, include the following:

- 1. Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of MPI's current "MPI Approved Products List" for each product category specified in Part 2, with the product proposed for use highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in its "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and finish systems indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply exterior finishes in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

1. Benjamin Moore & Co.
2. Cabot Incorporated, Samuel.
3. ICI Paints.
4. Sherwin-Williams Company (The)

2.2 MATERIALS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.

- B. Stain Colors: As selected by Architect from manufacturer's full range.

2.3 STAINS

- A. Exterior Semitransparent Stain (Solvent Based): MPI #13.
- B. Interior Wood Stain (Semitransparent): MPI #90.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
 - 1. Maximum Moisture Content of Wood Substrates: 15 percent when measured with an electronic moisture meter.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes.
 - 3. Begin finish application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 4. Beginning application of finish system constitutes Contractor's acceptance of substrate and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be finished. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 - 1. After completing finishing operations, reinstall items that were removed; use workers skilled in the trades involved. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Remove surface dirt, oil, or grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
 - 3. Countersink steel nails, if used, and fill with putty tinted to final color to eliminate rust leach stains.
- D. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for finish and substrate indicated.
 - 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when finishes are being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample finish materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces if, on refinishing with complying materials, the two finishes are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.6 EXTERIOR WOOD-FINISH-SYSTEM SCHEDULE

- A. Wood substrates, nontraffic surfaces, including wood trim, wood-based panel products, glued-laminated construction, exposed joists, and exposed beams.
 - 1. Semitransparent Stain System:
 - a. Prime Coat: Stain, exterior, solvent based, semi-transparent, matching topcoat.
 - b. Topcoat: Stain, exterior, solvent based, semi-transparent, MPI #13.

3.7 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Wood substrates, nontraffic surfaces, including wood trim, architectural woodwork, wood-based panel products, and exposed framing.

1. Semitransparent Stain System:

- a. Prime Coat: Stain, semi-transparent, matching topcoat.
- b. Topcoat: Stain, semi-transparent, for interior wood, MPI #90.

END OF SECTION

SECTION 101400 – INTERIOR SIGNAGE

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:
 - 1. Panel signs.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.
- B. Sign Schedule: Use same designations indicated on Drawings.
- C. Samples for Verification: For each type of sign, include the following Samples to verify color selected:

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
 - 1. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

- A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.

1. For signs supported by or anchored to permanent construction, furnish templates for installation of anchorage devices.

PART 2 - PRODUCTS

2.1 PANEL SIGNS

- A. General: Provide signs as selected under allowance, that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
 1. Produce smooth panel sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch measured diagonally.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide products indicated by **APCO Graphics, Inc.** or Architect approved comparable product by one of the following:
 1. Andco Industries Corp.
 2. ASI Sign Systems, Inc.
 3. Best Manufacturing Co.
 4. Mohawk Sign Systems.
 5. Seton Identification Products.
- C. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 1. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated to acrylic backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.
 2. Frame: As indicated to hold changeable sign panel.
 - a. Material: Aluminum.
 - b. Accent Band: Wood laminate.
 - c. Profile: Rounded.
 - d. Finish and Color: As indicated.
 3. Mounting: As indicated with.
- D. Graphic Content and Style: Provide sign copy that complies with applicable code requirements indicated for size, style, spacing, content, mounting height and location, material, finishes, and colors of signage.
- E. Tactile and Braille Copy: Manufacturer's standard process for producing copy complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille. Produce precisely formed characters with square cut edges free from burrs and cut marks.

2.2 ACCESSORIES

- A. Mounting Methods: Use concealed fasteners fabricated from materials that are not corrosive to sign material and mounting surface.
- B. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
- C. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:
 - 1. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert. Furnish blank insert paper for Owner's use.
 - a. Basis-of-Design Product: Signword paper.
 - 2. Furnish computer software program for Owner's use in printing inserts.
 - a. Basis-of-Design Product: Signword.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, provided under other sections of Work are sized and located to accommodate signs.
- C. Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using one of the following methods as indicated:

1. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
2. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION

SECTION 101427 – EXTERIOR SIGNAGE

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:
 - 1. Dimensional characters.
 - 2. Freestanding primary identification monument sign.
 - 3. Directional signs.
 - 4. Identification signs.
 - 5. Traffic control signs.
- B. Related Requirements:
 - 1. Section 042000 "Unit Masonry" for sign base.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide post and panel signs capable of withstanding the effects of gravity loads and wind loads and stresses in accordance with applicable code.
- B. Thermal Movements: Provide post and panel signs that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Include plans, elevations, sections, details, and attachments to other work.
 - 3. Provide message list, typestyles, graphic elements, and layout for each sign.
 - 4. Show all below-grade footings and foundations for permanent anchoring.

5. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 1. Dimensional Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element).
 2. Finish colors for all sign components.
 3. Exposed ½-inch through-bolts, 1-1/2-inch diameter with specified finish.
 4. Exterior high pressure laminate.
 - D. Sign Schedule: Use same designations indicated on Drawings.
 - E. Qualification Data: For Installer and fabricator.
 - F. Maintenance Data: For signs to include in maintenance manuals.
 - G. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Source Limitations for Signs: Obtain each sign type indicated from one source.
- C. Accessibility Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC A117.1.
- D. Regulatory Performance: Provide traffic signs in accordance with requirements of current editions of the following government agency publications:
 1. "Manual on Uniform Traffic Control Devices" (MUTCD) published by the Federal Highway Administration (FHWA), U.S. Department of Transportation.
 2. "Standard Highway Signs" published by the Federal Highway Administration (FHWA), U.S. Department of Transportation.
 3. "Standard Specifications for Highway Construction" published by South Carolina Department of Transportation (SCDOT).
- E. Contractor shall comply with all applicable federal, state, and local rules and regulations, including the Georgetown County Zoning Ordinance Sign Regulations.

1.6 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

1.7 COORDINATION

- A. Coordinate placement of all signs, verifying no conflict with utilities, other improvements or vegetation.
- B. Coordinate installation of direct burial sign posts (refer to sign location plan).

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metal and polymer finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image colors and sign lamination.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Steel Materials:
 - 1. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, G90 coating, either commercial or forming steel.
 - 2. Steel Sheet: Uncoated, cold-rolled, ASTM A 1008/A 1008M, commercial steel, Type B, exposed; with rusted steel finish and protective topcoat.
 - 3. Hot-Rolled, Structural-Steel Shapes: ASTM A 36/A 36M or ASTM A 529/A 529M.
 - 4. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529/A 529M or ASTM A 572/A 572M, 42,000-psi minimum yield strength.
 - 5. Steel Tubing or Pipe: ASTM A 500, Grade B.
 - 6. Bolts for Steel Framing: ASTM A 307 or ASTM A 325 as necessary for design loads and connection details.
 - 7. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.
- D. Polycarbonate Sheet (Lexan): ASTM C 1349, Appendix X1, Type II (coated, mar-resistant, UV-stabilized polycarbonate), with coating on both sides.
- E. High Pressure Laminate: NEMA LD 3, general-purpose HGS grade, 1/2-inch nominal thickness.

- F. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated and suitable for exterior applications.
- G. Dimension Lumber Posts: No. 2 grade, pressure preservative treated according to AWPA C15 for ground contact.
- H. Chromate Conversion Coating: ASTM B 449, Class 2, 10 – 33 mg/sq. ft, with a median of 25 mg/sq.ft.
- I. Reflective Sheeting: AASHTO M 268, "Standard Specification for Reflective Sheeting for Traffic Control" (latest edition).
- J. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.2 DIMENSIONAL CHARACTERS

- A. Cast Characters: Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free of pits, scale, sand holes, and other defects. Cast lugs into back of characters and tap to receive threaded mounting studs. Alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated. Comply with the following requirements.
 1. Character Material: PVC, painted.
 2. Typeface: Square 721 CN BT.
 3. Thickness: As indicated.
 4. Mounting: Concealed studs, noncorroding for substrates encountered.

2.3 PANEL SIGNS

- A. Sign Message Panels: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.
 1. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.
 2. Increase metal thickness or reinforce with concealed stiffeners as needed to produce surfaces without distortion, buckles, warp, or other surface deformations.
 3. Continuously weld joints and seams unless other methods are indicated; grind, fill, and dress welds to produce smooth, flush, exposed surfaces with welds invisible after final finishing.
- B. Message Panel Materials:
 1. Aluminum Sheet: Minimum ¼- inch thick, mounted with ¼-inch spacer, unless otherwise indicated.
 - a. Panel Finish: Primed and painted with reflective vinyl copy applied.
 - b. Color: As selected by Architect from manufacturer's full range.
 - c. Edge and Corner Conditions: As indicated.

2. Exterior High Pressure Laminate: Minimum ½- inch thick, mounted with tamper-proof screw from rear, unless otherwise indicated.
 - a. Panel Finish: Graffiti-proof, with 10-year warranty against fade.
 - b. Color: As selected by Architect from manufacturer's full range.
 - c. Edge and Corner Conditions: As indicated.

C. Typeface: Square 721 CN BT.

2.4 POSTS

A. General: Fabricate posts to lengths required for mounting method indicated.

1. Direct-Burial Method: Provide posts longer than height of sign to permit direct embedment. Depth below grade to be determined by fabricator based on soil conditions. Method and use of concrete to be determined by installer/fabricator.

B. Color: As indicated on Drawings.

2.5 TRAFFIC SIGNS

A. Sign Panels: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.

B. Sign Panel Materials: In accordance with SCDOT "Standard Specifications for Highway Construction", Section 608.

1. Aluminum Sheet: 0.080 inch thick for signs up to 48 inches wide; 0.100 inch thick for signs 48 inches or wider.
 - a. Panel Finish: Reflective sheeting.
 - b. Shape, Dimensions and Color: In accordance with FHWA "Standard Highway Signs".

C. Posts: Fabricate posts to lengths required for direct burial. Depth below grade to be determined by fabricator.

2.6 ACCESSORIES

A. Anchors and Inserts: Provide stainless steel or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance, unless otherwise indicated.

2.7 FABRICATION

A. General: Provide manufacturer's shop drawings prior to fabrication.

1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.

2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
3. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.

2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, and prepare for coating according to coating manufacturer's written instructions.
- B. Sheet or Plate Finish: Rusted steel appearance with 2 coats of clear protective satin finish.

2.10 ALUMINUM FINISHES

- A. Painted Finish: As specified in Section 099100 "Painting".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Excavation: Excavate for sign foundation to attain specified and approved elevations and dimensions based on soil conditions and local codes. Reconstruct subgrade that is not firm, undisturbed, or compacted soil, or that is damaged by freezing temperatures, frost, rain, accumulated water, or construction activities by excavating a further 12 inches, backfilling with satisfactory soil, and compacting to original subgrade elevation.

- B. Locate signs where indicated on sign location plan.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Mechanical Fasteners: For exterior high pressure laminate panels, use tamperproof mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
- C. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION

SECTION 102113 - TOILET COMPARTMENTS

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:
 - 1. Phenolic-core toilet compartments configured as toilet enclosures.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locations of cutouts for compartment-mounted toilet accessories.
- C. Samples for Verification: Of each type of color and finish required for units, prepared on 6-inch-square Samples of same thickness and material indicated for Work.

1.4 QUALITY ASSURANCE

- A. Comply with requirements in CID-A-A-60003, "Partitions, Toilets, Complete."
- B. Accessibility Requirements: In addition to local governing regulations, comply with ANSI / ICC A117.1.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PHENOLIC-CORE UNITS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products by Partition Systems, Inc. or comparable product by one of the following:
 - 1. Ampco.
 - 2. Bobrick Washroom Equipment, Inc.
 - 3. General Partitions Mfg. Corp.
 - 4. Lambaton Universal.
- B. Toilet-Enclosure Style: Overhead braced.
- C. Door, Panel, Screen, and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges.
 - 1. Thickness: Provide minimum heavy-duty 3/4-inch- thick doors, pilasters and panels.
- D. Pilaster Shoes and Sleeves (Caps): Fabricated from stainless-steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.
- E. Full-Height (Continuous) Brackets: Manufacturer's standard design; stainless steel.
- F. Phenolic-Panel Finish:
 - 1. Color: As selected by Architect from manufacturer's full range.

2.2 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's vandal-resistant institutional design, heavy-duty operating hardware and accessories.
 - 1. Material: Stainless steel.
 - 2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed or partially open position.
 - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 - 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 - 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 - 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications.
- C. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

2.3 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, in-swinging doors for standard toilet compartments and 36-inch- wide, out-swinging doors with a minimum 32-inch- wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

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. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Owner furnished/Contractor installed items
 - Toilet paper dispensers
 - Soap dispensers

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless

otherwise indicated.

- B. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- C. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product:

- 1. Bobrick Washroom Equipment, Inc.

B. Grab Bars: Model # B-6806

- 1. Mounting: Flanges with concealed fasteners.
- 2. Material: Stainless steel, 0.05 inch thick.
- 3. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
- 4. Outside Diameter: 1-1/2 inches.
- 5. Configuration and Length: As indicated on Drawings.

C. Stainless Steel Mirror Unit: Model # B-1556

- 1. Frame: Frameless.
- 2. Mirror: Type 430 stainless steel with bright polished finish. Provide mirror with ¼-inch return concealing ¼-inch tempered Masonite backing. Furnish mirror with mounting screws and finishing washers.
- 3. Size: As indicated on Drawings.

E. Hand Dryer: Model # B-7128 Trimline

- 1. Mounting: Surface mounted.
- 2. Operation: Electronic-sensor activated with timed power cut-off switch.
- 3. Cover Material and Finish: Stainless steel, No. 4 finish (satin).
- 4. Electrical Requirements: 115 V, 15 A, 1725 W.

F. Toilet Paper Dispensers: Owner provided and Contractor installed

G. Soap Dispensers: Owner provided and Contractor installed

2.3 UNDERLAVATORY GUARDS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

- 1. Plumberex Specialty Products, Inc.
- 2. Truebro by IPS Corporation.

- B. Under lavatory Guard: Model; Handy Shield Maxx
 - 1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
 - 2. Material and Finish: Antimicrobial, molded plastic, white.

2.4 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of three keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION

SECTION 104416 - FIRE EXTINGUISHERS

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. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.
 - 1. Fire Extinguishers: Include rating and classification.
- B. Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amerex Corporation.
 - b. Ansul Incorporated; Tyco International Ltd.
 - c. Badger Fire Protection; a Kidde company.
 - d. Buckeye Fire Equipment Company.
 - e. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - f. Larsen's Manufacturing Company.
 - g. Potter Roemer LLC.
 - h. Pyro-Chem; Tyco Safety Products.
 2. Valves: Nickel-plated, polished brass body.
 3. Handles and Levers: Stainless steel.
 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Steel Container:
1. UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.2 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 1. Remove and replace damaged, defective, or undercharged units.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire-protection specialties in locations indicated on Drawings and at mounting heights per NFPA 10 2007 Edition.

- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

3.3 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION

SECTION 107500 - FLAGPOLES

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. Section includes ground-mounted flagpoles made from aluminum.
- B. Owner-Furnished Material: Flags.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
 - 1. Wind Loads: Calculate according to SEI/ASCE 7 for wind speed of 80 mph.
 - 2. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.
- B. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- C. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Flagpole.
 2. Baartol Company.
 3. Concord Industries, Inc.
 4. Eder Flag Manufacturing Company, Inc.
 5. Ewing Flagpoles.
 6. Lingo Inc.; Acme Flagpole Company Division.
 7. PLP Composite Technologies, Inc.
 8. Pole-Tech Company Inc.

2.2 FLAGPOLES

- A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
 2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
 3. Provide self-aligning, snug-fitting joints.
- B. Exposed Height: 25' feet.
- C. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch.
- D. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.064-inch- nominal wall thickness. Provide with 3/16-inch steel bottom plate and support plate; 3/4-inch- diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.
1. Provide flashing collar of same material and finish as flagpole.
 2. Provide steel ground protectors extending 12 inches aboveground and 6 inches belowground for steel flagpoles where flashing collars are not provided.
- E. Cast-Metal Shoe Base: For anchor-bolt mounting; provide with anchor bolts.
1. Provide units made from aluminum with same finish and color as flagpoles.
 2. Provide ground spike at grade-mounted flagpoles.

2.3 FITTINGS

- A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
1. 0.063-inch spun aluminum, finished to match flagpole.

- B. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.

- 1. Halyard Flag Snaps: Provide two stainless-steel swivel snap hooks per halyard.

- a. Provide with neoprene or vinyl covers.

2.4 MISCELLANEOUS MATERIALS

- A. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.
- B. Sand: ASTM C 33, fine aggregate.
- C. Elastomeric Joint Sealant: joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - 1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including foundation; accurate placement, pattern, orientation of anchor bolts, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.
- B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.
- C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.
- D. Place concrete, as specified in Division 03 Section "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.
- E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.3 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where shown and according to manufacturer's written instructions.
- B. Ground Set: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure. Install flagpole, plumb, in foundation tube.
 - 1. Foundation Tube: Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.
- C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.

END OF SECTION

SECTION 129300 - SITE FURNISHINGS

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:

1. Dugout Bench
2. Scoreboard
3. Bleachers
4. Field Accessories - home plate, bases, pitcher's mound and base plugs
5. Warm-up Area Accessories - practice pitching rubber and home plate
6. Site Furniture

- B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for installation of pipe sleeves cast in concrete footings.
2. Division 31 "Earthwork" for excavation for installation of concrete footings.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain site furnishing(s) through one source from a single manufacturer.

PART 2 - PRODUCTS

2.1 DUGOUT BENCH

- A. Basis-of-Design Product: Subject to compliance with requirements, Contractor shall provide and install benches by Wabash Valley Manufacturing, Inc.
- B. Model: Signature Series SG331
- C. Frame: Galvanized structural steel tubing.
- D. Seat: $\frac{3}{4}$ -inch #9 expanded steel mesh and 12-gage sheet metal with die-formed 10-gage mitered angle frame.
 1. Material: Powder coated steel.
 2. Seat Height: As indicated.
 3. Seat Surface Shape: Flat.

- 4. Overall Height and Depth: As indicated.
- 5. Overall Width: 10 feet.
- 6. Arms: None.
- E. Steel Finish: Powder coated.
- F. Mounting: In-ground.

2.2 SCOREBOARD

- A. Contractor shall provide and install scoreboard by Electro-Mech Scoreboard Co.
- B. Model: LX1050 (6'x3')
- C. Built-in ID Panel, and SL-400 BTXK Wireless Control System.
 - 1. FCC compliant accessories
 - 2. Embedded Receiver Kit: Model SL-400 BRXK
- D. Frame: heavy duty extruded aluminum framing
- E. Light weight, rust free all aluminum construction
- F. Automotive grade baked on enamel based paint in color selected by Owner.
- G. LED displays in color selected by Owner.
- H. Simplified 15-key control console
- I. Five-year limited warranty
- J. Toll-free technical support via telephone and online for life of product

2.3 BLEACHERS

- A. Owner shall provide and install bleachers by GT Grandstands
- B. Model: GS-0515ADC-A
- C. Standard Series Aluminum Angle Frame (5 row x 15' portable)

2.4 FIELD ACCESSORIES

- A. Owner shall provide and install home plate, bases, pitcher's mound, base plugs and other field accessories.

2.5 WARM-UP AREA ACCESSORIES

- A. Owner shall provide and install practice pitching rubber, home plate and other warm-up area accessories.

2.6 SITE FURNITURE

- A. Owner shall provide and install site furniture (tables, benches, trashcans) not listed in this Section.

2.7 MATERIALS

- A. Steel and Iron: Free of surface blemishes and complying with the following:
 - 1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53/A 53M, or electric-resistance-welded pipe complying with ASTM A 135/A 135M.
 - 3. Tubing: Cold-formed steel tubing complying with ASTM A 500/A 500M.
 - 4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513, or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500/A 500M; zinc coated internally and externally.
 - 5. Sheet: Commercial steel sheet complying with ASTM A 1011/A 1011M.
 - 6. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F 1267.

7. Malleable-Iron Castings: ASTM A 47/A 47M, grade as recommended by fabricator for type of use intended.
 8. Gray-Iron Castings: ASTM A 48/A 48M, Class 200.
- B. Anchors, Fasteners, Fittings, and Hardware: Stainless steel; commercial quality.
 - C. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M; recommended in writing by manufacturer, for exterior applications.
 - D. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.
 - E. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
 1. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

2.8 FABRICATION

- A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
- B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
- C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- D. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, and sharpness; all edges and ends rolled, rounded, or capped.
- E. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.9 GENERAL FINISH REQUIREMENTS

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10 STEEL AND GALVANIZED-STEEL FINISHES

- A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.
- B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with

coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated. Complete field assembly of site and street furnishings, where required.
- B. Unless otherwise indicated, install site and street furnishings after landscaping and paving have been completed.
- C. Install site and street furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.
- D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
- E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site and street furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.
- F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

3.3 SCOREBOARD INSTALLATION

- A. Comply with manufacture's written recommendations for installation per project conditions.
- B. Refer to electrical drawings for further notes and details and locations.
- C. Refer to structural drawings for further notes and details.

3.4 CLEANING

- A. After completing site and street furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION

SECTION 221116 - PLUMBING

PART 1-GENERAL

1.1 SECTION INCLUDES

- A. Pipe and pipe fittings, valves.
- B. Plumbing Specialties: floor drains, interceptors, cleanouts, water hammer arresters
- C. Plumbing Fixtures.
- D. Plumbing Equipment.

1.2 SUBMITTALS

- A. Product Data: Provide for plumbing specialties, fixtures, and equipment.

1.3 WARRANTY

- A. Provide one-year warranty under provisions of Division 1.

1.4 SCOPE

- A. Provide new plumbing facilities as shown on the Contract Drawings.

1.5 REFERENCES

- A. ANSI/ASME A112.6.1 - Supports for Off-the-Floor Plumbing Fixtures for Public Use.
- B. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.
- C. ANSI/ASME A112.19.1 - Enameled Cast Iron Plumbing Fixtures.
- D. ANSI/ASME A112.19.2 - Vitreous China Plumbing Fixtures.
- E. ANSI/ASME A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use).
- F. ANSI/ASME A112.19.4 - Porcelain Enameled Formed Steel Plumbing Fixtures.
- G. ANSI/ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals (Dimensional Standards).
- H. ANSI/ARI 1010 - Drinking-Fountains and Self-Contained, Mechanically-Refrigerated Drinking-Water Coolers.

1.6 SUBMITTALS

- A. Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- B. Manufacturer's Installation Instructions.

PART 2-PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED AND EMBEDDED IN CONCRETE, WITHIN BUILDING

- A. DWV PVC: See drawings
- 2.2 SANITARY SEWER PIPING, ABOVE GRADE WITHIN BUILDING
- A. DWV PVC See drawings.
- 2.3 WATER PIPING
- A. Water piping inside the building shall be CPVC or PEX as noted elsewhere.
- 2.4 FLANGES, UNIONS, AND COUPLINGS
- A. PVC and PEX fittings as applicable.
- 2.5 BALL VALVES
- A. Manufacturers:
 - 1. Watts
 - 2. Jenkins
 - 3. Jamesbury
 - 4. Nibco
 - 5. Apollo
 - B. Up to 2-1/2 Inches (50 mm): Bronze or stainless steel body, stainless steel ball, Teflon seats, two piece body and stuffing box ring, lever handle, solder or threaded ends.
- 2.6 RELIEF VALVES
- A. Manufacturers:
 - 1. Watts Regulator Co.
 - 2. A.W. Cash
 - 3. McDonnell Miller Inc.
 - B. Two-piece Bronze body, Teflon seat, steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.
- 2.7 STRAINERS
- A. Manufacturers:
 - 1. Watts
 - 2. Zurn
 - 3. Mueller
 - B. Size 2 inch (50 mm) and Under: Screwed bronze, brass or iron body, Y pattern with stainless steel perforated bronze or stainless-steel screen. Body shall be suitable for service that it is installed in.
- 2.8 FLOOR DRAINS
- A. Manufacturers:
 - 1. Josam
 - 2. Zurn
 - 3. Smith
 - C. FD-1: Lacquered cast iron two piece body with double drainage flange, weep holes, and round, adjustable nickel-bronze strainer.

2.9 CLEANOUTS

- A. Manufacturers:
 - 1. Josam
 - 2. Zurn
 - 3. Smith
- B. Floor: Lacquered cast iron, two-piece body with double drainage flange, weep holes, reversible clamping collar, and adjustable nickel-bronze strainer, round scoriated cover in service areas and round depressed cover to accept floor finish in finished floor areas.
- C. Wall: Line type with lacquered cast iron body and round epoxycoated gasketed cover, and round stainless-steel access cover secured with machine screw.

2.10 FIXTURES

- A. All fixtures shall be Grade "A". These plumbing fixtures shall be standard products as manufactured by Kohler, Crane, American Standard or Toto. The fixtures shall be free from marks or chips and shall be new, first quality and shall be furnished with sufficient supports in order to adequately hang each and every unit. The space between fixtures and masonry walls shall be grouted with White General Electric Silicone flexible grout. 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 floor mounted wall carrier with steel washers and through bolts used on wall brackets supports. Furnish traps and supply fittings with stops for all fixtures.
- C. All fixtures, 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.
- L. Provide ADA protective insulation kits on all exposed piping under sink and or lavatories.

2.12 GATE VALVES

1. Gate valves shall not be allowed.

2.13 BALANCE VALVES

1. Griswold or approved equal.

2.14 FLEXIBLE HOSE

1. Flexible hose shall be suited for use within the intended system.
 - a. Metraflex
 - b. Flex-Hose Inc.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside piping before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Coordinate cutting or forming of roof or floor construction to receive drains to required invert elevations.
- E. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.
- F. Verify adjacent construction is ready to receive rough-in work of this Section.

3.2 INSTALLATION

- A. Provide dielectric connections wherever jointing dissimilar metals.
- B. Install piping to conserve building space and not interfere with use of space. Group piping whenever practical at common elevations.
- C. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Provide clearance for installation of insulation and access to valves and fittings.
- E. Slope water piping and arrange to drain at low points.
- F. Install bell and spigot pipe with bell end upstream.
- G. Install specialties in accordance with manufacturer's instructions.
- H. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- I. Install water hammer arresters complete with accessible isolation valve and access panel where required and as indicated on the drawings.
- J. Install each fixture with chrome plated rigid or flexible supplies with screwdriver stops, reducers, and escutcheons.

- K. Adjust stops or valves for intended water flow rate to fixtures without splashing, noises, or overflow.
- L. Install water heaters in accordance with manufacturer's instructions.
- M. Install 4 mil thick polyethylene pipe protection on all copper pipe(s) that penetrate and/or are encased in concrete and or masonry walls, masonry and or flooring for the prevention of damage from lime and other corrosive chemical in concrete.

3.3 RUNOUTS

- A. Runouts to fixtures shall be grouted in place at the fixture stop to prevent pipe movement at this point. Use concrete mortar grout. Remove insulation from pipe before grouting.
- B. Runouts to urinal and water closet flush valves in block and concrete walls shall have an 8" long piece of 1/2" copper, flattened and soldered to the runout and anchored in the wall. Runouts 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).
- C. Copper pipe anchorage to fixture can be done by the use of wing ells, securely anchored.

3.4 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.

3.5 TESTING OF WATER PIPING

- A. All water supply piping shall be tested 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.

3.6 APPLICATION

- A. Use grooved mechanical couplings and fasteners, and dielectric connections only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install globe valves for throttling, bypass, or manual flow control services.
- F. All vertical storm and sanitary piping shall be cast iron for sound control and physical protection in the parking garage.

3.7 SERVICE CONNECTIONS

- A. Provide sanitary and storm sewer connections. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide a new water service. Provide per local requirements, pay for all tap fees and obtain all inspections and permits as required.

3.8 TESTING AND ADJUSTING

- A. Upon completion of Work, and before Work is concealed, all equipment shall be cleaned and adjusted for proper operation and any defects discovered shall be corrected before final inspection prior to acceptance.

END OF SECTION

SECTION 230593 - TESTING & BALANCING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Testing, adjusting, and balancing of all air supply and exhaust systems.

1.2 SUBMITTALS

- A. Draft Reports: Prior to commencing work, submit draft reports indicating data required. Include detailed procedures and sample report forms.
- B. Test Reports: Submit prior to final acceptance of project and for inclusion in operating and maintenance manuals. Provide five (5) copies in soft cover, letter size, 3-ring binder, with index page and tabs, and cover identification. Include reduced scale drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations. Each final systems report shall bear the signature of the person performing the Work and recording the data and the signature of the certified on-the-job supervisor for the performing agency. Submit simultaneously with the final reports, a list of the instruments used with the last date of calibration for each instrument.

PART 2 - PRODUCTS

2.1 QUALITY ASSURANCE

- A. Environmental Systems Balancing Agency
 - 1. Provide the services of a certified independent agency for the testing, adjustment, and balancing of all air distribution and hydronic distribution systems complete with all connected apparatus and equipment. The agency shall be certified by the Associated Air Balance Council Bureau - AABC, Los Angeles, CA 90026 or by National Environmental Balancing Bureau - NEBB, Arlington, VA 22209.
 - 2. The work shall be performed by skilled mechanical technicians under the direct supervision of certified personnel in the employ of the independent agency. The on-the-job supervisor shall be personally certified by the national council or bureau, as approved by the Engineer.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Scheduling
 - 1. Perform environmental systems testing and balancing after cleaning, miscellaneous testing, adjustment and operational testing Work has been completed.
- B. Report any defects of deficiencies or abnormal conditions in mechanical systems which prevent system balance.
- C. Beginning of work means acceptance of existing conditions.
- D. Recorded data shall represent actually measured or observed condition.
- E. Permanently mark setting of valves, dampers, and other adjustment devices. Set and lock

memory stops.

3.2 INSTALLATION TOLERANCES

- A. Adjust air handling systems to plus or minus 5 percent for supply systems and plus or minus 10 percent for return and exhaust systems from figures indicated.

3.3 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.
- B. Make air quantity measurements in ducts by traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers.
- E. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- F. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Allow for 50 percent loading of filters.
- G. Adjust automatic outside air, return air, and exhaust air dampers for design conditions.
- H. Measure temperature conditions across outside air, return air, and exhaust air dampers to check leakage.
- I. Where modulating dampers are provided, take measurements and balance at extreme conditions.

3.4 PROJECT FINALIZATION

- A. Provide one return trip to rebalance the system for comfort, noise, or any other reason; 1-3 months after the Owner has occupied the building.

END OF SECTION

SECTION 230716 - MECHANICAL INSULATION

PART 1- GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation, jackets and accessories.
- B. Ductwork insulation.
- C. Equipment Insulation.

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.

1.3 SUBMITTALS

- A. Product Data: Provide manufacturer's product information on all materials used in this section. Provide a list of materials and thickness for each application, service and equipment scheduled locations, and manufacturer's installation 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 within or not within 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.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain ambient temperature during and after installation for minimum period of 24 hours.

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. To be used on all lines from -60°F. to 450°F., (asbestos-free calcium silicate) for temperatures over 450°F.
1. Domestic cold water supply, including all piping to the fixture, hot water supply, including all piping to the fixture and hot water return piping shall have insulation listed on the insulation schedule. All piping in non-conditioned space within the building envelope shall have twice (two times) the insulation called for in the schedule.
 2. Roof drain leaders are insulated to the last vertical drop.
 3. Above grade cold water drainage piping (i.e. condensate drain piping from air conditioning units including floor drain piping, ice machine drain piping, etc.) to last vertical drop.
 4. Refrigerant Suction Piping - flexible closed cell 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 (ASTME84-75).
- B. Thicknesses
1. Domestic cold water, domestic hot water, domestic hot water return, cold water drain lines, roof drain leaders, chilled water – within the building envelope - all pipe sizes 1".
 - a. Tanks and other equipment handling hot water (not factory insulated). Insulate with semi-rigid fiberglass board 1-1/2" thick. Cut to fit and cover with 8 oz. canvas jacket.
 - b. Tanks and other equipment handling chilled water (not factory insulated). Insulate with semi-rigid fiberglass board 1-1/2" thick. Cut to fit and cover with 8 oz. canvas jacket.
 - c. Chilled water application equipment and vessels, excluding piping, insulate with closed cell insulation 1-1/2" thick.
- C. Manufacturers
1. Johns Manville
 2. Owens Corning
 3. PPG
 4. Rubatex
 5. Armaflex
 6. Zeston
- D. Glass Fibers: ASTM C547; rigid molded, noncombustible.
1. `K' (ksi) Value: 0.24 at 75 degrees F (0.035 at 24 degrees C).
 2. Maximum Service Temperature: 450 degrees F
 3. Vapor Barrier Jacket: White Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, secure with self-sealing longitudinal laps and butt strips or with outward clinch expanding staples and vapor barrier mastic.

- E. Cellular Foam: ASTM C534; flexible, closed cell cellular elastomeric, molded or sheet.
 1. 'K' ('ksi') Value: 0.27 at 75 degrees F
 2. Maximum Service Temperature of 220 degrees F (104 degrees C).
 3. Maximum Flame Spread: 25.
 4. Maximum Smoke Developed: 100
 5. Connection: Waterproof vapor barrier adhesive.
- F. Jackets
 1. PVC Plastic: One piece molded type fitting covers and sheet material, white incolor.
 - a. Thickness: 20 mil
 - b. Connections: Brush on welding adhesive
 2. Canvas Jacket: UL listed fabric; 6 oz/sq. yd (220 g/sq. m) plain weave cotton treated with dilute fire retardant lagging adhesive.

2.2 DUCTWORK INSULATION

- A. Manufacturers:
 1. Johns Manville
 2. Owens Corning
 3. PPG
- B. Flexible Glass Fiber: ASTM C612; flexible, non-combustible blanket.
 1. 'K' ('ksi') Value: 0.29 at 75 degrees F (0.042 at 24 degrees C).
 2. Density: .75 lb./cu ft
 3. Vapor Barrier Jacket: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, secured with pressure sensitive tape.
- C. Rigid Glass Fiber Board: ASTM C612; rigid, noncombustible blanket.
 1. 'K' ('ksi') Value: 0.29 at 75 degrees F (0.042 at 24 degrees C).
 2. Density: 2.0 lb./cu ft (32 kg/cu m).
 3. Vapor Barrier Jacket: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, secure with pressure sensitive tape.

PART 3 – EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that ductwork and piping have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Continue insulation vapor barrier through penetrations.
- C. Piping Insulation
 1. Locate insulation and cover seams in least visible locations.
 2. Neatly finish insulation at supports, protrusions, and interruptions.
 3. Provide insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature with vapor barrier jackets. Finish with glass cloth and vapor barrier adhesive. Insulate complete system.
 4. For insulated pipes conveying fluids above ambient temperature, provide standard jackets. Bevel and seal ends of insulation at equipment, flanges, and unions.

5. Provide insert between support shield and piping on piping 2 inches (50 mm) diameter or larger. Fabricate of cork or other heavy density insulating material suitable for temperature, not less than 6 inches (150 mm) long.
6. For pipe exposed in mechanical equipment rooms or in finished spaces below 10 feet (3 meters) above finished floor, finish with canvas jacket sized for finish painting.
7. For exterior applications, provide vapor barrier jacket. Insulate pipe, fittings, joints, and valves and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. The metal jacketing and fitting covers shall be fabricated of 0.016" aluminum or stainless steel with a smooth finish. Securing of the jacket shall be made by the use of 1" x 0.016" aluminum or stainless steel bands and seals.
8. 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 chilled water and 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.
 - e. All piping exposed to view (equipment rooms, etc.) shall be covered with an 8 oz. canvas jacket.
9. Roof drain bodies shall be insulated. Insulation applied with insulating cement.

D. 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.

E. External Ductwork Insulation

1. Provide insulated ductwork conveying air below ambient temperature with vapor barrier jacket. Finish with tape. Seal vapor barrier penetrations with vapor barrier adhesive.
2. Provide insulated ductwork conveying air above ambient temperature with or without standard vapor barrier jacket. Where service access is required, bevel and seal ends of insulation.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging.
5. For ductwork exposed in mechanical equipment rooms or in finished spaces, finish with canvas jacket sized for finish painting.
6. For exterior applications, provide insulation with vapor barrier jacket. Cover with outdoor jacket.

F. Acoustical Duct Lining

1. All air ductwork, 10 lineal feet on both sides of air handlers, make-up air units, supply fans, return fans, exhaust fan intakes, and as otherwise shown, shall be acoustically lined. Lining shall be 3 pounds per cubic foot and shall be Owens/Corning Aeroflex 300. Thickness shall be 1". Duct sizes indicated are inside clear dimensions after insulation is installed. Provide oversized sheet metal as required to accommodate duct lining.

3.3 PIPING INSULATION SCHEDULE: As a minimum comply with IBC Energy Code

		PIPE SIZE THICKNESS	
Glass Fiber Insulation			
Domestic Hot and Cold Water		½-1.5"	1 5
conditioned space Outside the heated areas		2" & Up 2"	
& non-conditioned space Plumbing Vents Within 10 Feet		All	
of the Exterior		1" All	
Piping Exposed to Freezing		1" ½" & Up	
& non-conditioned space Roof Drains, Horizontal Drain Pipe And Vertical Pipe 10 Feet.	All	1 ½" 1"	
Cellular Closed Cell Foam Insulation Refrigerant lines		½-1.5"	1"

3.4 DUCTWORK INSULATION SCHEDULE: As a minimum comply with IBC Energy Code

		THICKNESS in Inches
		Exhaust Ducts
A.	Flexible Glass Fiber	
	Within 10 ft of	1
	Exterior Openings	
	Exhaust Ducts Exposed to Outside Air	1
	Ventilation Equipment Casings	1
	All interior HVAC supply and return ducts	1.5" min. R5
	HVAC supply and return outside building envelope	2" min. R8
	Outside Air Intake Ducts	2
B.	Lined Duct:	

1. Ductwork as indicated below shall be lined with Owens-Corning Aeroflex Vapor-Seal Duct Insulation, 1-1/2" and 1" thick pcf, or equal by Certain-Teed/St. Gobain or Johns Mansville, refer to drawings for locations.

- (a) Low Pressure Supply - All
- (b) Return - All
- (c) Outside Air – All

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 low pressure round ducts unless noted otherwise on plans shall be insulated by wrapping with 1-1/2" thick 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.

3.5 PIPING IN AREAS OF NON-CONDITIONED SPACE.

1. Areas that contain liquid filled piping in non-conditioned space and or are exposed to freezing shall have a minimum of 5 watts per lineal foot of heat trace, in addition to double the amount of pipe insulation, that shall be thermostatically controlled by atmospheric ambient temperature sensor thermostat that shall engage and energize heat trace when the ambient temperature is below 40 degrees Fahrenheit.

3.6 UNDERGROUND PIPING

1. All insulated underground piping shall have closed cell insulation and be of a waterproof material with joints that are permanently sealed watertight to form a continuous material.

END OF SECTION

SECTION 230800 - DEMONSTRATION OF COMPLETE MECHANICAL SYSTEMS

PART 1 - GENERAL

1.I. DESCRIPTION

A. Work Included

1. Thoroughly demonstrate and instruct designated representatives of the Owner in the care and operation of all the heating and ventilating systems and equipment furnished and installed in the contract.
2. Manufacturers of certain equipment specified herein shall provide technically qualified factory representatives to train the Owner's representative in the care, maintenance, and operation of their product. This instruction and service of the factory representative shall be furnished as specified elsewhere in the specifications. This time is in addition to what is specified above and will not be counted as part of the contractor's instructions.
3. The time and place of all training shall be coordinated and scheduled by the Architect at the convenience of the Owner.
4. Submit letters attesting to the satisfactory completion of all instructions. Letters shall include date of completion of instruction, names of persons in attendance and be countersigned by authorized representative of Owner.
5. Following equipment and systems included
 - a. Temperature controls.
 - b. Air conditioning units and equipment.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 233113 - BASIC MATERIALS AND METHODS

PART 1- GENERAL

1.1 SECTION INCLUDES

- A. Mechanical basic requirements
- B. Electric Motors
- C. Identification

1.2 SYSTEM DESCRIPTION

- A. Provide complete and fully operational systems with facilities and services to meet requirements indicated and in accord with applicable codes and ordinances.
- B. 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.
- C. The word "provide", shall mean "furnish and install complete and ready for use", shall be included in all work. It is the intention of these specifications and drawings to provide and call for a complete and finished system, tested and ready for operation with all required components provided including minor details and other incidentals not usually shown or specified, including singular and or multiple items that are required and provided for a complete and operational system.

1.3 REGULATORY REQUIREMENTS

- A. Obtain permits, plan review, and inspections from authority having jurisdiction.
- B. Comply with all Federal, State and Municipal laws and codes, ordinances, rules and regulations of health, public or other authorities controlling or limiting the methods, materials to be used or actions of those employed.

1.4 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 Engineer.
- 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. Submittals shall be complete, partial submittals shall not be accepted and will be returned as incomplete. Shop drawings will have an index sheet, established by the specification sections, with tabbed dividers corresponding to the index sheet.

- D. Prior to delivery of any material to the job site, and sufficiently in advance of requirements to allow the Engineer 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. Specific items to the product(s) being submitted shall be highlighted and clearly indicated. Pertinent information to the specific product being submitted shall be clearly indicated and all other information shall be "X'ed Out" for clarification.
- 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 specifications 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. The Contractor, as part of the shop drawing submitted, shall submit shop drawings of all ductwork in the mechanical rooms, the risers including takeoffs to the floors with their associated dampers, and ells with unequal legs showing turning vanes.
- H. Static pressure drops across fittings, dampers, heaters, attenuators, etc. shall not exceed minimum ASHRAE Standards when not specified.
- I. 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 and/or Paragraph 6.26, in NSPE Document 1910-8. 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 Engineer stamped shop drawings.

- N. One set of stamped approved shop drawing submittals shall be included in the O & M (Operation and Maintenance) Manuals.
- O. O & M manuals shall include all pertinent information relating to all equipment installed on the project that is associated and pertains to maintenance and upkeep. This shall include the manufacturers packing slip pertaining to make, model number, serial number, exploded views of equipment; manufactures order number and vendors order number. The intent is to provide maintenance personnel with readily available information on the specific equipment on the project. O & M manuals shall be submitted to the Engineer for final review thirty days (30), prior to project closeout.
- P. Equipment substitutions: Pumps and valves shall be complete. Substitute equipment shall contain an item by item comparison of the two products, no exceptions. Examples are pump casing, valve bodies, valve seats, stems, shafts, impellers, impeller attachment to the shaft, spline, taper, press fit, seals Vito, EDPM, silicone, nylon, mechanical seals, bushings, packing, material make up, UL listing and previous project usage. Substitute equipment and material shall be an equal to the specified item. All equipment listed is representative of the standard of quality and performance required. "Or Equal" substitutions will be considered if the substitutions are shown to be equal to or better quality, including efficiency of performance, size, and weight.
- Q. Submittals are to include all fire caulking materials and UL Assemblies to be used, along with certification from the CVPC Pipe manufacture that the intended fire caulk is compatible for use with the pipe being installed. This is to include chemical composition compatibility. All CPVC products and fire caulk products shall be from a single source manufacture, mixed products shall not be allowed.
- R. Contractor shall provide a time line schedule of work when required, to the General Contractor that will indicate all work schedules including the submittal process and emphasizing the critical path method of all major work. This schedule shall be in proper format of an industry accepted standard scheduling and management type.

1.5 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 and all applicable permits and 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.

1.6 DESIGN CRITERIA

- A. The arrangement, position and connection of pipes, equipment, and apparatus shown on the

Contract Drawings may be diagrammatic, but should be followed as closely as possible.

- B. The responsibility of accurately laying out the work to best fit with details of job conditions rests with the Contractor and he shall conform to any reasonable variation and change that may be required, without extra or additional cost to the Owner.
- C. Before installing any materials, ensure that they do not interfere with clearance required in finished rooms or with other work.
- D. All mechanical equipment for any one system shall be the product of the same manufacturer, wherever possible.
- E. All electrical products used on this project shall conform, unless otherwise specifically noted, to applicable standards of the National Electrical Manufacturers' Association and shall also be listed by Underwriters Laboratories, Inc., and/or other agencies, as approved.
- F. Materials and workmanship shall comply with latest revisions of applicable State Codes, City Codes, and utility company regulations.
- G. Should work be performed which does not comply with requirements of applicable State Codes, City Codes, and utility company regulations, changes for compliance shall be done at no additional cost.
- H. Notify Engineer of any materials or apparatus believed to be inadequate, unsuitable, in violation of laws, ordinances, rules or regulations of authorities having jurisdiction.

1.7 GUARANTEE

- A. Entire installation shall be guaranteed as called for in the general conditions. 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.
- B. All equipment shall be guaranteed to meet capacities specified.
- C. The entire installation shall be guaranteed to operate with no noise or vibration perceptible outside of the equipment space. Contractor shall make any necessary corrections at his own expense.
- D. 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.
- E. 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.

1.8 GENERAL CONDITIONS

- A. Contractor shall obtain copies of drawings and specifications for all trades of this Project, and review same for additional related Work. This Work shall be included in the Scope of this Division, whether or not the information appears on the Mechanical Drawings.
- B. Small details not usually shown or specified, but necessary for the proper operation and installation of the Work, shall be furnished and installed at no additional cost; complete and

operable systems shall be furnished.

- C. Contractor shall note that all service connections may not be shown in true positions. Each bidder is cautioned, therefore, to verify same with field conditions.
- D. Where discrepancies exist within the contract documents the proposal for the work shall be based on the better quality, or greater quantity of work involved. No other method of estimating shall be used in preparing the bid proposal, unless contrary instructions are issued in the form of an Addendum before the bid proposal due date.
- E. Any claim by the Contractor that they, in submitting their respective bid proposals, did not include all items as shown in the Contract Documents will not be given consideration for an adjustment of their bid. If any item specified in a section, which would not normally furnish this item, it shall be the responsibility of the Contractor to provide the Work in question, without any additional cost to the Owner.

1.9 SCOPE

- A. Work specified under this Division includes furnishing all materials, labor, equipment, permits, licenses, taxes and other items required for execution and completion of all work indicated. Everything necessary for a complete and satisfactory installation, including all necessary parts, devices, accessories, etc. required by the Codes or required to satisfactorily complete the installation of the above items shall be provided.
- B. The Plumbing Work required under this Division shall include, but is not necessarily limited to the following:
 - 1. Water piping where noted.
 - 2. Sanitary piping where noted.
 - 3. Water heaters and associated equipment and appurtenances.
 - 4. Provide new plumbing fixtures.
 - 5. Provide new sanitary, vent, domestic water supply piping as shown.
 - 6. Piping insulation, mechanical piping insulation, mechanical ductwork insulation, and mechanical equipment insulation.
 - 8. All hangers and supports.
 - 9. Seismic bracing as required code.
 - 10. Testing and Balancing of systems.
 - 11. All testing required.
 - 12. Permits and inspections.
 - 13. Cleanup and removal of debris.
 - 14. One (1) year guarantee.
- C. The Mechanical Work required under this Division shall include, but is not necessarily limited to the following:
 - 1. Permit filing.
 - 2. Setting of all equipment.
 - 3. Exhaust fans and ductwork.
 - 4. Insulation.
 - 5. Package Terminal Heat pumps.
 - 6. Temperature controls and low voltage wiring.
 - 7. Seismic bracing as required by code.
 - 8. Testing and balancing of systems.
 - 9. Clean up and removal of debris.

10. One (1) year guarantee.

- D. Furnish training and maintenance/operation manuals to the Owner's personnel for all equipment installed under this project. Furnish manuals bound in 3 ring binders with typewritten labels and index tabs. Remove extraneous material not pertinent to the equipment installed, clearly mark all pages to show exact models involved. Training shall be for a minimum of 2 hours for each item installed and shall include all maintenance functions.

1.10 DEFINITIONS

- A. The word "Contractor" as used in this section of the specification refers to the HVAC, Plumbing and Fire Protection Subcontractors unless specifically noted otherwise. The word "provide" means furnish, fabricate, 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.

1.11 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.
- B. All work shall be done by competent first-class experienced journeymen level mechanics, competent skilled workers, helpers and labor required to complete the project and all tasks within the scope of the project that are properly supervised by an on site competent resident superintendent.

PART 2 –PRODUCTS

2.1 ELECTRIC MOTORS

- A. Manufacturers: As specified on drawings
- B. Electric Service: Refer to Division 16 for required electrical characteristics.
- C. Motors: For continuous operation in 40 degrees C environment, and for temperature rise ANSI/NEMA MG 1 limits.
- D. Single Phase Motors: Split phase.
- E. Three Phase Motors: Squirrel cage motors to ANSI/NEMA MG 1 Class B, high efficiency type with thermistor system for motor frame sizes 254T and larger, ball bearings.
- F. 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. All motors 1 HP and above shall be rated as energy efficient in

accordance with NEMA standards.

- G. Epoxy adhesive anchor shall be a two part system specifically designed for anchoring into solid materials such as solid concrete material, or masonry materials. Hilti HSE 2421 Epoxy Adhesive Anchor for solid concrete or equal to, and Hilti HY 20 for masonry materials or equal to.

2.2 MECHANICAL IDENTIFICATION

- A. Plastic Nameplates: Laminated three-layer plastic with engraved black letters in light background color.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light background color, minimum 1-1/2 inch (38 mm) diameter.
- C. All pipes shall be labeled with flow arrows and 1/2" letters on vinyl or polyethylene coated cloth with pressure sensitive adhesive. Letters shall be black on yellow background. Pipe labels shall have custom lettering, as required. Labels shall be as manufactured by Kobi, Seton, W.H. Brady, or equal.
- D. Provide labels per ANSI A 13.1, ASME A 13.1.

2.3 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. Water hammer arrestors shall be provided on the water supply to each plumbing fixture. Provide system selection in accordance with PDI Standard W-201. Water Hammer Arrestors shall be by JOSAM, ZURN, SMITH, PPP or approved equal.

2.4 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, welders, 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.

2.5 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.

2.6 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 Subcontractor 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.

2.7 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.
- F. All v-belt drive equipment requiring more than a single v-belt shall be supplied in factory matched belt sets.
- G. Reeves drive equipment shall be supplied with one extra belt.

2.8 FOUNDATIONS, SUPPORTS, PIERS, ATTACHMENTS

- A. This Contractor shall furnish and install all necessary foundations, supports, pads, grout, bases and piers required for all air conditioning equipment, piping, pumps, tanks, compressors, 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. For pumps, compressors, and other rotating machinery and for all equipment where foundations are indicated, furnish and install concrete pads minimum 4 inches thick or as shown. All pads shall be extended six (6) inches beyond machine base in all directions with top edge chamfered. Insert six (6) inch long, 1/2" (# 4 rebar) steel dowel rods at 12" on center into floors to anchor pads. Shop drawings for all foundations and pads shall be submitted to the Architect for approval before same are constructed. Rebar shall be installed by a two-part epoxy adhesive anchor system specifically designed for that type installation.
- C. 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.
- D. All equipment, unless otherwise shown, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that are, in the opinion of the Architect, not strong enough shall be replaced as directed.
- E. Provide seismic requirements to all piping, equipment, equipment supports, ductwork and appurtenances as required by all applicable codes and adoptions by the authority or authorities having jurisdiction.

2.9 DIELECTRIC CONNECTIONS

- A. Dielectric connections shall be used at any points within the piping systems where dissimilar metals meet. Careful attention shall be given to support brackets and hangers to select proper materials to avoid dissimilar metal contact at these points.

2.10 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.

2.11 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.

- C. The Mechanical / Plumbing Contractor shall be responsible and required to provide all necessary electrical information to the Electrical Contractor for compliance with this section. This shall not relieve the Electrical Contractor from compliance due to non-compliance or cooperation from the Mechanical / Plumbing Contractor.

2.12 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 Lead No. 20.
- b. Duron: Deluxe Red Lead 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.

2.13 THERMOMETERS

- A. Adequate thermometer instrumentation shall be provided for operation, evaluation, adjustment, and malfunction indications of systems.
- B. Thermometers shall be installed with separable sockets, bronze in nonferrous systems and stainless steel in ferrous systems.
- C. Thermometers shall be:
 - 1. Case: shall be 9" long, V-shaped design with parts molded of GE Valox polyester, in black finish. Heavy glass window firmly secured against rattles by spring action.
 - 2. Stem: Material of quick response capability temperature changes, taped to industry standard thermowell.
 - 3. Locking device: hand rotatable friction lock design with angel adjusting screw work to provide 360 degree positioning with completely enclosed capillary to prevent tampering and foreign material from entering.
 - 4. Fill: High accuracy and quick response liquid filled non-toxic and environmentally safe liquid filled material.
 - 5. Accuracy: Within 1% of scale range.
 - 6. Scale: White coated aluminum with permanently baked bold black markings.
 - 7. Locked in place and adjusted though device at top of scale

8. Dial thermometers shall not be allowed.

D. Acceptable manufactures: Weiss or equal.

2.14 GAUGES

A. Adequate gauge instrumentation shall be provided for operation, evaluation, adjustment, pressure differentials and malfunction indications of systems.

B. Gauges: System compatibility shall be determined by the system in which the gauge is being used. Liquid systems shall have a liquid filled gauge. Non-liquid system shall have a non-liquid filled dry gauge.

C. Liquid System: Gauges shall be mounted on and include on each gauge, syphon device and be isolated from the system by means of an individual shut off valve / gauge cock just below the gauge. Material to be equal to the material of the system being installed and compatible with the intended system design and usage. Liquid filled material with gauges shall be compatible with the system in which they are being installed and shall be hermitically sealed.

D. Non-Liquid System: Gauges shall be mounted and be isolated from the system by means of an individual shut off valve / gauge cock just below the gauge. Material to be equal to the material of the system being installed and compatible with the intended system design and usage.

E. Gauges shall be:

1. Dial size: 4-1/2" diameter.
2. Case: Black impact resistant phenolic.
3. Bourdon Tube: Phosphor Bronze C tube to 1000 psi.
4. Range: twice that of the operating range.
6. Movement: Bushed Stainless Steel Rotary
7. Pointer: Black, Micrometer Adjustable
8. Window: Acrylic
9. Accuracy: 0.5%, ASME B40 Grade 2A

F. Acceptable manufactures: Weiss or equal.

2.15 FLEXIBLE CONNECTORS

A. Install flexible hose connectors at all building seismic joints locations and expansion loops that are designated on the contract documents.

B. Install flexible hose connectors between vibrating equipment where a hard pipe connection is made to the equipment.

C. Install flexible hose connectors on all pumps to compensate for misalignment, reduce noise and vibration transfer into the piping system and to facilitate ease of pump maintenance. Flexible hose connectors shall be UL listed and approved for the application intended. Seismic restraints that are UL listed shall be required at all seismic joints flexible hose connectors and expansion loop flexible hose connectors. Only flexible connectors of metallic braid shall be used on pressurized systems and shall be UL listed and rated for use in the type of system in which they are to be installed.

D. Flexible connectors shall not be used as a substitute for dielectric unions.

E. Acceptable manufactures: Metraflex, Flex-Hose.

2.16 PIPE PROTECTION

- A. Copper and Plastic Pipe that is encased or in contact with concrete, masonry or masonry products shall be protected by a minimum 4 mill polyethylene material sleeve material specifically designed for to plastic and copper pipe in concrete and masonry. Pipe sleeve material shall be color coded blue for cold water and red for hot water. Oatey Pipe Guard or equal.

2.18 SOUND AND VIBRATION ISOLATION

- A. Sound and vibrations conditions in excess of listed quantities shall be corrected in an approved manner by the Contractor at his expense.
- B. Acceptable manufactures
 1. Mason
 2. Peabody
 3. Vibration Eliminator Company
 4. Approved equal

2.19 PRODUCT SOURCES AND MANUFACTURES

- A. All products used are to be from a single source manufacture. Mixed manufactures materials will not be allowed.

2.20 CONTRACTOR RESPONSIBILITY

- A. The contractor is responsible provide products that meet and follow all standards and guidelines contained in the current South Carolina School Facilities Planning and Construction Guide as prepared by the Office of School Facilities and the South Carolina Department of Education.

PART 3 – EXECUTION

3.1 DUTIES OF CONTRACTOR

- A. 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.
- B. 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.

- C. 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.
- D. 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.
- E. 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.
- F. 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.
- G. Contractor shall provide a time schedule of work when required to the General Contractor that will indicate all work schedules including the submittal process and emphasizing the critical path method of all major work.

3.2 SOUND AND VIBRATION ISOLATION

- 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 besides, 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 23, Chapter 35 of ASHRAE Handbook and Product Directory.
- 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 ASHRAE Handbook and Product Directory, Chapter 32, Table 30. Submittal 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.

3.3 INSPECTION

- A. Verify that no defects or errors are present in completed portions of the Work and that structures or surfaces to receive materials or products have no defects, which would result in poor

- application, or cause latent defects in workmanship.
- B. Do not start Work until unsatisfactory conditions are corrected.

3.4 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Install plastic nameplates with adhesive.
- C. Install plastic tags with corrosion resistant metal chain.
- D. Take into account the varying ceiling heights, beams, etc., and offset piping or ducts up or down as required even if such offsets are not shown on the Drawings. However, before making any changes from the work shown on the Drawings, first obtain the approval of the Engineer. Failure on part of the Contractor to preserve maximum headroom will require him to raise his piping, ducts, and/or equipment without any additional cost to the Owner, whenever directed to do so by the Engineer.
- E. Furnish and install a suitable metal frame, having a removable glass cover, for posting certificates of inspection. Certificates are to be installed in frames by this Contractor before requesting final inspection of complete job by the Owner and Architect. Final payment will not be made until such certificate has been duly posted. All fees or expenditures necessary for this requirement shall be paid by this Contractor.
- F. Conflicts:
 - 1. In case of conflicts between different parts of Drawings, Specifications, or between drawings and specifications, Contractor shall promptly request an interpretation from the Engineer.
 - 2. If Contractor fails to request an interpretation, he shall make all changes ordered by the Engineer, without additional cost to the Owner.
- G. 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.
- H. 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.
- I. Clearance at Access Doors and Panels:
 - 1. Do not install any piping, insulation, hangers, or ductwork that will obstruct or interfere with the use of any access doors or removal of access panels, whether on equipment, in walls, or in the ceiling.
 - 2. Comply with this requirement, if necessary, by rerouting piping or ductwork at no extra cost after obtaining the approval of the Engineer.
- J. Safety
 - 1. Installations must be entirely safe in every respect, and must not create any condition of

any kind, at any time, that will be harmful to any occupant of building, operating personnel, installation personnel, testing personnel, workmen, public, or to any other persons.

- a. Contractor shall be solely responsible for providing installations which will meet these conditions.
- b. If Contractor believes that installations will not be safe for all people, he shall so report, in writing, to the Engineer before any equipment is purchased or work is installed, giving his exact recommendations and reasons for them.

K. The mechanical designs as indicated on the Drawings and described in these specifications are intended to be complete and fully functional in accordance with all applicable codes. All miscellaneous parts required, whether indicated on plans or not shall be included as part of the Work.

3.5 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.
- B. The Contractor shall keep an up to date set of redline drawings on site at all times for review which will indicate any and all changes that have been made to the project. These redline drawings shall be updated daily by the contractor.

3.6 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.

3.7 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.

3.8 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 PERMITS, INSPECTION FEES, ETC.

- A. Contractor shall obtain and pay for all permits required, give all legal notices and pay all fees for inspection or otherwise required for the work.

3.10 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.

3.11 CUTTING AND PATCHING

- A. Cutting and patching shall be performed per Division 1.
- B. Work under this Contract shall progress so that cutting of constructed or finished Work will be avoided.
 - 1. Do not cut Work of other Trades without Engineer's Approval.
 - 2. Seal all openings in walls, floors and ceilings with a UL listed fire retardant seal.
- C. 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.
- D. 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.
- E. The General Contractor will provide all openings or chases in masonry or concrete; however, it is this Contractor's responsibility to advise exact dimensions, shape and locations of openings required in sufficient time for the General Contractor to make the necessary provisions. This Contractor shall be responsible for correct size and location of each opening for his equipment even though these openings are provided by the General Contractor.

3.12 TEMPORARY LIGHTING

- A. Provide extension cords and lights essential to the execution of the Work. See Temporary Facilities - Division 1.

3.13 VALVE TAGS

- A. Except where specified otherwise, provide valve number tags on all valves, including automatic valves and cocks.
- B. For all valves furnished by the Heating Contractor, valve tags shall be stamped with a letter "H" followed by the valve number.
- C. For all valves furnished by the Plumbing Contractor, valve tags shall be stamped with a letter "P" followed by the valve number.
- D. Valve tags shall be 1-1/2" diameter brass with minimum of one-inch stamped bold letters and numbers filled with black enamel.
- E. Omit tags on valves which are end-of-branch pipe to only one item of equipment and which are located close to that item of equipment.
- F. Provide brass "S" hooks on tags for attaching to valves.
- G. Range of numbers to be as directed in order to avoid confusion with tags of other trade.
- H. The typed valve directory, on quality bond paper, shall be installed under glass in a wood frame, anchored flat to wall where directed. Hanging frames on wall will not be acceptable.
- I. Function and location of each valve shall be adequately described.
- J. Submit three (3) copies of typed valve directory for approval before installing. Submittal shall be with drawings.

3.14 PIPE LABELS

- A. Label piping in the following areas:
 - 1. Equipment rooms
 - 2. Rooms in which piping is exposed
 - 3. Rooms with accessible ceilings
 - 4. On branches with accessible shafts
- B. Labels shall be applied as follows:
 - 1. Minimum of once in a room.
 - 2. In large areas or corridors, minimum of 80 feet apart.
 - 3. Pipe labels shall be installed per ANSI A 13.1 and ASME A13.1.
- C. Labels shall be provided by the trade installing the pipe.
- D. Provide flow arrows for all piping.

- E. For insulated piping, apply pipe labels with 3/4" wide pressure sensitive tape around the pipe at both ends of the label. For manufacturer's instructions, tape shall be the same color as background of label.
- G. Labels for pipes on roof shall have a permanent attachment.
- H. Locate labels so as to be visible from normal viewing location.
- I. Provide labels per ANSI A 13.1 and ASME A13.1.

3.15 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.

3.16 FIELD QUALITY CONTROL

- A. Internal tests shall be made to ensure that all items of equipment and systems operate properly.
- B. All defective materials and workmanship discovered as a result of the tests shall be removed and replaced at the Contractor's expense and the test repeated until satisfactory results obtained.
- C. Make all adjustments which are necessary to place nonoperating equipment in proper operating condition.
- D. Adjustments will include, but not be limited to, regulating systems, set points, operating limits, etc.

3.17 CLEANING

- A. Upon completion of the mechanical installation, clean up and remove all debris.
- B. Clean all fixtures and equipment intended to be left exposed.
- C. Leave all work in perfect operating condition.

3.18 LAYOUT

- A. Work lines and established limits shall be in strict accordance with plans and specifications. Furnish the General Contractor and other Contractors, in ample time, any information they may require to accommodate this Work. Set all sleeves, anchors, bolts and/or inserts before any concrete is poured.

3.19 WATERPROOFING

- A. Whenever Work must pierce waterproofing, this Work shall be done with care.
 - 1. After the item piercing the waterproofing has been set in place, the opening made for this purpose shall be sealed and made absolutely watertight.
 - 2. Pipe penetrating walls, below grade, shall be spaced using a link seal or approved device for a watertight seal.

3. All holes shall be core drilled.

3.20 SLEEVES

- A. Where pipes or ducts pierce concrete floors, ceilings or masonry walls, provide and install substantial metal sleeves.
 1. Sleeves in exterior building walls below grade, or piercing waterproof surface shall be caulked after installation of conduit to make a watertight seal. Where items must pass through beams, the methods and locations proposed must be submitted to the Structural Engineer for approval.
 2. Terminate sleeves flush with walls, partitions and ceiling.
 3. In areas where pipes are concealed, as in chases, terminate sleeves flush with floor or as shown on the plans.
 4. In all areas where pipes are exposed, extend sleeves 1/4 inch above finished floor, except in rooms having floor drains, where sleeves shall be extended 3/4 inches above floor.
 5. Where galvanized material is used for sleeving and copper pipe passes thru sleeve, copper pipe shall be protected from contact with the galvanized material.
- B. Sleeves shall be constructed of schedule 40 black steel pipe unless otherwise indicated on the drawings. Sleeves through concrete beams shall be constructed as indicated on the drawings.
- C. Fasten sleeves securely in floor, walls, so that they will not become displaced when concrete is poured or when other construction is built around them. Take precautions to prevent concrete, plaster, or other materials being forced into the space between pipe and sleeve during construction.
- 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.

3.21 PIPE INSTALLATIONS

- A. Run all piping concealed in pipe chases, soffits, hung ceilings, walls, partitions, as shown on the drawings, except in unfinished spaces where piping shall be run exposed.
- B. All piping to be pitched to low points with drain valves. Soil, storm and waste lines to be sloped at 1/8" per foot, minimum or as noted on Drawings.
- C. Flash all piping though roof.
- D. Provide valves required for complete control of all systems. Stop valves for supply to all fixtures to be chrome plated and have escutcheon plates to match, where exposed.

- E. All piping including valves, traps, vents and accessories shall be installed so as to be easily accessible for maintenance, removal, replacement and cleaning.
- F. Provisions for expansion and contraction shall be made in all mains and connections in order that there will be no undue strain on the pipe work under any conditions.
- G. Particular care shall be taken in running the branches to prevent trapping. If after the plant is in operation any heating surfaces do not circulate or water hammer develops due to trapped connections, this Contractor must bear the expense of making the proper alterations in those defective connections. Contractor shall also bear the cost of refinishing any building construction damaged or disturbed.

3.22 HANGARS AND SUPPORTS

- A. Horizontal Lines: Adjustable clevis type.
- B. Insulated Pipe: Curved steel pipe saddles at hanger location. No wire to be used for pipe support. Solid inserts shall be used between pipe and insulation and hanger in addition to saddles on pipe 2-1/2" and larger to avoid compression of insulation. Minimum pipe saddle is 12" in length and 20 gauge material.
- C. Copper Pipe: Copper clad or copper split ring hangers.
- D. Support:
 1. Hanger rods to be machine threaded, secured to approved type beam clamps, angle clips or suitable inserts.
 2. Where construction permits, expansion bolts may be used for piping two (2) inches and smaller.
- E. Shall be capable of screw adjustment after piping is erected.
- F. Hangers supporting piping expanding into loops, bends and offsets shall be secured to the building structure in such a manner that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion.
- G. All such hangers shall be finally adjusted both in the vertical and horizontal direction when the supported piping is hot or chilled as required.
- H. All vertical piping shall be supported by means of heavy wrought iron or steel clamps securely bolted or welded to the piping and with end extensions bearing on the building. All horizontal piping 1-1/4" and smaller in size shall be supported with hangers, spaced not more than 6' on centers. All horizontal piping 1-1/2" and larger shall be supported with hangers spaced not more than 10 feet on centers except that copper tubing shall be supported with hangers spaced not more than 8 feet on centers.

For pipe 8" and smaller - Grinnell Figs. 185, 186, 187. Hanger rods shall be of the following

diameters:

PIPE SIZE	ROD DIAMETER
2 inches and below	3/8 inch
2-1/2 inch	1/2 inch

3 inch	5/8 inch
4 inch	5/8 inch
5 inch	5/8 inch

- I. Hanger rods shall be attached to concrete inserts with steel reinforcing rod through the insert and both ends hooked over the reinforcing mesh.
- J. Piping shall not be hung from other piping or from equipment of other trades. Hanger rods shall not pierce ducts.
- K. Where additional steel is required for the support of hangers, the Contractor shall furnish and install same subject to the approval of the Architect.
- L. Lateral bracing of horizontal and vertical pipe and ductwork shall be provided where required to prevent side sway or vibration. The lateral bracing shall be of a type approved by the architect and shall be installed where directed by the Architect. Provide sway bracing for seismic zone, furnish shop drawings for approval.

3.23 VALVES

- A. All systems shall be supplied with valves in all branch mains and risers, at all pumps, tanks reducing valves, heating surfaces and all apparatus; so located, arranged, and operated as to give complete shutoff and isolation from all other components of the system. Except where flanged valves are used, each connection to equipment shall be made with screwed or flanged union on the equipment or discharge side of the valve.
- B. All valves shall be installed with the best workmanship and are to have neat appearance and be arranged so that they are easily accessible.
- C. Generally, all valves are to be of the ball type, except that globe valves or valves specifically designed for flow control shall be used for throttling services, on traps, and pressure reducing and control valve bypasses. Gas valves shall be plug type.
- D. Gate valves shall not be allowed.

3.24 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.

3.25 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.

3.26 UTILITIES

- A. This Contractor shall bear the cost of utilities required to perform the work under this Contract. Where services such as electricity, hoist, etc. are provided by the General Contractor, he shall be responsible directly to the General Contractor for his portion of the utilities as may be agreed upon.

3.27 SCAFFOLDING, RIGGING, HOISTING

- A. This Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for erection, delivery and setting into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

3.28 EXCAVATING AND BACKFILLING

- A. Each trade shall perform all excavation and backfill required for the installation of its work.
- B. Particular care shall be taken not to disturb or damage work of other Contractors.
- C. Mass excavation to approximate levels will be carried out under a section of the architectural specifications. The Contractor shall, however, do all trench and pit excavation and backfilling required for work under this section of the specifications, inside and outside the building, including repairing of finished surfaces and all required shoring, bracing, pumping, dewatering and all protection for safety of persons and property. State and OSHA Safety Codes shall be strictly observed. In addition, it shall be the responsibility of the Contractor to check the indicated elevations of the utilities entering and leaving the building. If such elevations require excavations lower than the footing levels, the Architect shall be notified of such conditions and a redesign shall be made before excavations are commenced. It is also the responsibility of the Contractor to make the excavations at the minimum required depths in order to avoid undercutting the footings.
- D. No backfilling shall be done until work involved has been tested and approved by the Architect.
- E. Contractor shall schedule excavation work so as not to unduly interfere with work of other trades on the job. Contractor shall be responsible for establishing all lines and grades required for proper location of his work.
- F. When rock is encountered in excavation, it shall be paid for as outlined under the architectural section of these specifications.
- G. 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. 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 under Earth Work Section of specifications for specified area through which trench passes. Compact fill to 95% maximum density at optimum moisture content all other areas. Earth bearing pressure as indicated shall be verified by a testing laboratory, which following the criteria specified for foundation wall trench, etc. in the Earth Work Section of the specifications. The reports shall be forwarded to the Architect for

approval unless otherwise specified; the cost will be borne by this contractor, before any work is performed. If the earth bearing pressure is less than that required, the Contractor shall not begin additional work until notified by the Architect to do so. A copy of the report shall be forwarded to the Architect in triplicate.

- H. Excess earth shall be distributed on premises as directed by the Architect.
- I. Where ditches occur outside the 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.

3.29 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. Motors less than 1/2 HP shall be 115 volts, single phase. Motors 1/2 HP and larger shall be 200 volts, 3 phase unless otherwise indicated.
- D. 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.

3.30 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, with the manufacturer's recommendations 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.

3.31 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.

3.32 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.

3.33 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. Oil burners, gas burners, and water chillers shall be started by a representative of the equipment manufacturer. All costs of these procedures shall be borne by this Contractor.
- 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 equipment shall be adjusted to setting indicated. Fans shall be adjusted to the speed indicated by the manufacturer to meet specified conditions.

- D. 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.

3.34 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 Subcontractor's Name and Address
- (f) Control Subcontractor's Name and Address
- (g) Warranty Dates

2. Section II:

- (a) Description of System

3. Section III:

- (a) Major Equipment List (name, manufacturer, serial no., H.P. and voltage) (include all equipment with motors)
- (b) Control Sequence Description
- (c) Routine Maintenance Instructions in Step-by-Step form
- (d) Lubrication Charts and Schedules
- (e) Valve Schedules
- (f) Test and Balance Reports
- (g) Sound Power Level Readings (where required)

4. Section IV:

- (a) Operating and Maintenance Instructions by Manufacturer
- (b) Shop Drawings (Major Requirement)
- (c) Wiring Diagrams
- (d) Control Drawings

3.35 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, chillers, pumps, 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, roof and exterior portions of the building 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 - Orange
- (b) Cold Water - Dark Green

END OF SECTION

SECTION 233300 - DUCTWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Ductwork and ductwork accessories
- B. Flexible duct connections
- C. Louvers and roof hoods

1.2 SUBMITTALS

- 1. Shop Drawings provide for manufactured products, assemblies, and duct fabrication.
 - 2. Submit scaled layout drawings of metal ductwork and fittings including but not limited to: duct sizes, locations elevations, and slopes of horizontal runs, all and floor penetrations, and connections. Show interface and spatial relationship between ductwork and proximate equipment. Show modifications of indicated requirements, made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.
 - 3. At project closeout, submit record drawings of installed metal ductwork and ductwork products, in accordance with the requirements of Division 1.
- B. Product Data: Include for manufactured products and assemblies.
 - C. Operating and Maintenance Instructions: Include instructions for lubrication, filter replacement, spare parts lists, and wiring diagrams.

1.3 QUALITY ASSURANCE

- A. Sound Ratings: AMCA 301; tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
- B. Fabrication: Conform to AMCA 99 and ARI 430.
- C. Filter Media: ANSI/UL 900 listed, Class I or Class II.
- D. Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.
- E. ASHRAE Standards: Comply with ASHRAE Handbook, Equipment Volume, Chapter 1 "Duct Construction", for fabrication and installation of metal ductwork.
- F. NFPA Compliance: Comply with NFPA 96 for Kitchen Hood Exhaust ductwork, 90A "Standard for the Installation of Air Conditioning and Ventilating Systems", and NFPA 90B "Standard for the Installation of Warm Air Heating and Air Conditioning Systems"

1.4 WARRANTY

- A. Provide warranty under provisions of Division 1.

PART 2 - PRODUCTS

2.1 DUCTWORK

- A. Materials
 - 1. Steel Ducts: Galvanized steel sheet, lock-forming quality.
 - 2. Aluminum Ducts: Aluminum sheet, alloy 3003-H14.

3. Flexible Ducts: Fabric supported by helically wound spring steel wire or flat steel bands.
4. Insulated Flexible Ducts: Flexible duct wrapped with flexible glass fiber insulation, enclosed by vapor barrier jacket.
5. Fibrous Glass Ducts: Not Permitted
6. Sealant: Non-hardening, water resistant, fire resistive, used alone or with tape.

B. Metal Ductwork

1. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, except as indicated.
2. Construct T's, bends, and elbows with radius of 1-1/2 times width of duct on centerline. Where not possible, provide turning vanes.
3. Increase duct sizes gradually, not exceeding 30 degrees divergence and 45 degrees convergence.
4. Connect flexible ducts to metal ducts with liquid adhesive plus tape.
5. Use crimp joints with or without bead for joining round duct sizes 8 inches (200 mm) and smaller with crimp in direction of air flow.
6. Shop fabricate ductwork of gages and reinforcement complying with SMACNA "HVAC Duct Construction Standards".

2.2 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Fabricate splitter dampers of same material and gage as duct to 24 inches (600 mm) size in either direction, and two gages heavier for larger sizes, secured with continuous hinge or rod, operated with minimum 1/4 inch (6mm) diameter rod.
- C. Fabricate single blade dampers for duct sizes to 9-1/2 x 30 inch (240 x 760 mm).
- D. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch (300 x 1 825 mm). Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. Except in round ductwork 12 inches (300 mm) in diameter and smaller, provide endbearings.
- F. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where width exceeds 30 inches (750 mm), provide regulator at both ends.

2.3 BACKDRAFT DAMPERS

- A. Gravity backdraft dampers furnished with air moving equipment, size 18 x 18 inches (457 x 457 mm) or smaller, may be air moving equipment manufacturer's standard construction.
- B. Fabricate multi-blade, parallel action, gravity balanced backdraft dampers of galvanized steel or extruded aluminum, with center pivoted blades linked together; with sealed edges, steel ball bearings, and plated steel pivot pin.

2.06 AIR TURNING DEVICES

- A. Multi-blade device with blades aligned in short dimension, steel or aluminum construction; with individually adjustable blades and mounting straps.
- B. Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction, with push-pull operator strap.

2.4 FLEXIBLE DUCT CONNECTIONS

- A. UL listed, fire-retardant, neoprene-coated woven glass fiber fabric to NFPA 90A; approximately 3 inches (75mm) wide, crimped into metal edging strip.

2.5 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Access doors smaller than 12 inches (300 mm) square may be secured with sash locks. Access doors with sheet metal screw fasteners are not acceptable.

2.6 FITTINGS

- A. Provide radius type fittings fabricated of multiple sections with maximum 15 degree change of direction per section. Unless specifically detailed otherwise, use 45 degree laterals and 45 degree elbows for branch takeoff connections. Where 90 degree branches are indicated, provide conical type tees.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all materials in accordance with manufacturer's instructions.
- B. Install flexible connections specified between fan inlet and discharge ductwork. Flexible connectors shall not be in tension while running.
- C. Provide backdraft dampers on discharge of exhaust fans and as indicated.
- D. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- E. Install filter gage static pressure taps upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum in accessible position. Adjust and level.
- F. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal cap with spring device or screw to ensure against air leakage.
- G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- H. Connect diffusers or troffer boots to low pressure ducts with 5 ft (1.5 m) maximum length of flexible duct. Hold in place with strap or clamp.
- I. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- J. Provide fire dampers at locations indicated and at all crossings of fire walls. Install with required perimeter mounting angles, sleeves, breakaway duct connection, corrosion resistant springs, bearings, bushings and hinges.
- K. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.
- L. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated.
- M. Support terminal units individually from structure. Do not support from adjacent ductwork. Provide minimum of 10 ft of 1 inch thick lined ductwork downstream of units.
- N. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

- O. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.
- P. Paint ductwork visible behind air outlets and inlets matte black. Refer to Division 9.
- Q. Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and prevent buckling. Support vertical ducts at every floor.
- R. Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details, and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of the building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction, or above suspended ceilings. Do not encase horizontal runs in solid partitions except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.
- S. Do not make final connections to diffusers with bent flex duct. Provide 90 degree elbows at each diffuser for flex duct connection,

END OF SECTION

SECTION 260000 – SITE ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

This section applies to all sections of Division 26, "Electrical," of this project specification unless specified otherwise in the individual sections.

1.2 DEFINITIONS

- a. Unless otherwise specified or indicated, electrical and electronic terms used in these specifications, and on the drawings, shall be as defined in IEEE 100.
- b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.
- c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.3 SUBMITTALS

Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and technical paragraph reference. Submittals shall also include applicable industry, and technical society publication references, and years of satisfactory service, and other information necessary to establish contract compliance of each item to be provided. Photographs of existing installations are unacceptable and will be returned without approval.

1.3.1 Manufacturer's Catalog Data

Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. Handwritten and typed modifications and other notations not part of the manufacturer's preprinted data will result in the rejection of the submittal. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for certificates of compliance.

1.3.2 Reference Standard Compliance

Where equipment or materials are specified to conform to industry and technical society reference standards of organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be

acceptable evidence of compliance.

1.3.3 Operation and Maintenance Manuals

Comply with the requirements and the technical sections.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 PAINTING OF EQUIPMENT Factory Applied

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test and the additional requirements specified in the technical sections.

END OF SECTION

SECTION 260513 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Sequencing and scheduling including coordination with other Contracts.
2. General requirements for materials including painting of electrical components.
3. Installation requirements for painting and trenching related to installation of Electric Work components.
4. Supporting devices including all supports, beams, angles, hangers, rods, bases, anchors, braces, etc., required to properly support equipment and materials installed, including supports as detailed on Drawings.
5. Electrical identification devices, including color codes, for following items:
 - a. Panels, contactors, starters, disconnect switches, control switches, junction boxes, cabinets, circuit breakers, and conduits.
 - b. Signal and/or communication wiring in equipment and junction boxes, fire alarm wiring in panels and junction boxes, feeder and branch circuit wiring in panels and junction boxes, and pull wires.
6. Fire stopping at all electrical conduit penetrations through fire-rated walls and floors.

B. Related Sections

1. DIVISION 2 - Site Work
2. SECTION 099100 - Painting

1.2 SUBMITTALS

A. Comply with requirements of SECTION 01300 - Submittals and as modified below.

B. Product Data

1. Identification Devices: Submit manufacturer's product literature for conduit markers, nameplates and underground tape demonstrating compliance with specified requirements.
2. Fire stopping Materials: Submit manufacturer's product literature for Fire stopping materials, demonstrating compliance with specified requirements.

1.3 SEQUENCING AND SCHEDULING

A. New Construction

1. Painting
 - a. General Work Contractor: Paint exposed electrical raceways including wiremold, fittings,

supports, and boxes in finished spaces.

- b. Electric Work Contractor: Install construction and components included in Electric Work Contract in sufficient time to facilitate painting by General Work Contractor. Compensate General Work Contractor for additional costs resulting from all painting made necessary by any fault, error, or tardiness on part of Electric Work Contractor including damage resulting from construction included in Electric Work Contract.

2. Trenching

- a. Site Work Contractor: Provide all backfill and compaction of all trenches from 12" below final grade to final grade; and all grading and seeding or paving.
- b. Electric Work Contractor: Install construction and components included in Electric Work Contract in sufficient time to facilitate backfill, compaction, grading, and seeding or paving by Site Work Contractor. Compensate Site Work Contractor for additional costs resulting from any fault, error, or tardiness on the part of Electric Work Contractor including damage resulting from construction included in Electric Work Contract.

B. All Construction

1. Painting - Unless otherwise specified in Contract Documents, Electric Work Contractor shall provide painting for following items:
 - a. All fire alarm junction boxes, pull boxes, and surface cabinet boxes, red.
 - b. All ferrous material, with unprotected surfaces, located in crawl spaces, tunnels, trenches, conduits, manholes, pits or buried in earth, or exposed to the outdoors, with bituminous or preservative paint.
 - c. All wooden surfaces installed for the purposes of affixing starters, panels, controls, etc., with semi-gloss black before devices are affixed to the surface and at end of job.
2. Trenching: Unless otherwise specified, all trenches for conduit or cable included in Electric Work Contract dug by Electric Work Contractor with trenching machine to minimum width for conduit or cable in accordance with soil conditions. Cut sidewalks, paved drives and parking areas with masonry saw, unless otherwise specified. Bed all conduits and cables as required by National Electric Code and manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Electric Work Contract: Install new and unused materials of latest style and as specified free of all defects which impair appearance and operation. Provide materials and equipment meeting design and capacity specified by description and manufacturer's catalog number. Include all necessary auxiliary components to form complete, operating and approved installation.
- B. Painting of Components in Electric Work Contract: Comply with requirements specified in SECTION 099100.
- C. Sleeves, Inserts, Fasteners, Hangers, Supports, and Similar Components: Provide all necessary sleeves, inserts, fasteners, hangers, supports, connectors, etc., for complete electrical system meeting approval of Architect.
- D. Channel Support Systems: Install channels for backing conduits, trapeze suspensions, cable racks, panel racks, fixture supports, etc. Similar to Kindorf G-953 Series, Unistrut or Globe.

1. Provide all necessary bolts, screws, angles, anchors, connection plates, straps, for complete installation.

E. Electrical Identification Devices

1. Name Plates: White plastic with black engraved letters and/or numbers. Unless otherwise noted, provide single line of text, 1/2" high lettering on 1 1/2" high nameplate (2" high nameplate where 2 lines of text are required). Provide text matching terminology and numbering of the Contract Drawings and/or shop drawings. Nameplates shall be permanently fastened utilizing self-tapping stainless steel screws or pop rivets. Where fasteners cannot penetrate the mounting substrate, contact-type permanent adhesive shall be permissible.
2. Directories: Typewritten and enclosed in plastic and mounted in metal or wood frame.
3. Tags: Reinforced white cardboard.
4. Conduit Markers: Pressure-sensitive vinyl marker, 1-1/8" x 4-1/2", with orange background with black letters; similar to Thomas and Betts E-Z Code, Stranco Lamicode or equal; provided on appropriate components of following systems:
 - a. Emergency
 - b. Exit lights
 - c. Fire alarm
5. Underground Tape: Polyethylene 4 mil thick 3" wide; with black continuous printing. Provide red background for electric lines and orange background for telephone lines. Similar to Thomas and Betts, Stranco or equal.

F. Fire stopping: 1-part silicone elastomer compound; similar to "Dow Corning Fire Stop Sealant #2000" by Dow Corning Corp., Midland, Michigan.

1. Apply Fire stopping by filling annular space between sleeves and conduits in openings through fire-rated floors and interior walls.
2. Provide Fire stopping specified in all fire-rated wall and ceiling penetrations complying with ASTM E 119 requirements for rated assemblies with fire-rating indicated on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Painting: Comply with requirements specified in SECTION 099100.
- B. Trenching: Arrange for inspection of trench by Architect's Representative, Clerk of the Works, NBFU, and utility company as required for Project. Notify Architect's Representative for inspection of all underground services prior to backfilling. Uncover any underground services as required by Architect's Representative, NBFU, or utility company if backfill in place prior to inspection. Comply with requirement of applicable DIVISION 2 sections for all backfill, compaction, grading, seeding, and paving.
- C. Channel Support System Installation
 1. Use galvanized threaded rod hangers for all trapeze supports.
 2. Use channel support system for supporting dry type transformers, free standing panels, starters, etc.
 3. Obtain approval of all exposed support systems and methods.

D. Identification Installation

1. Name Plates: Install nameplates on all Panels, Contactors, Starters, Disconnect Switches, and Time clocks. Name plates shall contain numbers and/or letters as shown on plans and schedules.
2. Directories: Install directories in Panels (identifying each circuit) and in equipment requiring instructions for operation.
3. Tags: Install tags on all wiring in junction boxes, wiring in fire alarm panels and cabinets, pull wire left in empty conduit, telephone wire at termination blocks, and sound system wire at termination blocks.
4. Conduit Markers: Install markers approximately 20' apart on all conduits in mechanical spaces, basements, crawl spaces, attics, and above lay-in ceilings. Install markers on work installed under this contract.
5. Underground Tape: Install underground tape over all underground electric and telephone lines.
6. Color Coding: Color codes to meet NEC requirements.

E. Fire stopping

1. Preparation: Comply with Fire stopping manufacturer's written instructions for cleaning and preparation of joints, environmental conditions (weather and temperature), priming, and backer rod/bond breaker tape installation.
2. Comply with Fire stopping manufacturer's printed instructions unless more stringent requirements are shown on Drawings or specified in Documents. Comply with directions provided by Fire stopping manufacturer's technical representative.
3. Use installation techniques ensuring Fire stopping is deposited in uniform continuous ribbons without gaps or air pockets, providing complete "wetting" of joint bond surfaces on opposite sides.
4. Cure Fire stopping compounds in accordance with manufacturer's instructions and recommendations producing high early bond strength, internal cohesive strengths and surface durability.
5. Comply with all applicable installation requirements of ASTM E 119 for applicable fire-ratings.

END OF SECTION

SECTION 260514 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. General requirements applicable to all components and systems included in Electric Contract.

B. Products Installed but Not Furnished Under This Section

1. Make all electrical connections to equipment shown on Drawings and furnished by others. Obtain approved wiring diagrams and location drawings for roughing in and final connections from Contractor furnishing equipment. Provide and install disconnect switches, push button stations, and similar components, required but not furnished with equipment.

1.2 REFERENCES

A	AIA	-	American Institute of Architects
B	AISC	-	American Institute of Steel Construction
C	ANSI	-	American National Standards Institute
D	ASTM	-	American Society of Testing Materials
E	IEEE	-	Institute of Electric and Electronic Engineers
F	IES	-	Illuminating Engineering Society
G	NBFU	-	National Board of Fire Underwriters
H	NEC	-	National Electric Code
I	NEMA	-	National Electrical Manufacturers' Association
J	NFPA	-	National Fire Protection Association
K	UL	-	Underwriters' Laboratories, Inc.

1.4 SUBMITTALS

- ##### A. Comply with requirements of SECTION 01330 - Submittals and as modified below. Refer to submittal listing in each section for specific items required.

B. Shop Drawings

1. Electric Layouts: Submit detailed drawings showing exact sizes and locations for approval before beginning work.

C. Samples

1. Factory-Finished Surfaces: On all submittals, indicate standard factory color. Where more than one color is available, selection made by Architect from manufacturer's full range of colors.

- D. Contract Closeout Submittals: Comply with requirements of SECTION 01700, including submission of operating and maintenance instructions as item in "Electric Work Instructions" manual described in that section.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements

- 1. Codes and Standards: Comply with all applicable Federal, State and Local Building and Electrical Codes, Laws, Ordinances, and Regulations, and comply with all applicable NFPA, National Electrical Code and Utility Company requirements and regulations. Provide Underwriter's Laboratory Seal on all materials.
- 2. Permits and Inspections: Obtain all approvals, tests, and inspections required by Architect, Engineer, Local Electrical Inspector, agent or agency specified in Project Manual, or National, State, or Local Codes and Ordinances.
 - a. Furnish all materials and labor necessary for tests and pay all costs associated with tests and inspections.
 - b. Conduct all tests under load for load balancing and where required by Codes, Regulations, Ordinances, or Technical Specification.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection

- 1. Take all reasonable precautions to store materials and products to protect finishes and not permit dust and dirt to penetrate equipment.
- 2. Replace all equipment damaged beyond reasonable repair as required by Architect.
- 3. Refinish any equipment with marks, stains, scratches, dents, etc., as required by Architect.

1.7 COORDINATION OF WORK

A. Cutting and Patching (as required for installation of components and systems included in Electric Contract):

- 1. New Construction
 - a. Openings, Chases, Recesses, Lintels and Bucks (required for admission of Electric Contract systems and components): Coordinate requirements with General Contractor for inclusion in General Contract. Furnish all necessary information (e.g., locations and sizes) to General Contractor in ample time for installation of systems and components included in Electric Contract.
 - b. Anchor Bolts: Deliver to General Contractor all anchor bolts required for Electric Contract construction that are to be installed in construction included in General Contract.
 - c. Locate settings, check locations as installation in General Contract progresses, and provide templates or holding fixtures as required to maintain proper accuracy.
- 2. Existing Construction: Unless otherwise specified, employ General Contractor for all cutting, patching, repairing and replacing of general work required for installation of systems and components included in Electric Contract. Secure approval before cutting.

- a. Anchor Bolts: Deliver to General Contractor all anchor bolts required for Electric Contract construction that are to be installed in construction included in General Contract. Provide templates or holding fixtures as required to maintain proper accuracy.
- B. Access Doors: Provide and install all access doors shown on Drawings or required for access to pull boxes, junction boxes, relays and all other electrical devices requiring periodic inspection, adjustment or maintenance, where located above or within inaccessible walls or ceilings, and including cutting and patching of adjacent walls and ceilings to match existing materials and finishes.
 - 1. Access Doors for material and installation requirements for access doors provided and installed as part of Electric Contract.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION

3.1 CUTTING AND PATCHING

- A. In no case may floors or walls that are waterproofed be cut for the admission of any equipment or materials, nor may any structural members be pierced without written permission.
- B. Furnish and install all sleeves, inserts, panels, raceways, boxes, etc., ahead of the general construction work and keep a man on the job during the installation of the general construction work to be responsible for and to maintain them in position.
- C. Unless otherwise noted elsewhere in the contract documents, the Electric Contractor shall bear the expense of all cutting, patching, repairing or replacing of the work of other trades made necessary by any fault, error or tardiness on the part of or damage done by him. He shall employ and pay the contractor whose work is involved.

END OF SECTION

SECTION 260523 - GROUNDING

PART 1 – GENERAL

1.1 SCOPE

- A. The electric system neutral, the neutral of each separately derived system, 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.

PART 2 – PRODUCTS

2.1 MATERIALS AND APPLICATIONS

Grounding conductors shall be of THWN insulated copper, unless otherwise indicated. Grounding bus bars in distribution equipment shall be bare copper. Aluminum and aluminum alloys are not acceptable as grounding materials. 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.

- A. Clamps for attaching conductors to building steel shall be of steel, bronze, or malleable iron.
- B. 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.
- C. Driven grounding electrodes shall consist of copper clad steel rods. Rods shall be 8 feet long and 5/8" diameter unless otherwise indicated.
- D. Bonding bushings shall be of steel or malleable iron with non-removable plastic throats rated 150 deg. C.
- E. Bonding locknuts and wedges for service conduits shall be of zinc coated steel.

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. Where isolated grounds are indicated, or required to serve isolated ground type receptacles, provide two equipment grounding conductors of equal size; one to ground raceways, boxes, and other enclosures; the other to connect to the isolated grounding terminals on the equipment or its special receptacle. Both grounding conductors shall be provided in each branch circuit and each feeder raceway back to the point where the service neutral, or the separately derived system neutral, is connected to ground.
- D. 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.
- E. Grounding terminals on wiring devices, other than isolated ground receptacles, but 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.
- F. Where metal raceways enter sheet metal enclosures through knockouts provide bonding bushings and jumpers to the enclosure under any of the following conditions:
 - 1. Voltage exceeds 250 volts to ground.
 - 2. Branch circuit conduit exceeds 1" in size.
 - 3. Feeder conduit regardless of voltage and size.

3.2 GROUNDING ELECTRODE SYSTEM

- A. The grounding electrode system for the service neutral and service equipment shall include connections to the following:
 - 1. The water main at the nearest accessible point to where it enters the building and on the street side of the main valve. This connection shall remain accessible after construction is complete.
 - 2. A ground rod using #4 AWG copper conductor. Provide additional ground rods not less than 6 feet apart where needed to comply with NEC ground resistance limitations, and resistance limitations specified herein.
 - 3. Structural metal building frame, where applicable.

- B. Grounding electrode conductors 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.
- C. The Contractor shall test the ground resistance of the completed grounding electrode system. If test indicates a resistance to ground in excess of 15 ohms it shall be reduced to 15 ohms or less by providing additional ground rods.
- D. Prior to making the final main bond jumper connection from the grounding electrode conductor to the system neutral, the contractor shall demonstrate by megger test adequate isolation from ground of the system neutral. This test will require that the system neutral be suitably isolated from utility neutral if it has been grounded in any way by the utility.

3.3 SEPARATELY DERIVED SYSTEMS

- A. The secondary of each Dry-Type Transformer, and the output of each Generator whose neutral is not solidly connected to the service neutral are considered to the Separately Derived Systems.
- 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.

END OF SECTION

SECTION 260533 - RACEWAYS AND FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Raceways for all conductors of size and type specified, installed per latest National Electric Code and as specified or shown on Drawings, including conduit, surface metal raceways, surface non-metallic raceways, telepower poles and cable tray.

1.2 SUBMITTALS

- A. Comply with requirements of SECTION 01300 - Submittals, SECTION 16010 - General Provisions, and as modified below.
- B. Product Data - Submit manufacturer's product literature for all specified equipment demonstrating compliance with specified requirements:
 1. Metal Clad (MC) cable

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. For convenience, details and specifications have been based on products by following manufacturers.
 1. Conduit
 - a. RGS: Allied Tube, Republic Steel, Wheatland Torrance Tubing, Western Tube
 - b. EMT: Allied Tube, Republic Steel, Torrance Tubing, Western Tube, Wheatland
 - c. Non-Metallic Conduit: Anaconda, Carlon, Midland-Ross, Pennwalt, Plastiline
 - d. Metal Clad Cable: AFC/Nortek and Kaiser
 - e. Metallic Fittings: Crouse-Hinds, Appleton, Afcor, Raco O.Z. Gedney
 - f. Non-Metallic Fittings: Carlon, Pennwalt, Plastiline

2.2 MATERIALS

A. Conduit

1. Rigid Galvanized Steel (RGS) Conduit: Rigid, hot dipped, galvanized steel with galvanized threaded malleable iron fittings and bushings with insulated throat (galvanized steel).
2. Electrical Metallic Tubing (EMT) Conduit: Metallic galvanized steel tube with galvanized steel set-screw type fittings and bushings with insulated throat (galvanized steel).
3. Non-Metallic (PVC) Conduit: Heavy wall rigid (Schedule 40) high impact PVC (polyvinylchloride), conforming to industry standards, Federal Specification W-C-1094, and Underwriter's Laboratories, Inc. Standard UL- 651.
4. Flexible Conduit: Flexible galvanized interlock with galvanized screw-in type steel fittings. Set screw fittings not acceptable.

5. Metal Clad (MC) Cable: Flexible galvanized interlock cable with galvanized steel screw-in type fittings, 98% conductivity #12 AWG annealed solid copper wire with 600 volt type THHN/THWN wire insulation.
6. Expansion Fittings: Weatherproof type with bonding jumper.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Conduit Installation: Securely support conduit from building construction, separately from outlet boxes and junction boxes. Secure to masonry surfaces with lead shields; plastic anchors not acceptable. Use flexible conduit for terminations to all transformers, motors, and equipment with motors or moving parts. Use liquid tight flexible conduit and fitting for all connections to equipment in pits, wet areas, and any areas subject to moisture. Use galvanized painted hanger rods, inserts and hangers. Conceal all conduit runs except in mechanical rooms, storage room ceilings, and areas above suspended ceilings. Run exposed conduit neatly, parallel and level, to ceilings, walls and floors. Make necessary offsets and bends to comply with construction. Install expansion fittings at all building expansion joints. Support all conduits with clamps per National Electric Code.
 1. Do not secure branch circuit wiring associated with equipment located within, supported by, or secured to fire-rated floor or roof/ceiling assembly to ceiling support wires. Where branch circuit wiring is associated with equipment located within, supported by, or secured to non-fire-rated floor or roof/ceiling assembly, branch circuit wiring may be supported by ceiling support wires.
 2. RGS and EMT Installation: Use RGS conduit in slabs, below slabs and where exposed, extending minimum 6" above and below slabs. Use RGS elbows when penetrating concrete slab from PVC conduit below or in slabs. Use EMT in block walls, ceilings and in all exposed interior areas.
 3. Metal Clad Cable: Use metal clad cable for branch circuit wiring beyond corridors for switches, receptacles, light fixtures, etc. Do not use metal clad cable in corridors other than for 6 ft. whips for lighting fixtures; provide EMT conduit for all homeruns above corridors. Do not install exposed metal clad cable in any areas, including mechanical and electrical spaces.
 4. Non-Metallic Conduit (PVC): Use for underground applications, in slabs, and below slabs. Provide rigid conduit when extending through slabs. Install in accordance with requirements of Article 347 of NEC.
 5. Conduit Painting: Refer to provisions for painting in SECTION 16050.
- B. Surface Raceways: Securely support from building construction, and secure to masonry surfaces with lead shields. Mount at heights at locations shown on Drawings; obtain approval for all routing not indicated on Drawings. Paint surface raceway only where indicated on Drawings.

END OF SECTION

SECTION 262416 - PANEL BOARDS

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 Drawings.

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 NEC requirements.
- C. Panelboard backboxes shall be constructed of galvanized sheet steel and shall be securely fabricated with screws, bolts, rivets, or by welding. Backboxes shall be a minimum 20" wide and 5-3/3" 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 flush with face and closed against a full inside trim stop. Hinges shall be inside type.
 - 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 backbox 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 buswork shall be of 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 drawings schedules indicate spaces for addition of future circuit breakers, furnish all necessary buswork, 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 suppressors in panelboard as indicated on the Drawings for limiting surge voltages and to prevent continued flow of follow current while remaining capable of repeating these functions.

2.2 DISTRIBUTION PANELBOARDS

- A. Manufactures:
 - 1. Cutler Hammer
 - 2. General Electric Company.
 - 3. Substitutions: As permitted by owner or indicated in the contract documents.

- B. Panelboards rated 400 amperes and greater shall be Distribution Type.
- C. Description: NEMA PB 1, circuit breaker type. Distribution Panelboard shall be Square D Company I-Line construction or GE Spectra type construction.
- D. Panelboard Bus: Silver or tin plated copper. One continuous fully rated bus bar per phase with ratings as indicated. Provide copper ground bus and copper neutral in each panelboard equipped with lugs to accommodate all conductors to be connected. Neutral bus shall be sized 50% and the ground bus shall be sized a minimum of 25% of panelboard bussing. Where more than one ground bar is furnished, each ground bar will be interconnected with a conductor sized not less than the panelboard feeder ground conductor. Ground bar shall be bonded to enclosure.
- E. Interior trim shall be dead front construction. Main lugs shall be mounted in the mains compartment.
- F. Main circuit breaker and main lug interiors shall be field convertible for top or bottom incoming feed.
- G. Enclosure: NEMA PB 1, Type 1 unless otherwise indicated on drawings.
 - 1. The operating handle of the top most mounted device shall be no higher than 6 feet 6 inches above the finished floor.
 - 2. Panelboard backbox shall be constructed without pre-punched knockouts.
 - 3. Circuit breakers used in service entrance equipment should be listed for such use. Cabinet front shall be a four piece surface trim for surface mount unless otherwise indicated on the drawings.
 - 4. Enclosure and front shall be either galvanized steel or stainless steel and shall be finished in manufacturer's standard grey enamel.
 - 5. The enclosure shall be minimum 26 inches wide.
- H. Minimum fully rated short circuit rating: RMS symmetrical amperage shall be minimum 22,000 amperes unless otherwise indicated on drawings.
- I. Molded Case Circuit Breakers: NEMA AB 1, UL 489 listed circuit breakers.
 - 1. Manufactured by the same company manufacturing the panelboard.
 - 2. Circuit breakers used in service entrance equipment should be listed for such use.
 - 3. Include shunt trip where required or as indicated on the contract documents.
 - 4. Rating plugs, where used, shall be front accessible.
 - 5. Breakers shall have minimum interrupting capacity, as indicated for the panelboard on the contract documents.
 - 6. Breaker frame sizes and trips shall be as indicated on the drawings.
 - 7. Circuit breakers shall provide positive indication of ON, OFF, and tripped conditions.

8. Breakers with frame sizes 100 Amperes and larger shall be plug-in-construction. Bolt-on-breakers are not acceptable. Exception: Where all of the branch circuit (feeder circuit) breakers are less than 100 Amperes frame size, the panelboard main, if there is one, may be bolt-on.
9. All breakers shall be quick-make, quick-break.
10. Multi-pole breakers shall be common-trip, resulting in all poles opening simultaneously under trip conditions.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Equipment shall be perfectly plumb and level.
- B. Openings in backboxes 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 260513 BASIC MATERIALS AND METHODS.
- F. Panelboard back boxes shall be mounted with their tops 6’ -8” above the floor.

END OF SECTION

SECTION 262723 - WIRES AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Conductors, including power feeder conductors, branch circuit conductors

B. Related Sections

1. SECTION 16050 - Basic Electrical Materials and Methods
2. SECTION 16110 - Raceways

1.2 SUBMITTALS

- A. Comply with requirements of SECTION 01300 - Submittals, SECTION 16010 - General Provisions, and as modified below.
- B. Product Data - Submit manufacturer's product literature for all specified conductors and cables demonstrating compliance with specified requirements:
 - a. Power conductors (below 600V)
 - b. Splices and terminations
 - c. Accessories

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Power Conductors (600 Volt and below) - Copper
 1. 98% conductivity, annealed copper, #12 AWG minimum size. Provide solid conductors for #10 and #12 AWG.
 2. Insulation: Use Type THHN/THWN in all locations. Use insulation, shielding, and jacketing as required by communications equipment manufacturer.
- B. Manufacturers
 1. Power Conductors (600 Volt and below): Southwire, Rome, Crescent.
 2. Communications Conductors: Belden, Carol, Alpha.
- C. Splices and Terminations
 1. 600 Volt Conductors: Use wire connectors similar to Ideal wire nuts or Scotchlok spring connectors for size #10 and smaller. Use T & B or Burndy Type KSU for sizes #8 and larger.
 2. Connectors and terminations installed with aluminum-alloy conductors shall be only those listed by UL Standard 486B, marked "AL9CU" for 90°C. rated circuits.

3. All connections and terminations shall be installed according to manufacturer's recommendations.
4. All bolted or screw-type terminations shall be specifically torqued to the torque setting specified by the manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Wire and Cable Installation: Install all wire and cable in approved raceway with exit light circuits, emergency lighting circuits, and special systems wiring installed in separate raceways. Use UL approved lubricants for wire pulling. Tag all feeders, subfeeders, special system wiring and branch circuit wiring at each pull box, junction box and gutter space indicating point of origin and termination. Install green grounding wire in flexible conduit for connection to equipment, motors, transformers, etc., and install communication cables as detailed in individual sections.
- B. Splices and Terminations: Make all splices accessible. Insulate all splices, taps, connections to insulation value of conductor. Follow all instructions and recommendations of the splice material manufacturer. Terminate communication cables with termination blocks as described in individual sections.

END OF SECTION

SECTION 262727 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Switches
2. Receptacles
3. Coverplates

B. Related Sections

1. SECTION 16130 - Boxes
2. SECTION 16400 - Service and Distribution

1.2 SUBMITTALS

A. Comply with requirements of SECTION 013000 - Submittals and as modified below.

B. Product Data - Submit manufacturer's product literature and technical specifications for following components demonstrating compliance with specified requirements:

1. Single pole switches
2. Three way switches
3. Switches with pilot lights
4. Standard receptacles
5. Surge suppression receptacles
6. Ground fault interrupting (GFI) receptacles
7. Coverplates

PART 2 - PRODUCTS

2.1 MATERIALS

A. Switches for Lighting

1. Light Switches: 20 amp heavy duty specification grade, toggle type, quiet operation, and flush mounted, rated 120/277 volt. Provide single, three-way, four-way or key operation as indicated on Drawings. Gray color. Similar to Hubbell HBL1221GY or approved equal by General Electric or Pass & Seymour.
2. Light Switch with Pilot Light: 20 amp heavy duty specification grade, toggle type quiet operation, grounding, flush mounted, rated 120/277 volt. Provide single, three-way or four-way operation as indicated on the Drawings. Lighted ivory nylon toggle. Similar to Hubbell HBL1221ILCN, or approved equal by General Electric or Pass & Seymour.
3. Dimmer Switch: Rated 1500W for incandescent lighting, heavy duty, specification grade, 125V, 60 Hz, static free, full-on bypass, RFI protected. Gray color. Similar to Pass & Seymour Cat. No. 91581-GRY or approved equal by Lutron or Hubbell.
4. Combination Occupancy Sensor/Wall Switch: Rated 10 amperes, 120/277 volt, 60 Hz fluorescent loading, compatible with electronic ballasts, 180° sweep; 10° downward viewing angles. Time delay adjustable from 15 secs. to 15 mins. Gray color; Green LED indicator. Similar to Pass & Seymour Cat. OSC3020-GRY or approved equal by Watt Stopper or Universal Energy Controls

(UEC).

B. Receptacles

1. Duplex Receptacles: Specification grade, UL Listed, 125 volt, 20 amp, 3 wire grounding, NEMA 5-20R. Color to match existing devices in bldg. Similar to Hubbell 5362GRY or approved equal by Pass & Seymour or General Electric.
2. Ground Fault Interrupting (GFI) Receptacles: 20 amp, 125VAC, 60 Hz, NEMA 5-20R. Trip threshold: 5 mA (\pm 1 mA). Trip time: 0.025 sec. Max. interrupting capacity: 2000 A. UL listed under 498 (Receptacle Requirements) and 943 (Class A Requirements). Gray color. Similar to Hubbell GF5362GY or approved equal by Pass & Seymour or General Electric.
3. Surge Suppression Receptacles: 20 amp, 125VAC, 60 Hz. with clamping response of less than 1 nanosecond, 210 joules, and 13,000A per node. UL Listed under 498 and 1449. Power-on indicating light; (light off - power interrupted, light flashing - surge suppression damaged, Blue color similar to Hubbell 5362GYS or approved equal by Pass & Seymour or General Electric.
4. Special Duty Receptacles: Type and configuration as indicated on the Drawings or elsewhere within these Specifications.

C. Coverplates:

1. Stainless Steel Coverplates: Type 302 or 304, satin finish, 0.040 inch thick, accurately die cut, protected with release paper. Flush mounting plates shall be beveled with smooth rolled outer edge. Surface mounting plates shall be beveled and pressure formed for smooth edge to fit box. Single and combination plates as required to match types and sizes of specified wiring devices.
2. Weatherproof Coverplates: Flame retardant, UV stabilized polycarbonate, non-conductive, UL Listed, tamper resistant. NEMA 3R rated while in use to comply with NEC 410-57. Single and combination plates as required to match types and sizes of specified wiring devices. Similar to plates as manufactured by Taymac Corp., Carlon Industries or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Switch and Receptacle Installation: Mount all devices in metal outlet box, flush or surface as required. Align all devices in vertical direction and at heights as specified, as shown on Drawings, or required by equipment. Confirm all non-standard mounting heights with casework installer prior to installation.
- B. Coordinate with all other work, including painting, electrical boxes and wiring installations, as necessary to interface installation of wiring devices with all other Work. Install coverplates after all painting work is complete. Clean all dirt, debris and building materials from boxes prior to installing wiring devices.

END OF SECTION

SECTION 264316 - TVSS

PART 1 - GENERAL

1.1 SCOPE

- A. These specifications describe the electrical and mechanical requirements for a high energy transient voltage surge suppression system (TVSS). The specified system shall provide effective high energy surge current diversion, sine wave tracking as required for electrical line noise filtering and be suitable for application in ANSI/IEEE C62.41 Category A, B, and C environments, as tested by ANSI/IEEE C62.11, C62.45 and MIL-STD-220A. The system shall be connected parallel with the protected system; no series connected elements shall be used which limit load current KVA capability.

1.2 STANDARDS

- A. The specified system shall be designed, manufactured, tested and installed in compliance with:
 - 1. Canadian Standards Association (CSA).
 - 2. American National Standards Institute and Institute of Electrical and Electronic Engineers (ANSI/IEEE C62.11, C62.41, and C62.45).
 - 3. Federal Information Processing Standards Publication 94 (FIP PUB 94).
 - 4. National Electrical Manufacturer Association (NEMA).
 - 5. National Fire Protection Association (NFPA 20, 70, 75, and 780).
 - 6. Underwriters Laboratories (UL 1449, UL 1283) MIL-STD-220A.

1.3 SYSTEM DESCRIPTION

- A. The individual TVSS units shall be UL listed under UL 1449 (Rev. 7/2/87) Standard for Transient Voltage Surge Suppressions (TVSS) and the surge ratings shall be permanently affixed to the TVSS.

1.4 SYSTEM DESCRIPTION

- A. Operating Temperature range shall be -40 to +50 C (-40 to +122 F)
- B. Storage temperature range shall be -55 to +85 C (-67 to +187 F)
- C. Operation shall be reliable in an environment with 0% to 95% non-condensing relative humidity.
- D. The TVSS shall generate an audible noise level of not more than 45 dba at 5 feet.
- E. The unit shall not generate any appreciable magnetic fields and shall be suitable for use directly inside computer rooms.
- F. The system shall be capable of operating up to an altitude of 12, 000 feet above sea level.

- G. The TVSS maximum continuous operating voltage shall be greater than 115% of the nominal system operating voltage to ensure the ability of the system to withstand temporary RMS overvoltage (swell) conditions.
- H. The operating frequency range of the system shall be at least 47 to 63 Hertz.
- I. Protection Modes:
 - 1. All Modes. L-N, L-L, L-G, (N-G where applicable).
 - 2. Note: L = Line, N = Neutral, G = Ground

1.5 DOCUMENTATION

- A. The manufacturer shall furnish an installation manual with installation, start up, troubleshooting guide and operating instructions for the specified system.
- B. Electrical and mechanical drawings shall be provided by the manufacturer which show unit dimensions, weights, component and connection locations, mounting provisions, connection details and wiring diagram.
- C. Documentation of specified system's UL 1449 Listing and clamping voltage ratings of all protection modes shall be included as required product data submittal information.
- D. Independent fuse coordination tests from a nationally recognized independent testing laboratory.
- E. The manufacturer shall provide a full five year warranty from date of shipment against any part failure when installed in compliance with manufacturer's written instructions, UL listing requirements, and any applicable national or local electrical codes. Manufacturer shall make available local field engineering service support. Where direct factory employed service engineers are not locally available, travel time from the factory or nearest dispatch center shall be stated.
- F. The specified system shall be thoroughly factory tested before shipment. Testing of each system shall include but shall not be limited to qualify control checks, dielectric voltage withstand tests at twice rated voltage plus 1000 volts per UL requirements, and operational and calibration tests.

PART 2 – PRODUCTS

2.1 SERVICE EQUIPMENT TVSS

- A. The system shall be a symmetrically balanced, metal oxide varistor (MOV) array system, constructed using surge current diversion modules, each rated for at least 25 kAmps of surge current capacity based on the standard 8 x 20 microsecond waveform. Each module shall be capable of withstanding over 1000 pulses of the 10 kAmps IEEE C62.41 Category C surge current without degradation of clamping voltage. The module shall consist of multiple gap-less metal oxide varistors. The modules shall be monitored and a green LED shall be illuminated if the module is in full working order. When module performance is degraded, such as if one or more varistors have failed, the LED shall indicate a failed module.

- B. Terminals shall be provided for all of the necessary power and ground connections. The terminals shall accommodate wire sizes of #14 to #2/0 AWG.
- C. The nominal system operating voltage shall be 227/480 three phase WYE, 4 wire plus ground.
- D. The TVSS repetitive surge current capacity rating of the unit, based on an 8 x 20 microsecond waveform, shall be a minimum of 200 kAmps per phase (L-N+L-G).
- E. The minimum surge current capacity of the unit based on a standard 8 x 20 microsecond waveform with fusing in line shall be 12 kAmps per phase.
- F. The system performance ratings shall be based on the UI 1449 listing ratings for IEEE C62.41 Category C3 impulse waveforms of 20,000 V 1.2 x 50 microseconds, 10,000 A 8 x 20 microseconds equipment. The maximum UL 1449 clamping voltage ratings for each and/or all of the specified protection modes shall not exceed 800 Volts for 277/480 volt systems.
- G. Tests demonstrating clamping voltage following procedures established in ANSI/IEEE C62.45 (1987) and C62.41 Category C3 shall be applicable for service entrance TVSS. The clamping voltage shall be 1500 volts.
- H. The TVSS system shall provide a joule rating that meets or exceeds the requirements of ANSI/IEEE C62.41 Category C3 delivery capability.
- I. The system shall provide noise attenuation for electrical line noise of 40 dB.
- J. Fusing of the unit for protection against internal system fault conditions utilizing individual module fuses designed for this purpose. A 60A, 3 pole circuit shall be provided in the distribution equipment where the TVSS is utilized for circuit protection and as a means of disconnecting the TVSS from the line. These protection and disconnecting means shall be suitably monitored to allow a LED indication to show if the unit is not available for proper operation.

2.2 PANEL MOUNTED TVSS

- A. The TVSS shall be constructed using multiple surge current diversion arrays of metal oxide varistors (MOV), matched to 1% variance, each array rated for at least 40kA and 10 surges at 25kA of surge current capacity based on the standard 8 X 20 microsecond waveform. Each array shall be capable of withstanding over 1,250 pulses of the 10kA IEEE 62.41 Category C surge current without failure when tested per C62.11, C62.45, using suggested wait times. The array shall consist of multiple gap-less metal oxide varistors. The arrays shall be designed and constructed in a manner which ensures MOV surge current sharing. The status of each array shall be continuously monitored and a green LED shall be illuminated if the array is in full working order. All protection modes, including N-G, shall be monitored.
- B. The nominal system operating voltage shall be 120/208 three phase WYE, 4 wire plus ground.
- C. The TVSS repetitive surge current capacity rating of the unit, based on an 8 x 20 microsecond waveform, shall be a minimum of 130 kAmps per phase (L-N+L-G).

- D. The system performance ratings shall be based on the UL 1449 listing ratings for IEEE C62.41 Category B3 impulse waveforms of 6kV 1.2 x 50 microseconds, 3kA 8 x 20 microsecond waveshapes. The maximum UL 1449 listed surge rating for each and/or all of the specified protection modes shall not exceed:
 - 1. 400 Volts for 120/208 volt systems.
- E. The TVSS system shall provide a joule rating that meets or exceeds the requirements or ANSI/IEEE C62.41 Category C delivery capability.
- F. Typical response time of all suppression components shall be .5 nanoseconds
- G. All parallel connections to the TVSS shall be kept as short as possible. The connection to the TVSS shall be made using No. 8 AWG minimum.

PART 3 – INSTALLATION

3.1 MISCELLANEOUS REQUIREMENTS

- A. The installing contractor shall connect the TVSS in parallel to the power source, keeping conductors as short and straight as practically possible. The contractor shall twist the TVSS input conductors together to reduce input conductor impedance.
- B. When installed to an electrical distribution panelboard the unit shall be close nipped to the panel and be supplied by a 30 amp circuit breaker.
- C. The contractor shall follow the TVSS manufacturer's recommended installation practices and comply with all applicable codes.

END OF SECTION

SECTION 265100 - LIGHTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Luminaires and lampholders.
- B. Lamps.
- C. Ballasts.

1.2 SUBMITTALS

- A. Shop Drawings: Indicate construction details for Products which are not manufacturer's standard.
- B. Product Data: Provide product data for each luminaire and lighting unit.

1.3 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Conform to requirements of NFPA 101
- C. Furnish products listed by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction.

1.4 MAINTENANCE

- A. Provide two extra of each type lamp installed.

PART - PRODUCTS

2.1 LUMINAIRES AND LAMP HOLDERS

- A. Luminaire Schedule: Product requirements for each luminaire and lampholder are specified in luminaire schedule on Drawings.
- B. Accessories: Provide required accessories for mounting and operation of each luminaire as indicated.
 - 1. Recessed Luminaires: Provide trim type suitable for ceiling system in which luminaire is installed.
 - 2. Thermal Protection: Provide thermal protection devices to meet NFPA 70 requirements.
 - 3. Surface Luminaires: Provide spacers and brackets required for mounting.
 - 4. Pendant Luminaires: Provide swivel hangers, pendant rods, tubes, and chains as indicated to install luminaire at appropriate height.

2.2 LAMPS

- A. Manufacturers:
 - 1. General Electric
 - 2. Sylvania
- B. Description:
 - 1. LED Type.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine adjacent surfaces to determine that surfaces are ready to receive work.

3.2 INSTALLATION

- A. Install luminaires and accessories in accordance with manufacturer's instructions.
 - 1. Provide pendant accessory to mount suspended luminaires and exit signs at height indicated. Use swivel hanger on sloped ceilings.
 - 2. Support surface-mounted luminaires from ceiling grid tee structure; provide auxiliary support laid across top of ceiling tees. Fasten to prohibit movement.
 - 3. Install recessed luminaires to permit removal from below. Install grid clips.
 - 4. Install lamps in luminaires and lampholders.
 - 5. Provide safety wires on all recessed troffers tied to building steel per ASTM.

3.3 ADJUSTING AND CLEANING

- A. Align luminaires and clean lenses and diffusers at completion of work.
- B. Aim adjustable luminaires and lampholders as indicated or as directed.
- C. Adjust directional arrows on exit signs to meet approval of authority having jurisdiction.
- D. Clean paint splatters, dirt and debris from installed luminaires.
- E. Touch up luminaire finish at completion of work.
- F. Relamp luminaires which have failed lamps at completion of work.

3.4 SCHEDULES: See drawings for all schedules.

END OF SECTION

SECTION 310000 - EARTHWORK

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Grading
- B. Excavation
- C. Backfilling
- D. Compaction
- E. Remove and Replace Topsoil
- F. Dressing of Shoulders and Banks
- G. Stone Drainage Filter
- H. Water Control
- I. Testing

1.2 RELATED SECTIONS

- A. Section 01 45 00 – Quality Control
- B. Section 01 45 23 – Testing and Inspecting Services
- C. Section 31 10 00 – Site Clearing

1.3 REFERENCES (LATEST REVISION)

- A. ASTM D 448 – Sizes of Aggregate for Road and Bridge Construction.
- B. ASTM D 1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.
- C. ASTM D 2487 – Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- D. ASTM D 6938 – In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- E. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- F. ASTM E 329 – Agencies Engaged in Construction Inspection and/or Testing.

1.4 SUBMITTALS

- A. Section 01 33 00 – Submittal Procedures: Procedures for submittals.

- B. Materials Source: Submit gradation analysis, proctor results, and soil classification for all borrow material.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with County of Georgetown standards.

1.7 TESTING

- A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).
- B. In place density tests in accordance with ASTM D 6938.
- C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- D. The testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any of the tests.
- E. Owner shall select and engage the testing laboratory. Testing laboratory shall be responsible to the Owner and Owner's Engineer. Payment for laboratory and all tests shall be by the Owner, except Owner specifically reserves the right to deduct from Contractor's payment, expenses and charges of testing laboratory when:
 - 1. Contractor gives notice the work is ready for inspection and testing, and fails to be ready for the test, and/or
 - 2. Testing of the Contractor's work, products or materials fail, and retesting is required, and/or
 - 3. Contractor abuses the services or interferes with the work of the testing laboratory in the conduct of this work.
- F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Borrow shall consist of sand or sand-clay soils capable of being readily shaped and compacted to the required densities, and shall be reasonably free of roots, trash, rock larger than 2 inches, and other deleterious material.
- B. All soils used for structural fills shall have a PI (plastic index) of less than 10, and a LL (liquid limit) of less than 30. Fill soils shall be dried or wetted to appropriate moisture contents prior to compaction. Additionally, fill soils used for the top 2 feet of fill beneath roads and parking lots shall have no more than 15% passing the # 200 sieve. Fill soils used for house lots shall have no more than 25% passing the # 200 sieve.
- C. Contractor shall furnish all borrow material.

- D. Contractor shall be responsible for and bear all expenses in developing borrow sources including securing necessary permits, drying the material, haul roads, clearing, grubbing, excavating the pits, placing, compaction and restoration of pits and haul roads to a condition satisfactory to property owners and in compliance with applicable federal, state, and local laws and regulations.

2.2 SOURCE QUALITY CONTROL

- A. If tests indicate materials do not meet specified requirements, change material and retest.
- B. Provide materials of each type from same source throughout the Work.

PART 3 – EXECUTION

3.1 TOPSOIL

- A. Contractor shall strip topsoil and stockpile on site at a location determined by the Owner at the Contractor's expense.
- B. Topsoil shall be placed to a depth of 4 inches over all disturbed or proposed landscaped areas.
- C. Topsoil shall be provided at Contractor's expense if it is not available from site.
- D. Any remaining topsoil determined by the Owner or Engineer to be useful will be stored on site at a location determined by the Owner at the Contractor's expense.
- E. Do not excavate wet topsoil.

3.2 EXCAVATION

- A. Suitable excavation material shall be transported to and placed in fill areas within limits of the work.
- B. Unsuitable material encountered in areas to be paved and under building pads, shall be excavated 2 feet below final grade and replaced with suitable material from site or borrow excavations. Contractor shall notify Engineer if more than 2 feet of excavation is needed to replace unsuitable material.
- C. Unsuitable and surplus excavation material not required for fill shall be disposed of off site.
- D. Proper drainage, including sediment and erosion control, shall be maintained at all times. Methods shall be in accordance with the National Pollutant Discharge Elimination System standards and other local, state, and federal regulations.
- E. Unsuitable materials as stated herein are defined as highly plastic clay soils, of the CH and MH designation, border line soils of the SC-CH description, and organic soils of the OL and OH description based on the Unified Soils Classification System. Further, any soils for the top two feet of pavement subbase shall have no more than 15% passing the # 200 sieve.

3.3 GROUND SURFACE PREPARATION FOR FILL

- A. All vegetation, roots, brush, heavy sods, heavy growth of grass, decayed vegetable matter, rubbish, and other unsuitable material within the areas to be filled shall be stripped and removed prior to beginning the fill operation.
- B. Sloped ground surfaces steeper than 1 vertical to 4 horizontal, on which fill is to be placed shall be plowed, stepped, or benched, or broken up as directed, in such a manner where fill material will bond with the existing surface.
- C. Surfaces on which fill is to be placed and compacted shall be wetted or dried as may be required to obtain the specified compaction.

3.4 FILL

- A. Shall be placed in successive horizontal layers 8 inches to 12 inches in loose depth for the full width of the cross-section and compacted as required.

3.5 FINISHED GRADING

- A. All areas covered by the project including excavated and filled sections and adjacent transition areas shall be smooth graded and free from irregular surface changes.
- B. Degree of finish shall be that ordinarily obtainable from either blade-grader or scraper operations, supplemented with hand raking and finishing, except as otherwise specified.
- C. Unpaved areas to within 0.1 feet of elevations shown on the drawings provided such deviation does not create low spots that do not drain.
- D. Paved Areas – Subgrade to within 0.05 feet of the drawing elevations less the compacted thickness of the base and paving.
- E. Building Pads – Subgrade to within 0.05 feet of the drawing elevations [less the thickness of the concrete slab].
- F. Ditches and lagoon banks shall be finished graded, dressed, and seeded within 14 calendar days of work to reduce erosion and permit adequate drainage.

3.6 DISPOSAL OF WASTE MATERIAL

- A. All vegetation, roots, brush, sod, broken pavements, curb and gutter, rubbish, and other unsuitable or surplus material stripped or removed from limits of construction shall be disposed of by the Contractor.

3.7 PROTECTION

- A. Graded areas shall be protected from traffic, erosion, settlement, or any washing away occurring from any cause prior to acceptance.
- B. Contractor shall be responsible for protection of below grade utilities shown on the drawings or indicated by the Owner at all times during earthwork operations.
- C. Repair or re-establishment of graded areas prior to final acceptance shall be at the Contractors expense.
- D. Site drainage shall be provided and maintained by Contractor during construction until final acceptance of the project. Drainage may be by supplemental ditching, or pumping if necessary, prior to completion of permanent site drainage.

3.8 DRAINAGE

- A. Contractor shall be responsible for providing surface drainage away from all construction areas. This shall include maintenance of any existing ditches or those constructed in the immediate vicinity of the work. Contractor shall provide proper and effective measures to prevent siltation of wetlands, streams, and ditches on both the Owner's property, and those properties downstream.

3.9 FIELD QUALITY CONTROL

- A. Compaction testing shall be performed in accordance with ASTM D 6938. Where tests indicate the backfill does not meet specified requirements, the backfill shall be reworked or removed and replaced, and then retested at the Contractor's expense.
- B. Unpaved areas – at least 90% of maximum laboratory density within 2% optimum moisture content unless otherwise approved by the Engineer.
- C. Paved Areas and Under Structures – top 6 inch layer of subbase to at least 98% of maximum laboratory density within 2% optimum moisture content. Layers below top 6 inches shall be compacted to 95% of maximum laboratory density within 2% optimum moisture content.
- D. Rolling and compaction equipment and methods shall be subject to acceptance by the Engineer. Acceptance in no way relieves Contractor of the responsibility to perform in correct and timely means.
- E. Number of Tests – Under paved areas, no less than one density test per horizontal layer per 5,000 square feet of subbase shall be made. In unpaved areas, no less than one density test per horizontal layer per 10,000 square feet of fill area shall be made. Under curb and gutter, no less than one density test per every 300 linear feet. [On building pads, no less than one density test per horizontal layer per 1,500 square feet of fill area shall be made.]

3.10 PROOF ROLLING

- A. Shall be required on the subbase of all curb and gutter and paved areas and on the base of all paved areas where designated by the Engineer. Proof rolling shall take place after all underground utilities are installed and backfilled. The operation shall consist of rolling the subbase or base with a fully loaded 10-wheeled dump truck. A full load shall consist of 10 to 12 cubic yards of soil or rock. The dump truck shall be capable of traveling at a speed of two to five miles per hour and be in sound mechanical shape with no exhaust leaks or smoking from burning oil. The Engineer shall determine number of passes and areas rolled.

END OF SECTION

SECTION 311000 - SITE CLEARING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Removal of surface debris.
- B. Removal of trees, shrubs, and other plant life.
- C. Topsoil excavation.

1.2 RELATED SECTIONS

- A. Section 31 00 00 – Earthwork.

1.3 REGULATORY REQUIREMENTS

- A. Conform to State and County codes for disposal of debris.
- B. Coordinate clearing Work with utility companies.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Provide tree protection materials as detailed on the construction drawings.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Verify existing plant life designated to remain is tagged or identified.

3.2 PROTECTION

- A. All trees on site will be saved except those marked specifically by the Owner's representative for removal during construction. No trees, including those marked for removal on site or any other tree, may be removed prior to the preconstruction conference. All trees not to be removed will be protected from injury to their roots and to their top to a distance three feet beyond the drip-line and no grading, trenching, pruning, or storage of materials may go in this area except as provided by an Owner's representative stakeout. Contractor will pay a penalty for any tree removed from the site that has not been marked specifically for removal. Contractor also will pay for any tree that dies due to damage during construction. This applies to all trees on site whether or not they are shown on the plans.
- B. Contractor shall not be held accountable for damages to trees resulting from placement of fill or removal of soils where such action is required by the contract documents. Any tree, the trunk of which is within 10 feet of any footing or trench, shall be exempt from these penalties except Contractor shall exercise all reasonable precautions to preserve even these trees. Contractor agrees to pay fines as established below in the event he or any of

his subcontractors causes loss or removal of trees designated to be saved under provisions of this contract.

The fines are as follows:

<u>Caliper</u>	<u>Fine</u>
1" – 2"	\$ 150.00
2" – 3"	200.00
3" – 4"	250.00
4" – 5"	400.00
5" – 6"	500.00
6" – 7"	600.00
7" – 8"	750.00
8" – 11"	1,500.00
12" – 20"	2,000.00
21" & larger	\$ 2,500.00

- C. Trees shall be graded by Owner's representative as to variety, condition, and site importance, with above figures acting as a maximum fine. Lowest assessment amount shall be no less than one-half of the above fine figures.
- D. Protect benchmarks, survey control points, and existing structures from damage or displacement.
- E. Protect all remaining utilities.
- F. Clearing operations shall be conducted to prevent damage by falling trees to trees left standing, to existing structures and installations, and to those under construction, and to provide for the safety of employees and others.

3.3 CLEARING

- A. Clear areas required for access to site and execution of work. Clearing shall consist of felling and cutting trees into sections, and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within area 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 cleared areas shall be trimmed of dead branches 1-1/2 inch or more in diameter. Limbs and branches to be trimmed shall be neatly cut close to the trunk of the tree or main branches. Cuts more than 1-1/2 inches in diameter shall be painted with an accepted treewound paint. Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations, by the erection of timber barriers or by such other means as circumstances require. Such barriers must be placed and be checked by the OWNER before construction observations can proceed (See 3.2). Clearing shall also include removal and disposal of structures obtruding, encroaching upon, or otherwise obstructing the work.

3.4 REMOVAL

- A. Where indicated or directed, trees and stumps shall be removed from areas outside those areas designated for clearing and grubbing. Work shall include felling of such trees and removal of their stumps and roots. Trees shall be disposed of as hereinafter specified.
- B. Remove debris, rock, and other extracted plant life from site.

3.5 DISPOSAL

- A. Disposal of trees, branches, snags, brush, stumps, etc., resulting from clearing and grubbing shall be the Contractor's responsibility and shall be disposed of, by removal from site. All costs in connection with disposing of materials will be at the Contractor's expense. All liability of any nature resulting from disposal of cleared and grubbed material shall become the Contractor's responsibility. Disposal of all materials cleared and grubbed will be in accordance with rules and regulations of the State of South Carolina. No material will be burned.

3.6 GRUBBING

- A. Grubbing shall consist of removal and disposal of stumps, roots larger than one inch in diameter, and matted roots from designated grubbing areas. This material, together with logs and other organic or metallic debris not suitable for building of pavement subgrade or building pads, shall be excavated and removed to a depth of not less than 18 inches below original surface level of the ground in embankment areas and not less than 2 feet below finished earth surface in excavated areas. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform to original adjacent ground.

END OF SECTION

SECTION 311210 – CONSTRUCTION OF SPORTS FIELDS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Work under this Section includes but is not limited to all Work associated with the construction of the playing field and is generally understood to include all sportsfield-related construction.
- B. The Contractor shall be responsible for providing all services, labor, equipment and materials necessary or convenient to the Contractor for completing the Work within the time specified in the Contract Documents, including but not limited to the following:
 - 1. Verification of subgrade to meet specified tolerances.
 - 2. Materials and labor to construct subgrade drainage system, if applicable.
 - 3. Materials and labor to construct the specified rootzone.
 - 4. Compliance with the Quality Requirements of Sections 1400 and 1410.
 - 5. Clean-up of the construction site.
- C. The elevations shown on the Drawings as existing are taken from the best existing data and are intended to give reasonably accurate information about the existing elevations. The Contractor shall become satisfied as to the exact quantities of materials and labor required to complete the Work of this Section.

1.2 QUALITY ASSURANCE

- A. Inspection and Approval:
 - 1. Wherever the terms "approve", "approval", or "approved", are used, they shall mean the approval of the Owner and Architect/Engineer.
 - 2. Materials and workmanship are subject to inspection by the Owner and Architect/ Engineer at any time and place, before or after installation, for compliance.
 - 3. Furnish the Owner and Architect/Engineer with every reasonable facility for ascertaining whether or not the Work performed and the products used are in accordance with the intent and requirements of the Specifications and Contract Documents. No Work shall be done or products used without suitable inspection by the Owner and Architect/Engineer. Failure to reject any defective Work or product shall not in any way prevent later rejection when such defect is discovered, or obligate the Owner to final acceptance.
 - 4. Inspection of the Work shall not relieve the Contractor of any obligations to fulfill the Contract. Defective Work shall be made good regardless of whether such Work has been previously inspected by the Owner and Architect/Engineer and accepted or estimated for payment. Failure of the Owner and Architect/Engineer to reject improper Work shall not be considered a waiver of any defect which may be discovered later or for Work actually defective.
 - 5. Contractor shall coordinate with the Owner's and Architect/Engineer's on-site representative to monitor progress and compliance with Plans and Specifications.

6. Inspected work that is found to be in violation of the Plans or Specifications shall be brought into compliance before the following, scheduled inspection.
 7. Provide surveys performed by a surveyor licensed in the State of South Carolina.
- B. Materials Equipment & Workmanship Warranty:
1. Guarantee workmanship for 12 months from the date of project final acceptance by Owner.
 2. Equipment and fittings shall be warranted according to manufacturer's guarantee.
- C. Contractor Qualifications:
- D. All WORK associated with constructing the sportsfields within the perimeter fencing of the playing areas, after subgrade construction, shall be performed by a Qualified Sportsfield Contractor meeting the following:
1. Shall be a specialty Contractor whose primary business is the construction or renovation, of sports turf facilities with a demonstrated ability to successfully construct professional-quality sports turf venues.
 2. Shall have renovated or constructed a minimum of 5 sports turf facilities within the last 3 years using the laser-grading techniques specified herein.
 3. Shall exhibit a high standard of professional conduct by not having defaulted on a bond or contract nor been involved in any litigation resulting from failure to perform on any past project.

1.3 TESTING AND QUALITY CONTROL

- A. Grading Tolerances and Verification
1. Verification of the Finished Subgrade
 - a. Prior to commencing installation of the drainage and irrigation systems, Owner and Architect/Engineer shall meet on site with Contractor to verify that finished subgrade falls within the specified tolerances. Surveyor shall take elevation readings at 10 random locations on each field to verify compliance.
 - b. If any of the elevations fail to fall within the specified tolerances, the area shall be regraded until it meets specifications.
 - c. If all of the readings reveal subgrade is uniformly high or low, indicating uniform planarity, the Owner shall review contractor's recommendation and determine if recommended action is appropriate.
 - d. Tests for compaction, moisture-content, and density compliance shall be conducted by an independent geotechnical engineer as specified in Section 310000, and shall be paid for by the Owner.
 2. Verification of Finished Grade Before Grassing
 - a. After final grading but before grassing is installed, Owner and Architect/Engineer shall meet on site with Contractor to verify finished grade falls within the specified tolerances. Surveyor shall take elevation readings at 10 random locations on each field to verify compliance.
 - b. If any of the elevations fail to fall within the specified tolerances, the area shall be regraded until it meets specifications.
 - c. If all of the readings reveal grade is uniformly high or low, indicating uniform planarity, the Owner shall determine appropriate action.

3. Verification of Finished Grade After Grassing
 - a. After sportsturf has been installed and rolled, Owner and Architect/Engineer shall meet on site with Contractor to verify finished grade falls within the specified tolerances. Owner's Surveyor shall take elevation readings at 10 random locations on each field to verify compliance.
 - b. If any of the elevations fail to fall within the specified tolerances, the entire area shall be regraded until it meets specifications.
 - c. If all of the readings reveal subgrade is uniformly high or low, indicating uniform planarity, the Owner shall review contractor's recommendation and determine if recommended action is appropriate.

B. Materials Testing

1. Rootzone Testing – Criteria
 - a. Materials testing for compliance
 - b. Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting all tests. The cost of all re-tests made necessary by the failure of materials to comply with the requirements of the Contract Documents shall be paid by the Contractor.
 - c. Materials to be used for rootzone components shall be tested as follows:
 - d. Complete Physical Analysis of Soil/Rootzone Mix (ASTM F1815) to include water permeability rate, pore space distribution, bulk density, water retention, pH, and particle size analysis.
2. Rootzone and Drainage Materials Testing -Before Construction Begins
 - a. Testing shall be paid for by the Owner and samples gathered by the Contractor.
 - b. Materials to be used for rootzone components and the underdrain backfill, if applicable, shall be tested.
3. Materials Verification Testing Before Delivery to Site
 - a. Testing of the rootzone and drainage materials for compliance before construction commences shall be paid for by the Owner and made by the Owner's Testing Agent once at the stockpile location or the vendor's yard prior to delivery to job site.
 - b. Obtain a 1 gallon sample from each of the rootzone materials, and have a Physical Analysis (ASTM F1815) test made by the same testing laboratory that tested the Contractor's submitted materials.
 - c. Materials that do not comply with the Contract Documents will be rejected.
4. Materials Testing During Construction
 - a. Testing of the rootzone material and drainage gravel, if applicable, for compliance after construction commences shall be made by the Owner's Testing Agent on materials delivered to the site.
 - b. Obtain a 1 gallon sample from each of the rootzone materials and have a Physical Analysis (ASTM F1815) test made by the same testing laboratory that tested the Contractor's submitted materials.
 - c. Repeat tests on rootzone material shall be made every 500 cu. yds.
 - d. Materials that do not comply with the Contract Documents will be rejected.

1.4 GRADING TOLERANCES

A. SUBGRADE

1. Subgrade shall be constructed in accordance with Section 312000 to within +/- 1/2 inch of the specified finish grade less the rootzone thickness.

B. ROOTZONE LESS SPORTSTURF

1. Rootzone shall be constructed as specified herein and in all areas uniformly fall within +/- 1/2 inch of the specified finish grade.

C. FINISH GRADE WITH SPORTSTURF INSTALLED

1. Finish grade after installing and rolling sportsturf in all areas uniformly fall within +/- 1/2 inch of the specified finish grade.

1.5 JOB CONDITIONS

- A. Utilities Protection: The sportsfield construction plan is not a survey of underground utilities. It is the responsibility of the Contractor to have all utilities clearly marked before starting work and to have the markings maintained throughout construction.
- B. Protection of Existing Site Elements: Protect remaining site elements, the work of other trades, adjacent properties, and easements, and rights-of-way, and all areas outside of the limit-of-work area. Damages shall be repaired at the Contractor's expense.
- C. Product Storage: During construction and storage, protect materials from damage, theft, and prolonged exposure to sunlight.
- D. Keep premises free from rubbish, debris, and waste material, at all times. Store materials so as not to interfere with the operation of the Project.
- E. Protection of Contractor's Work, Equipment, and Materials Contractor is solely responsible for protecting his work, materials, and equipment from damage, theft, and vandalism.
- F. The Contractor shall correlate his work with other site developments, Contractors, and Georgetown County work crews to accommodate other work, special events, and use of the site during construction.
- G. Sportsfield Construction operations shall be performed in a safe and proper manner, by Contractors meeting the qualifications described herein, with appropriate precautions being taken against all hazards.
- H. Work associated with this Section shall be maintained by the Contractor in good condition at all times until final acceptance by the Owner. Damage caused by erosion, acts of God, or construction operations during the life of the Contract, shall be repaired at the Contractor's expense using material of the same type as specified herein.
- I. The Contractor shall control grading in a manner to prevent water running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water can drain uninterrupted in existing gutters, other surface drains or temporary drains. Free access must be provided to all fire hydrants, water valves and meters.

1.6 SUBMITTALS

- A. The Contractor shall submit the following information to the Owner for review and approval:
- B. Materials To Be Submitted With Bid
 - 1. List of subcontractors and vendors to be used including: blending Contractor, rootzone-amendment supplier(s), irrigation subcontractor (if work is to be subcontracted), and sportsturf Contractor (if work is to be subcontracted).
- C. Materials To Be Submitted After Bid and During Construction
 - 1. Test results of the rootzone materials (amendments, topsoil inorganic amendments, and nutrient requirements from the specified laboratory.)
 - 2. Final rootzone mixture specifications based upon a Complete Physical Analysis of Soil/Rootzone Mix (ASTM F1815).
 - 3. Certificates and Bills of Lading for all rootzone material and amendment deliveries.
 - 4. Product warranties and manufacturer specification sheets that prove a product's compliance and suitability for inclusion in the Work.
 - 5. Use a Certified Lab to perform a Complete Physical Analysis on Rootzone Mix and provide mixture specification recommendations, including compliance of materials and/or organic Matter source and quantity, and other amendments necessary.

PART 2 - PRODUCTS, MATERIALS, AND EQUIPMENT

2.1 SPORTSFIELD CONSTRUCTION EQUIPMENT

- A. Grading equipment used to construct the sportsfield shall be either low-ground pressure (max 4.7 psi) bulldozers equal to a CAT LGP D5, or a three-axle motor grader weighing not more than 8500 lbs.
- B. Grading apparatus shall be equipped with dual laser pickups (dual laser range mode). One pickup shall be mounted on each end of the grading blade.
- C. The laser pickup shall actuate the blade elevation controls automatically when locked on the laser beam that is emitted from a central control station. Each of the two receivers mounted on the blade shall operate one end of the blade respectively.
- D. The laser source shall be capable of accuracy to three decimal points (.000) of grade and shall be capable of operating in either a positive or negative angle configuration without being physically moved, relocated, or re-setup.
- E. Tiller / Cultivator for Incorporating Amendments shall be either a ROTERA cultivator or a Lily Earth-Shaper, pulled behind a rubber-tired tractor maximum 75 hp.
- F. Aeration of the rootzone shall be made using an aerator equal to an Aeroway AERAVATOR pulled by a max. 75 hp, rubber-tired tractor.

2.2 ROOTZONE PROFILER

- A. Install rootzone mix to depths shown on plans on sportsfields only, or as directed by Architect/Engineer.
- B. ROOTZONE SAND
Materials shall meet the following specifications for Sportsturf Rootzone Mix (SRM) Sands:

- a. Water Permeability Rate (ASTM F 1815): 8.0 - 15.0 in./hr.
- b. Water Retention at FC: 12-18%

c. PARTICLE SIZE CRITERIA FOR THE ROOTZONE SAND
SRM is composed of predominantly medium fine sand with no gravel.

Very Coarse	(1 mm)	.0 to 7%
Coarse and Medium	(0.5 mm)	Greater than or equal to 60%
Fine	(0.15 mm)	Less than or equal to 20%
Very Fine	(0.05 mm)	Less than or equal to 5%
Silt & Clay	(0.02-.05 mm)	Less than or equal to 8%

C. INORGANIC SOIL CONDITIONER

Soil conditioners and inorganic rootzone amendments such as vitrified or calcined clay shall be equal to TURFACE MVP SPORTS FIELD CONDITIONER for heavier clay soils or PROFILE FIELD & FAIRWAY CONDITIONER for sandier soils manufactured by Profile Products LLC or approved equal.

Material shall be an illite, montmorillinite clay & silica blend at 40% minimum and 60% minimum amorphous silica, processed in a rotary kiln at temperatures not less than 1200 degrees Fahrenheit.

Material shall be screened and de-dusted.

Material shall not exceed 5% degradation on ASTM-C88 Sulfate Soundness Test, nor exceed 5% degradation on a Static Degradation Test.

D. ORGANIC MATTER

Organic matter and other amendments shall be incorporated into the rootzone mix in accordance with the approved rootzone mixture specification.

2.3 SPORTSTURF

- A. As described in Section 329200 Turf and Grasses.

PART 3 - EXECUTION

3.1 SUBGRADE ADJUSTMENTS AND ACCEPTANCE

- A. The Contractor shall carefully schedule the sportsfield construction work with all other site developments.

- B. Contractor shall commence his Work immediately after subgrade elevation of the sportsfield has been reached and that Work has been acceptably completed in accordance with the Contract Documents.

3.2 STAKING AND LAYOUT

- A. Sportsfield-related Work shall be located in the field accurately and in compliance with the Drawings by a qualified Surveyor, who shall be employed directly by the Contractor.
- B. During layout, consult with the Owner to verify proper placement and for recommendations where adjustments are required.
- C. Do not commence any Work of this Section without Owner's and Architect/Engineer's approval of the staked locations of the sportsfield elements.
- D. Contractor to stake out infield (back tip of home plate and all bases) for Owner's and Architect/Engineer's approval prior to fence installation.

3.3 UNDERGROUND IRRIGATION SYSTEM

- A. The irrigation system laterals, mains, swing-joint connections, valves, wiring, and flow-control devices shall be installed prior to commencing work on the underfield drainage system, if applicable, and after subgrade adjustment is completed.
- B. Install the irrigation system as described in Section 328400 and as described on Plans.

3.4 ROOTZONE CONSTRUCTION

- A. After laser-grading the surface, Contractor shall construct the rootzone as follows:
 1. Install the rootzone to a minimum depth of 8" and assure it meets the uniform depth specified, and that laboratory test results indicate compliance with specifications.
 2. Apply the inorganic soil conditioner and thoroughly and homogeneously incorporate throughout the rootzone.
 3. After completely constructing the rootzone layer, laser grade and roll surface to the grades specified.
 4. Apply fertilizer and any other amendments and nutrients specified by soil test at the specified rates. Incorporate fertilizer using an aerator, as specified, by making two passes in opposite directions, or as necessary to completely and homogeneously incorporate the amendments throughout the rootzone.
 5. Roll and grade surface, using the roller and laser-actuated grading equipment described herein, to assure the finished, compacted grade everywhere falls within the specified tolerances.

3.5 CLEAN-UP

- A. Remove litter, debris, and waste material from site daily.

- B. Clean all equipment and remove standing water from valve boxes and other equipment prior to final inspection.
- C. Locate debris piles generally out of sight and allow Owner safe, unobstructed access and to maintain traffic sightlines.
- D. Do not use local trash collectors or dumpsters without written permission.

3.6 BASIS OF ACCEPTANCE

- A. After successful completion of all required work, repairs, replacements, punch-list items, and the submittal of all required materials, the Contractor shall arrange a final inspection of the work by the Owner and Architect/Engineer.
- B. Acceptance of the work shall be contingent upon the decision of the Owner.

END OF SECTION 311210

SECTION 312500 - EROSION AND SEDIMENTATION CONTROLS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions apply to this section.

1.2 DESCRIPTION OF WORK

- A. Extent of soil erosion control work includes all measures necessary to meet the requirements of this section.

Erosion and sediment control measures shall be installed prior to any construction activity.

Soil erosion and sediment control measures shall include all temporary and permanent means of protection and trapping soils of the construction site during land disturbing activity. Activity covered in this contract shall meet standards of NPDES General Permit for the state where work is performed.

1.3 PURPOSES

- A. Contractor is to achieve the following goals:
 1. Minimize soil exposure by proper timing of grading and construction.
 2. Retain existing vegetation whenever feasible.
 3. Vegetate and mulch denuded areas as soon as possible.
 4. Divert runoff away from denuded areas.
 5. Minimize length and steepness of slopes when it is practical.
 6. Reduce runoff velocities with sediment barriers or by increasing roughness with stone.
 7. Trap sediment on site.
 8. Inspect and maintain erosion control measures.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of soil erosion control systems products of types and sizes required, whose materials have been in satisfactory use for not less than 5 years.
- B. Codes and Standards: Comply with all applicable Local, State, and Federal Standards pertaining to soil erosion control.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instruction for soil erosion control materials and products.

PART 2 – PRODUCTS

2.1 GRASSING MATERIALS

- A. Refer to Section 32 92 00 – Turf and Grasses.
 - 1. General: All grass seed shall be free from noxious weeds, grade A recent crop, recleaned and treated with appropriate fungicide at time of mixture. Deliver to site in original sealed containers with dealer's guarantee as to year grown, percentage of purity, percentage of germination and date of the test by which percentages of purity and germination were determined. All seed sown shall have a date of test within six months of the date of sowing.
 - 2. Type of Seed: Either Annual Rye or Common Bermuda Grass seed will be used depending on time of year in which seeding is to occur.
 - 3. Mulch: Straw.
 - 4. Fertilizer: Commercial balanced 4–12–12 fertilizer.

2.2 HAY BALES

- A. Standard size, densely baled straw or hay, wrapped with synthetic or wire bands (two minimum per bale).

2.3 SILT FENCE

- A. Silt fence shall be a woven geotextile fabric sheet. Fabric shall be a synthetic polymer composed of at least 85% by weight propylene, ethylene, amide, ester, or vinylidene chloride, and shall contain stabilizer and/or inhibitors added to the base plastic to make filaments resistant to deterioration due to ultra-violet and/or heat exposure. Fabric should be finished so the filaments will retain their relative position with respect to each other. Fabric shall be free of defects, rips, holes, or flaws.

Fabric shall meet the following requirements:

Woven Fabrics	
Grab Strength	90 lbs.
Burst Strength	175 PSI
UV Resistance	80%

2.4 CHEMICALS FOR DUST CONTROL

- A. Calcium Chloride, Anionic Asphalt Emulsion, latex Emulsion or Resin-in-Water Emulsion may be used for dust control.

2.5 RIP-RAP

- A. Shall be hard quarry or field stone of such quality the pieces will not disintegrate on exposure to water, sunlight, or weather. Stone shall range in weight from a minimum of

25 pounds to a maximum of 125 pounds. At least 50 percent of the stone shall weigh more than 60 pounds. The stone shall have a minimum dimension of 12 inches.

2.6 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products before ordering. Engineer will review all products before they are ordered.

PART 3 – EXECUTION

3.1 GENERAL

- A. All disturbed soil areas except those to support paving shall be graded and protected from erosion by grassing. Disturbed areas must be grassed within 14 days of work ending unless work is to begin again before 21 days. Storm water conveyance systems shall have sediment barriers installed at all entrances, intersections, change in direction and discharge points.

3.2 GRASSING

- A. Refer to Section 32 92 00 – Turf and Grasses.

3.3 SEDIMENT BARRIERS

- A. Hay Bales for Sheet Flow Applications:
 - 1. Excavate a 4 inch deep trench the width of a bale and length of proposed barrier. Barrier should be parallel to the slope. Place barrier 5 to 6 feet away from toe of slope, unless otherwise instructed.
 - 2. Place bales in the trench with their ends tightly abutting. Corner abutment is not acceptable. A tight fit is important to prevent sediment from escaping through spaces between the bales.
 - 3. Backfill the trench with previously excavated soil and compact it. Backfill soil should conform to ground level on downhill side of barrier and should be built up to 4 inches above ground on uphill side of bales.
 - 4. Inspect and repair or replace damaged bales promptly. Remove hay bales when uphill sloped areas have been permanently stabilized.
- B. Rock Ditch Check
 - 1. Excavate a 6 inch deep trench the width and length of proposed barrier. Install a non-woven geotextile fabric in the trench before placing rock for the ditch check.
 - 2. The body of the ditch check shall be constructed of 12 inch rip-rap. The upstream face may be covered with 1-inch washed stone.
 - 3. Ditch checks shall not exceed a height of 2 feet at centerline of the channel and have a minimum top flow length of 2 feet.
 - 4. Rip-rap shall be placed over the channel banks to prevent water from flowing around ditch check. Rock must be installed by hand or mechanical placement

(no dumping of rock) to achieve complete coverage of the ditch and ensure the center of the check is lower than the edges.

5. The maximum spacing between ditch checks shall be where the toe of the upstream check is at the same elevation as the top of the downstream check.
6. Contractor shall maintain ditch checks as required by State regulations.

3.4 SILT FENCE

- A. Silt fence shall be placed at approximate location shown and installed in accordance with the detail on the construction drawings. Contractor shall maintain silt fence as required by state regulations.

3.5 DUST CONTROL

- A. Dust raised from vehicular traffic will be controlled by wetting down access road with water or by the use of a deliquescent chemical, such as calcium chloride, if relative humidity is over 30%. Chemicals shall be applied in accordance with manufacturer's recommendations.
- B. Contractor shall use all means necessary to control dust on and near the work, or off-site borrow areas when dust is caused by operations during performance of work or if resulting from the condition in which any subcontractor leaves the site. Contractor shall thoroughly treat all surfaces required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of work on site.

3.6 SEDIMENT BASIN

- A. A sediment basin equal in volume to 3,600 cubic feet per disturbed acre is required. The sediment basin/lagoon adjacent to the outfall for the site shall be constructed and stabilized prior to any additional land disturbed activity.

3.7 RIP-RAP

- A. Rip-Rap shall be placed at the locations shown and installed in accordance with the detail on the construction drawings.

3.8 CONSTRUCTION EXIT

- A. Construct exit at the location shown per detail on the construction drawings. Contractor shall maintain construction exit as required by state regulations.

3.9 INLET PROTECTION

- A. Install inlet protection per detail on the construction drawings. Contractor shall maintain inlet protection as required by state regulations until all disturbed surfaces are stabilized.

END OF SECTION

SECTION 313116 - 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 South 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 313116

SECTION 313700 - RIP-RAP

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Material placed as bank protection and erosion control.

1.2 RELATED SECTIONS

1.3 ALLOWABLE TOLERANCES

- A. Depth of rip-rap blanket as shown on the drawings and in these specifications is a minimum depth.

1.4 REFERENCES (LATEST REVISION)

- A. ASTM C 150 – Portland Cement.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Stone Rip-Rap: Shall be hard quarry or field stone of such quality the pieces will not disintegrate on exposure to water, sunlight, or weather. Stone shall be solid and non-friable and range in weight from a minimum of 25 pounds to a maximum of 150 pounds. At least 50 percent of the stone pieces shall weigh more than 60 pounds. The stone pieces shall have a minimum dimension of 12 inches. Documents indicating stone analysis, source and other pertinent data (i.e. – filter fabric) shall be submitted for review by the Engineer prior to delivery.
- B. Sand-Cement Bag Rip-Rap:
 - 1. Bags: Shall be of cotton, burlap, or fiber-reinforced paper capable of containing the sand-cement mixture without leakage during handling and placing. Bags previously used for any purpose shall not be used. Capacity shall be not less than 0.75 cubic foot nor more than two cubic feet.
 - 2. Cement: Portland cement shall be Type I meeting requirements of ASTM C 150. Cement which has been damaged, or which is partially set, lumpy, or caked shall not be used.
 - 3. Fine Aggregate: Shall be composed of hard, durable particles, free from injurious amounts of organic impurities and shall contain, in the material passing the No. 10 sieve, not more than 7 percent clay, and not more than 20 percent passing the No. 200 sieve.
- C. Filter Fabric: Shall be a woven fabric of monofilament and multifilament yarn equivalent to Mirafi FW700. Fabric shall be finished so the filaments will retain their relative position with respect to each other. Fabric shall contain stabilizers and/or inhibitors added to make filaments resistant to deterioration due to ultraviolet and/or heat exposure. Fabric shall be free of flaws, rips, holes, or defects.

2.2 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products before ordering. Engineer will review all products before they are ordered.

PART 3 – EXECUTION

3.1 PREPARATION

- A. The surface to receive rip-rap shall be prepared to a relatively smooth condition free of obstruction, depressions, debris, rises, and soft or low density pockets of material. Contours and elevations on construction drawings are to the surface of rip-rap material.

3.2 PLACEMENT

- A. Filter fabric shall be placed with the long dimension running up slope. The strips shall be placed to provide a minimum width of one foot of overlap for each joint. Fabric shall be anchored in place with securing pins of the type recommended by fabric manufacturer. Pins shall be placed on or within 3 inches of the over-lap. Place fabric so upstream strip will overlap the downstream strip. Fabric shall be placed loosely to give and avoid stretching and tearing during placement of the stones.

- B. Minimum depth or thickness of stone blanket shall be 12 inches with no under tolerance. Stones shall be dropped no more than three feet during construction. Placing shall begin at bottom of slope. Provide a toe trench if required as detailed on the construction drawings. Entire mass of stone shall be placed to conform with lines, grades, and thickness shown on the plans. Rip-rap shall be placed to its full course thickness at one operation and in such a manner as to avoid displacing the underlying material. Placing of rip-rap in layers, or by dumping into chutes, or by similar methods likely to cause segregation, will not be permitted.

Larger stones shall be well distributed and the entire mass of stone shall conform to gradation specified. All material used in rip-rap protection shall be placed and distributed so there will be no large accumulations of either the larger or smaller sizes of stone.

It is the intent of these specifications to produce a fairly compact rip-rap protection in which all sizes of material are placed in their proper proportions. Hand placing or rearranging of individual stones by mechanical equipment may be required to secure the results specified.

- C. Sand-Cement Bag Rip-Rap: Bags shall be uniformly filled. Bagged rip-rap shall be placed by hand with tied ends facing the same direction, with close, broken joints. After placing, bags shall be rammed or packed against one another to produce the required thickness and form a consolidated mass. The top of each bag shall not vary more than 3 inches above or below required plane. When directed by the Engineer or required by construction drawings, header courses shall be placed.

END OF SECTION

SECTION 321123 - AGGREGATE BASE COURSES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Aggregate base course.

1.2 RELATED SECTIONS

- A. Section 01 22 00 – Unit Prices: Requirements applicable for the work of this section.
- B. Section 01 45 00 – Quality Control.
- C. Section 31 00 00 – Earthwork

1.3 REFERENCES (LATEST REVISION)

- A. ASTM C 131 – Resistance to Degradation of Small–Size Coarse Aggregate by Abrasion and Impact in the Lost Angeles Machine.
- B. ASTM D 1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.
- C. ASTM D 6938 – In–Place Density and Water Content of Soil and Soil–Aggregate by Nuclear Methods (Shallow Depth).
- D. ASTM D 3740 – Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.
- E. ASTM E 329 – Agencies Engaged in Construction Inspection and/or Testing.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

1.6 TESTING

- A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).
- B. In place density tests in accordance with ASTM D 6938.
- C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- D. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.
- E. Owner shall select and engage the Testing Laboratory. Testing Laboratory shall be responsible to the Owner and Owner's Engineer. Payment for laboratory and all tests shall be by the Owner, except Owner specifically reserves the right to deduct from Contractor's payment, expenses and charges of Testing Laboratory when:

1. Contractor gives notice the work is ready for inspection and testing, and fails to be ready for the test, and/or
 2. Testing of the Contractor's work, products, or materials fail, and retesting is required, and/or
 3. Contractor abuses the services or interferes with the work of the testing laboratory in the conduct of this work.
- F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Aggregate shall consist of processed and blended crushed stone. Aggregates shall be free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material and shall be durable and sound. Coarse aggregate shall have a percentage of wear not to exceed 65% after 500 revolutions as determined by ASTM C 131. Aggregate shall meet applicable requirements of Section 305.2 in the South Carolina Department of Transportation Standard 2007 Specifications for Highway Construction. Material shall meet the following gradation and other requirements:

Granite Stone or Recycled Concrete	
Sieve Size	Percent by Weight Passing
2"	100
1-1/2"	95 – 100
1"	70 – 100
1/2"	48 – 75
# 4	30 – 60
# 30	11 – 30
#200	0 – 12
Liquid Limit	0 to 25
Plasticity Index	0 to 6

Marine Limestone	
Sieve Size	Percent by Weight Passing
2"	100
1-1/2"	95 – 100
1"	70 – 100
1/2"	50 – 85
# 4	30 – 60
# 30	17 – 38
#200	0 – 20
Liquid Limit	0 to 25
Plasticity Index	0 to 6

- B. Prime Coat: Shall be EA–P Special, Emulsified asphalt, conforming to Section 407 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify subbase has been tested, is dry, and slopes and elevations are correct.
- B. ON SITE OBSERVATIONS OF WORK: Owner's Representative or Engineer will have the right to require any portion of the work be completed in their presence. If the work is covered up after such instruction, it shall be exposed by Contractor for observation at no additional cost to the Owner. However, if Contractor notifies Owner such work is scheduled, and the Owner fails to appear within 48 hours, Contractor may proceed. All work completed and materials furnished shall be subject to review by the Owner, Engineer, or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Owner, Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

3.2 PREPARATION

- A. Subbase shall be graded and shaped conforming to the lines, grades, and cross sections required and cleaned of all foreign substances prior to constructing base course. Do not place base on soft, muddy or frozen surfaces. Correct irregularities in subbase slope and elevation by scarifying, reshaping, and recompacting.
- B. At the time of base course construction, subbase shall contain no frozen material.
- C. Surface of subbase shall be checked by the Engineer or Project Representative for adequate compaction and surface tolerances. Ruts or soft yielding spots appearing in areas of subbase course having inadequate compaction, and areas not smooth or which vary in elevation more than 3/8 inch above or below required grade established on the plans, shall be corrected to the satisfaction of the Engineer or Project Representative. Base material shall not be placed until subbase has been properly prepared and test results have so indicated.

3.3 AGGREGATE PLACEMENT

- A. Aggregate shall be placed in accordance with South Carolina Department of 2007 Transportation Standard Specifications for Highway Construction Section 305 and in accordance with all terms included in these specifications.
- B. Level and contour surfaces to elevations and slopes indicated.
- C. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

- E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
- F. While at optimum moisture ($\pm 1-1/2\%$), compact base course with rollers capable of obtaining required density. Vibratory, flatwheel, and other rollers accepted by the Engineer may be used to obtain required compaction. Rolling shall continue until base is compacted to 98% of the maximum laboratory dry density as determined by ASTM D 1557. In-place density of the compacted base will be determined in accordance with ASTM D 6938.

3.4 PRIME COAT

- A. Bituminous material for the prime coat shall be applied uniformly and accurately in quantities of not less than 0.15 gallons per square yard nor more than 0.30 gallons per square yard of base course. All irregularities in the base course surface shall be corrected prior to application of prime coat. Clean the base course of all mud, dirt, dust, and caked and loose material
- B. Do not apply prime to a wet surface nor when temperature is below 40°F in the shade. Do not apply prime when rain threatens nor when weather conditions prevent proper construction and curing of prime coat.
- C. The primed base should be adequately cured before the binder or surface course is laid. In general, a minimum of 48 hours should be allowed for complete curing. Ordinarily, proper surface condition of the prime is indicated by a slight change in the shiny black appearance to a slightly brown color.

3.5 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with an acceptable 10-foot straight edge.
- B. Scheduled Compacted Thickness: Within 3/8 inch.
- C. Variation from Design Elevation: Within 3/8 inch.
- D. Depth measurements for compacted thickness shall be made by test holes through the base course. Where base course is deficient, correct such areas by scarifying, adding base material, and recompacting as directed by the Engineer.

3.6 FIELD QUALITY CONTROL

- A. Section 01 45 00 – Quality Control: Field observation.
- B. Density and moisture testing will be performed in accordance with ASTM D 1557 and ASTM D 6938.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Tests:
 - 1. Base Density and Thickness – One test per 5,000 square feet.

END OF SECTION

SECTION 321216SC - ASPHALT PAVING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Surface Course
- B. Binder Course

1.2 RELATED SECTIONS

- A. Section 01 22 00 – Unit Prices
- B. Section 01 45 00 – Quality Control
- C. Section 31 00 00 – Earthwork
- D. Section 32 11 23 – Aggregate Base Courses

1.3 REFERENCES (LATEST REVISION)

- A. ASTM D 946 – Penetration–Graded Asphalt–Cement for Use in Pavement Construction.
- B. ASTM E 329 – Agencies Engaged in Construction Inspection and/or Testing.
- C. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.
- D. ASTM D 2726 – Bulk Specific Gravity and Density of Non–Absorptive Compacted Bituminous Mixtures.
- E. ASTM D 2950 – Density of Bituminous Concrete in Place by Nuclear Methods.
- F. ASTM D 1188 – Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples.
- G. ASTM D 1754 – Effect of Heat and Air on Asphaltic Materials (Thin–film Oven Test).

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.
- B. Mixing Plant: Conform to South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Do not place asphalt mixture when ambient air temperature is less than that indicated in the Table nor when the surface is wet or frozen.

Lift Thickness	Min. Air Temperature, Degrees F.
1" or Less	55
1.1" to 2"	45
2.1" to 3"	40
3.1" to 4.5"	35

- B. Mixture shall be delivered to the spreader at a temperature between 250 degrees F and 325 degrees F.

1.6 GUARANTEE

- A. Contractor shall guarantee the quality of materials, equipment, and workmanship for a period of 12 months after acceptance. Defects discovered during this period shall be repaired by the Contractor at no cost to the Owner.

1.7 TESTING

- A. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- B. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.
- C. Owner shall select and engage the testing laboratory. Testing laboratory shall be responsible to the Owner and Owner's Engineer. Payment for laboratory and all tests shall be by the Owner, except Owner specifically reserves the right to deduct from Contractor's payment, expenses and charges of testing laboratory when:
 1. Contractor gives notice the work is ready for inspection and testing, and fails to be ready for the test, and/or
 2. Testing of the Contractor's work, products or materials fail, and retesting is required, and/or
 3. Contractor abuses the services or interferes with the work of the testing laboratory in the conduct of this work.
- D. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

2.1 TACK COAT

- A. Shall consist of asphalt binder (asphalt cement) or emulsified asphalt, conforming to Section 401 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction. Asphalt binder shall be PG64–22. The acceptable grades of emulsified asphalt are RS–1, MS–1, MS–2, HFMS–1, HFMS–2, SS–1, CRS–1, CRS–2, CMS–2, and CSS–1.

2.2 ASPHALT BINDER AND ADDITIVES

- A. Shall be PG64–22 and conform to Section 401 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.
- B. Anti–Stripping: Shall conform to requirements of Section 401 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

2.3 AGGREGATES

- A. General: Mineral aggregate shall be composed of fine aggregate or a combination of fine and coarse aggregate. Coarse aggregate shall be that portion of the material retained on a No. 4 sieve.

Fine aggregate shall be considered that portion passing the No. 4 sieve. Fine aggregate, coarse aggregate, and any additives in combination with the specified percentage of asphalt cement shall meet the requirements of tests specified, before acceptance may be given for their individual use. Marine (Fossiliferous) limestone shall not be used.

- B. Fine Aggregate: Shall conform to the requirements of Section 401 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
- C. Coarse Aggregate: Shall be granite stone and conform to the requirements of Section 401 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.
- D. Surface Course: The surface course shall consist of fine and coarse aggregate and mineral filler uniformly mixed with hot asphalt binder in an acceptable mixing plant. The plant shall conform to South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction. The gradations, asphalt content and air voids shall be the following:

TYPE C	
Square Sieve	% Passing
3/4 inch	100
1/2 inch	97 – 100
3/8 inch	83 – 100
No. 4	58 – 80
No. 8	42 – 62
No. 30	20 – 40
No. 100	8 – 20
No. 200	3 – 9
% Asphalt Binder	5.0 – 6.8
Air Voids, %	3.5 – 4.5

- E. Intermediate or Binder Course: The mineral aggregates and asphalt binder shall be combined in such proportions the composition by weight of the finished mixture shall be within the following range limits:

2.4 SOURCE QUALITY CONTROL AND TESTS

- A. Section 01 45 00 – Quality Control and Section 01 45 23 – Testing and Inspecting Services.

- B. Submit proposed mix design for review prior to beginning of work.
- C. Test samples in accordance with the requirements of these specifications.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. On-Site Observations: Owner's Representative or Engineer will have the right to require any portion of work be completed in their presence. If work is covered up after such instruction, it shall be exposed by the Contractor for observation at no additional cost to Owner. However, if Contractor notifies Engineer such work is scheduled, and Engineer fails to appear within 48 hours, the Contractor may proceed. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Owner, Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

- B. Contractor shall verify base has been tested, is dry, and slopes and elevations are correct.

3.2 PREPARATION

- A. Apply tack coat in accordance with Section 401 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction. Rate of application shall be 0.05 to 0.15 gallons per square yard of surface.
- B. Work shall be planned so no more tack coat than is necessary for the day's operation is placed on the surface. All traffic not essential to the work should be kept off the tack coat.
- C. Apply tack coat to contact surfaces of curbs and gutters. Apply in manner so exposed curb or gutter surfaces are not stained.
- D. Coat surfaces of manhole frames and inlet frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.3 PLACEMENT

- A. Construction shall be in accordance with Sections 401, 402, and 403 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.
- B. Asphaltic concrete shall not be placed on a wet or frozen surface.
- C. Compaction shall commence as soon as possible after the mixture has been spread to the desired thickness. Compaction shall be continuous and uniform over the entire surface. Do not displace or extrude pavement from position.

Hand compact in areas inaccessible to rolling equipment. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks. Compaction rolling shall be complete before material temperature drops below 175° F.

- D. Areas of pavement with deficient thickness or density shall be removed and replaced at no additional cost to the Owner.

3.4 TOLERANCES

- A. General: All paving shall be subject to visual and straightedge evaluation during construction operations and thereafter prior to final acceptance. A 10-foot straightedge shall be maintained in the vicinity of the paving operation at all times for the purpose of measuring surface irregularities on all paving courses. The straightedge and labor for its use shall be provided by the Contractor. The surface of all courses shall be checked with the straightedge as necessary to detect surface irregularities. Irregularities such as rippling, tearing or pulling, which in the judgment of the Engineer indicate a continuing problem in equipment, mixture or operating technique, will not be permitted to recur. The paving operation shall be stopped until appropriate steps are taken by the Contractor to correct the problem.
- B. Flatness: All irregularities in excess of 1/8 inch in 10 feet for surface courses and 1/4 inch in 10 feet for intermediate courses shall be corrected.
- C. Variation from Design Elevation:
 - 1. General Paving: Less than 1/4 inch.
 - 2. Accessible Routes: Shall not exceed 1/4 inch. However, accessible routes shall not exceed maximum ADA allowable slopes. Contractor shall remove and replace any and all portions of the accessible route that exceed maximum ADA allowable slopes.
- D. Scheduled Compacted Thickness: Within 1/4 inch per lift.
- E. Pavement Deficient in Thickness: When measurement of any core indicates the pavement is deficient in thickness, additional cores will be drilled 10 feet either side of the deficient core along the centerline of the lane until the cores indicate the thickness conforms to the above specified requirements. A core indicating thickness deficiencies is considered a failed test. Pavement deficient in thickness shall be removed and replaced with the appropriate thickness of materials. If the Contractor believes the cores and measurements taken are not sufficient to indicate fairly the actual thickness of the pavement, additional cores and measurements will be taken, provided the Contractor will bear the extra cost of drilling the cores and filling the holes in the roadway as directed.

3.5 FIELD QUALITY CONTROL

- A. Acceptance of the in-place density of the binder and surface courses shall be in accordance with the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.
- B. Density Testing: Performed in accordance with ASTM D-2726 and ASTM D-2950. Core samples for each day's operation shall be taken, tested and results reported to the Engineer the following day. The areas sampled shall be properly

restored by the Contractor at no additional cost to the Owner. Nuclear gauge tests shall be taken during the asphaltic concrete placement.

1. The pavement core and nuclear gauge densities shall range between 94% and 96% of the theoretical maximum laboratory density.

C. Temperature:

1. Asphaltic concrete shall not exceed 325 degrees F at any time.
2. Asphaltic concrete shall not be placed once the temperature of the mix falls below 250 degrees F or the delivered temperature is more than 15 degrees F below the batch plant's delivery ticket.
3. Temperature at time of loading shall be recorded on the truck delivery ticket.

D. Frequency of Tests:

1. Asphaltic Concrete – One test for each 250 tons placed.
 - a. Asphalt extraction and gradation test.
 - b. Core Sample
2. Field determination of density by nuclear method every 5,000 square feet during construction of the asphaltic concrete binder/surface course.

END OF SECTION

SECTION 02410 - PERVIOUS CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes exterior pervious cement concrete pavement for the following:
 - 1. Parking lots.
 - 2. Pavement markings.

1.2 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each pervious concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Qualification Data: Demonstrating compliance with requirements indicated in the "Quality Assurance" paragraph below.
 - 1. For pervious concrete manufacturer.
 - 2. For pervious concrete contractor.
- D. Concrete Jointing Plan, where a jointing plan has not been provided by the Engineer.
- E. Field quality-control test reports.
- F. Minutes of pre-installation conference.
- G. Test panels: As defined in "Quality Assurance" paragraph below.

1.3 QUALITY ASSURANCE

- A. General: Work shall conform to all requirements of American Concrete Institute document ACI 522.1, "Specification for Pervious Concrete Pavement", except as modified by these Contract Documents.
- B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with the equipment, material and production requirements of Section 701 of the South Carolina Department of Transportation Standard Specifications for Highway Construction and is a current member in good standing of the Carolinas Ready Mixed Concrete Association, Inc.
- C. Pervious Contractor Qualifications: A qualified pervious concrete Installer whose work has resulted in successful installation of pervious concrete pavements.
 - 1. Experience: Two years' experience in pervious concrete installation, including the verifiably, successful completion of at least five pervious concrete installations of equal or greater scope, in addition to requirements in Division 01 Section "Quality Requirements."
 - 2. Contractor's Field Supervision: Require Contractor to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 3. Personnel Certifications: At all times when work is in progress and for each placement crew, Contractor's field personnel shall have certifications from the National Ready Mixed Concrete Association (NRMCA) in at least one of the following combinations:
 - A. At least one NRMCA Certified Pervious Concrete Craftsman.
 - B. At least three NRMCA Certified Pervious Concrete Installers.

4. Pre-Approved Pervious Contractors: These pervious contractors are pre-approved based upon evidence of satisfactory completion of previous projects and have been found to meet or exceed the aforementioned personnel certifications found in Section 1.4.C.3:
 - A. ACE/Avant Concrete Construction, Inc.; Archdale, NC
 - B. Southern Concrete Construction; Anderson, SC
 - C. Construction Perfected, Inc.; North Augusta, SC
 - D. Magruder Construction; Sanford, FL
 - E. Pervious Solutions; Wilmington, NC
 - F. Swederski Concrete and Paving; Gastonia, NC

- D. Concrete Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 and ASTM C 1077 to perform material evaluation tests and to design concrete mixtures.
 1. Field testing shall be performed by an individual certified as both an NRMCA Certified Pervious Concrete Technician and an American Concrete Institute (ACI) Concrete Field Testing Technician – Grade 1.

- E. Test Panels: Cast two test panels of pervious concrete pavement, using the manufacturer, mixture proportions, materials, personnel, and equipment as proposed for the Project, to demonstrate strength, porosity, typical joints, surface finish, texture, color, and standard of workmanship.
 1. Notify Engineer seven days in advance of dates and times when test panels will be constructed.
 2. Each panel shall have a minimum size of 225 sq. ft. and be full-thickness indicated.
 3. Build test panels in the location indicated or, if not indicated, as directed by Engineer.
 4. Testing: Perform tests as indicated on “Field Quality Control” paragraph below.
 - A. Obtain Engineer's approval of test panels before starting installation of additional concrete.
 - B. Approved test panels may become part of the completed Work if accepted by Engineer and undisturbed at time of Substantial Completion.
 - C. Maintain approved test panels during construction in an undisturbed condition as a standard for judging the completed concrete.
 - D. Demolish and remove rejected test panels, or those subsequently damaged or disturbed, from the site.

- F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
 1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
 - A. Contractor's superintendent.
 - B. Independent testing agency responsible for concrete design mixtures.
 - C. Ready-mix concrete producer.
 - D. Pervious concrete contractor.
 - E. Owner's testing agency representative and technician responsible for testing.
 - F. Architect.
 - G. Engineer.

- G. Authorities Having Jurisdiction: Conform to requirements of all authorities having jurisdiction.
 1. Where conflicts exist between the requirements of the Contract Documents and those of authorities having jurisdiction, the higher quality or more restrictive requirement shall apply.

1.4 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
 1. Where Work activities encroach into public rights-of-way, provide traffic control to maintain safe transit of work area by vehicular and pedestrian traffic.
- A. All traffic control shall be in accordance with the requirements of the authorities having jurisdiction.

- B. Environmental Limitations: Do not install pervious concrete paving if subgrade is frozen, wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the ambient air temperature is below, or is expected to fall below, 40 deg F during the time of placement.
- C. Pavement-Marking: Proceed with pavement marking only on clean, dry surfaces; at a minimum ambient or surface temperature of at least 55 deg F, and not exceeding 95 deg F; and at a maximum relative of 85%. Do not apply pavement markings if rain is imminent or expected before time required for adequate drying.
- D. Scheduling and Protection: Plan construction to mitigate potential contamination of pervious pavement surface with sediment from adjoining grounds and vehicular traffic.
 - 1. Where practicable, delay installation until as late as possible in the construction sequence to avoid potential for contamination.
 - 2. Implement and maintain protection measures, as indicated in the "Protection" article below, immediately after installation is complete.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
 - 1. Use flexible or curved forms for curves as necessary in order to prevent a chord effect in the alignment of the finished work.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 PERVIOUS CONCRETE MATERIALS

- A. Comply with ASTM C 94/C 94M and the following requirements:
 - 1. Aggregate: Selected, hard, and durable; washed; free of materials with deleterious reactivity to cement or that cause staining; from a single source, with gap-graded coarse aggregate as follows:
 - A. Aggregate Sizes: Nominal maximum aggregate size shall not exceed 1/3 of the specified pavement thickness.
 - 2. Admixtures: Air-entraining, accelerating, hydration stabilizing, water reducing and other admixtures that facilitate the production and placement of pervious concrete shall be permitted provided that they do not produce any adverse effect to the strength or longevity of concrete or reinforcement. At a minimum, the mix shall include the following types of admixtures:
 - A. Water reducing admixtures conforming to ASTM C 494 Type A or F
 - B. Air-entraining admixtures
 - C. Viscosity modifying admixtures
 - D. Hydration stabilizing admixtures (if ambient temperature exceeds, or is expected to exceed, 70° F at any time during batching, delivery or placement)

2.3 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film, min thickness: 6 mils.
 - 1. Color shall be clear or white during summer months. During cooler weather, black color may be used.

2.4 RELATED MATERIALS

- A. Isolation-Joint-Filler Strips: Shall conform to ASTM D 1751, ASTM D 1752, or ASTM D 994.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements, and as follows:
 - 1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.5 PAVEMENT MARKINGS

- A. Pavement-Marking Paint: Reflectorized, heavy metals free, fast drying, waterborne paint for pavement markings in accordance with Section 625 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
 - 1. Color: As indicated.
- B. Glass Beads: AASHTO M 247, Type 1.

2.6 CONCRETE MIXING

- A. Ready-Mixed Pervious Concrete: Measure, batch, mix and deliver concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. Discharge shall be complete within 60 minutes of the introduction of mixture water to the cement.
- A. Increase time to 90 minutes when using an extended set control (hydration stabilizing) admixture.
- 2. Water addition is permitted at the point of discharge provided it is performed under the supervision of a qualified, NRMCA Certified member of the placement crew or by a technically qualified employee of the ready mix concrete producer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Confirm that subgrade has been prepared according to requirements in Section 02222 "Earthwork". Proof-roll prepared subgrade according to requirements in Section 02222 "Earthwork" to identify soft pockets and areas of excess yielding. Proceed with installation only after deficient subgrades have been corrected and are ready to receive pervious concrete paving.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
 - 1. Provide joints at location indicated on the Drawings. Where not indicated, provide jointing plan and obtain Architect's approval before initiating concrete placement.
- A. Contraction joint spacing shall not exceed 20 feet.
- B. Locate contraction joints at intervals such that the larger horizontal panel dimension shall not exceed the smaller dimension by more than 125%.
- C. Where the pavement width exceeds 20 feet to a maximum of 40 feet, locate a longitudinal contraction joint along the centerline of the pavement.
- D. Where the pavement width exceeds 40 feet, locate longitudinal contraction joints at evenly spaced divisions not to exceed 20 feet.
- E. The angle between two intersecting joints shall be between 80 and 100 degrees.
- F. Joints shall intersect pavement free edges at 90 degrees and shall extend straight for a minimum of 18" from the pavement edge.
- G. Align joints with adjoining curbs, where applicable.
 - 2. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
 - 1. Extend joint fillers full width and depth of joint.
 - 2. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - 3. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - 4. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction (Control) Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
 - 1. Saw Cut Joints: Saw cut joints are prohibited.
 - 2. Grooved Joints: Form contraction joints after initial compaction by grooving and finishing each edge of joint with grooving tool to a 1/2-inch radius. Repeat grooving of contraction joints after cross rolling. Eliminate groover marks on concrete surfaces unless indicated to remain.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete with an edging tool with a radius of not less than 1/4".

3.5 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
 - 1. Do not allow foot traffic on fresh concrete.
- E. Screed pavement surfaces with a form-riding paving machine, roller screed or vibrating truss-screed. Vibrating hand screeds are not acceptable.
- F. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
- G. When adjoining pavement lanes are placed in separate pours, do not operate concrete installation equipment on placed concrete until it has attained 85 percent of its 28-day compressive strength.
- H. Finish the pavement to the elevations and thickness indicated and to meet the tolerances indicated below.
- A. Do not use steel trowels or power finishing equipment.
- I. Cold-Weather Placement: Comply with ACI 306.1, recording concrete temperature no less than twice per 24-hr period. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. Concrete operations shall not be undertaken when air temperature has fallen to or is expected to fall below 40 deg F.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.
- J. Hot-Weather Placement: See ACI S22.1 and S3.11.1 when hot-weather conditions exist:
 - 1. Fog-spray forms and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 FINAL SURFACE TEXTURE

- A. Compact fresh concrete to the elevations and thickness indicated and to meet the tolerances indicated below.
- B. Compact concrete with either a manually operated roller applying approximately 40 lb/lf of force, or with a hydraulic roller keeping a consistent head of concrete across the entire roller.
 - 1. Sod rollers are prohibited.
- C. Compact concrete along the slab edges with hand tools being sure not to drag tool across the surface so as not to seal the surface.
- D. Compact concrete to a dense, pervious surface.

3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from vehicular or foot traffic, premature drying, and excessive cold or hot temperatures.
- B. Begin curing within 20 minutes of concrete discharge.
- C. Curing Method: Cure concrete by penetrating sealer and moisture-retaining-cover curing.
 - 1. Penetrating Sealer: The contractor shall use a penetrating sealer consisting of no less than 27% soybean oil and manufactured per U.S. Patent number 5,647,899. The sealer shall be spray applied at a rate of 200-300 sq.ft./gallon. The sealer shall be applied directly following the finish pass of the roller and before plastic is placed on the concrete.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- A. Secure curing cover material without using dirt.
- B. Cover shall be a minimum 6 mil thick white or clear polyethylene sheet.
- D. Cure pavement for a minimum of 7 uninterrupted days; 10 days if using supplementary cementitious materials.

3.8 PAVEMENT TOLERANCES

- A. Comply with the following:
 - 1. Elevation: +3/4 inch., -0"
 - 2. Thickness: Plus 1-1/2" inch, minus 1/4 inch.
 - 3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch.
 - 4. Joint Spacing: 3 inches.
 - 5. Contraction Joint Depth: Plus 1/4 inch, no minus.
 - 6. Joint Width: Plus 1/8 inch, no minus.
- B. Mechanically sweep pavement, using like-new, clean sweeping device, before testing for compliance with tolerances.

3.9 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.
- B. Sweep and clean surface to eliminate loose material and dust.
- C. Surface shall be dry and free of glaze, oil, dirt, grease or other foreign contaminants.
- D. Apply paint with mechanical equipment for the application of waterborne asphalt paint meeting the requirements of Section 625 of the South Carolina Department of Transportation Standard Specifications for Highway Construction.
 - 1. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
 - 2. Broadcast glass beads uniformly into wet pavement markings at a rate of 6 lb/gal.
- E. Apply to produce pavement markings of the dimensions indicated; which are straight or of uniform curvature; of consistent width; and with crisp, uniform, edges.
 - 1. The finished line markings shall be free from waviness and the lateral deviations shall not exceed 2 inches in 15 feet.
 - 2. No markings shall be less than the specified width.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Responsible party will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Fresh Concrete Testing: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Test density of fresh concrete, in accordance with ASTM C 1688, at the frequencies indicated below. Test results shall be considered acceptable when density measurements are within ± 5 pcf of the approved mix design theoretical density.
- A. Test Panels: One test for each test panel.
- B. Final Installation: One test for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
- C. Hardened Concrete Testing:
 - 1. Core Samples: Obtain drilled cores of hardened concrete in accordance with ASTM C 42 and the following requirements:
 - A. Cores shall be taken not less than 7 days after placement.
 - B. Cores shall be a minimum of 4" in diameter.
 - C. Cores shall be tested for hardened density in accordance with ASTM C 140.
 - D. Cores shall be tested for thickness in accordance with ASTM C 42.
 - E. Cores holes shall be filled with regular concrete or coarse pre-blended grout.
- F. Test panels:
 - 1) Testing Frequency: Three cores for each test panel.
 - 2) Test results shall be considered the average result of all three cores.
 - a) Acceptable tolerances for thickness shall be +1.5" and -0.25" (with no single core greater than -0.50")
 - b) Calculate and save average hardened density test results for future comparison with final installation test results.
- G. Final Installation:
 - 1) Testing Frequency: Three cores for each lot of 5,000 sf of placed concrete, to be take at locations determined in accordance with ASTM D 3665.
 - 2) Test results shall be considered the average result of all three cores of each 5,000 sf lot.
 - a) Acceptable tolerances for thickness shall be +1.5" and -0.25" (with no single core greater than -0.50")
 - b) Test results shall be considered acceptable for density when measurements are within $\pm 5\%$ of the approved hardened density measured for the test panels.
- D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, concrete mixture proportions and materials, and test results.
- E. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that requirements have not been met, as directed by Engineer.
- F. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

- B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete.
- C. Protect paving installations from deposition of sediments from adjoining grounds and vehicular traffic.
 - 1. Install and maintain erosion control measures as necessary, at boundaries of paving installations, to prevent migration of sediment onto the pavement surface.
 - 2. Do not allow tracking of mud or debris onto the pavement surface by any vehicle.
 - 3. If deposition of sediment on the paving surface is noted, immediately contact Architect and request instructions for cleaning and repair. Do not delay cleaning efforts as subsequent rainfall events will wash sediments into lower levels of the paving system and worsen potential damage.
- D. Erect and maintain barricades to prevent construction traffic on the paving surface.
 - 1. Provide alternate construction traffic routes to discourage potential use of paving installation by construction traffic.
 - 2. Where alternative construction routes are not available, contact Engineer for instructions regarding use of pavement for construction access. Implement, monitor, and maintain any specified protection measures.
- E. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Vacuum concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 02421 - CONCRETE SURFACES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete curb, gutter, curb and gutter, sidewalks, and driveways.
- B. Reinforcement.
- C. Surface finish.
- D. Curing.

1.02 RELATED SECTIONS

- A. Section 01410 - Testing Laboratory Services.
- B. Section 02100 - Earthwork.
- C. Section 02400 – Hot Mixed Asphalt Pavement.
- D. Section 03250 - Concrete.

1.03 REFERENCES

- A. ACI 347 - Recommended Practice for Concrete Form Work.
- B. ASTM A 185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- C. ASTM A 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- D. ASTM C 309 - Liquid Membrane - Forming Compounds for Curing Concrete.
- E. PS 1 - Construction and Industrial Plywood.
- F. SCDOT SS - South Carolina Department of Transportation Standard Specifications for Highway Construction, latest edition.

1.04 QUALITY ASSURANCE

- A. Obtain materials from same source throughout.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete in temperatures less than 40 degrees F without Engineer's approval.

1.06 WARRANTY

- A. Contractor shall provide an unconditional maintenance free warranty in writing, for all concrete surfaces including curbs and gutters, sidewalks, and driveways against defects in workmanship and materials for a period of one (1) year. The warranty period shall begin on the date of the final approval.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portland Cement Concrete: Class 3000 conforming to the requirements of Section 03250.
- B. Forms: Metal, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required. Coat forms with nonstaining type coating that will not discolor or deface surface of concrete.
- C. Joint Fillers: Resilient pre-molded bituminous impregnated fiberboard units complying with ASTM D 1751 and AASHTO M 213.
- D. Welded Steel Wire Fabric: ASTM A 185, plain type, coiled rolls, uncoated finish 6"x6" mesh of 0.135-inch diameter.
- E. Reinforcing Bars: ASTM A 615, 60 ksi yield grade, billet-steel deformed bars with uncoated finish as specified in the Drawings.
- F. Curing Compound: ASTM C 309, Type 1.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify compacted subgrade is ready to support concrete surfaces and imposed loads.
- B. Verify grades and elevations of subgrade are correct. Correct deficiencies in grade, contour, and compaction.
- C. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

- A. Moisten subgrade before placement of concrete.

3.03 FORMING

- A. Set forms to required grades and lines, rigidly braced and secured.
- B. Place joint fillers vertical in position, in straight lines. Secure to form work during concrete placement.
- C. Clean forms after each use, coat with form release agent as often as required to ensure separation from concrete without damage.

3.04 REINFORCEMENT

- A. Place reinforcing steel as indicated in the Drawings.
- B. Support reinforcing on metal chairs or spacers to provide 1-1/2 inch clear from top of finish surface unless specified otherwise in the Drawings.
- C. Place wire mesh to provide one full mesh lap at sides, minimum 8 inch at ends.
- D. Interrupt reinforcement at expansion joints.

3.05 CONCRETE PLACEMENT

- A. Do not place concrete until subgrade and forms have been checked for line and grade.
- B. Place concrete using methods which prevent segregation of mix.
- C. Curb extruding equipment may be used in lieu of forms. Machine placement must produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as directed by the Engineer.
- D. Concrete curb and gutters shall be constructed in 10 foot sections, except where shorter sections are necessary for closures; but no section shall be less than 4 feet in length. The sections shall be separated by steel divider plates full depth.

3.06 CONCRETE WALKS AND DRIVEWAYS

- A. Slope the paving abutting walls and other vertical surfaces away from such structures at not less than 1/8 inch per foot and finish true planes to avoid standing water. Pitch unconfined walks to one side at 1/4 inch per foot.
- B. Thickness: Concrete walks - 4 inches; concrete driveways - 6 inches; unless otherwise noted on the Drawings.
- C. As soon as conditions permit, perform joint work, edging and marking. Score in straight lines and tool neatly. Maintain joint pattern previously established on existing sidewalks.
- D. Finish edges with a radius of 1/4 inch.
- E. Preformed expansion joints shall be 3/4 inch thick placed not over 25 feet apart and where concrete walk abuts a structure or vertical surface. Expansion joints are not required adjacent to curbs.
- F. Score contraction joints at 5 foot intervals in walks and at 10 foot intervals in driveways.
- G. Where sidewalk slabs are more than 10 feet in width, they shall be scored longitudinally in the center. Transverse and longitudinal scoring shall extend for a depth of one inch and shall not be less than 1/4 inch nor more than 1/2 inch in width.
- H. Provide steel trowel finish, followed by brushing with a broom. Brooming shall be transverse to the line of traffic.
- I. Apply curing compound after finishing at a uniform rate of 1 gallon per 400 square feet or control curing by other approved methods such as vapor barrier or misting.
- J. Remove forms when the condition of the concrete permits.

3.07 CURB AND GUTTERS

- A. Provide 3/4 inch thick expansion joints at intervals of not more than 100 feet.
- B. Provide contraction joints at 10 foot intervals, 1 inch depth tooled joints.
- C. Remove forms as soon as the condition of the concrete permits and perform finishing work on exposed surfaces.
- D. Provide steel trowel finish, followed by brushing with a broom. Brooming shall be transverse to the line of traffic.

- E. Apply curing compound after finishing at a uniform rate of 1 gallon per 400 square feet or control curing by other approved methods such as vapor barrier or misting.
- F. Remove other forms when the condition of the concrete permits.

3.08 PATCHING

- A. Notify Engineer immediately upon removal of forms.
- B. Patch imperfections.

3.09 DEFECTIVE CONCRETE

- A. Modify or replace concrete not conforming to required levels and lines, details and elevations.
- B. Repair or replace concrete not properly placed or of the specified type.
- C. Remove and replace defective concrete as directed, at no additional cost to the Owner.
- D. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.

3.10 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01410.

3.11 PROTECTION

- A. Protect concrete from damage until acceptance of work.

END OF SECTION

SECTION 02470 - PARKING LOT PAVEMENT MARKINGS

PART I GENERAL

1.01 SECTION INCLUDES

- A. Painted parking lot markings.

1.02 RELATED SECTIONS

- A. Section 02400 – Hot Mixed Asphalt Pavement.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The paint shall be non-bleeding, quick-drying, latex paint suitable for traffic-bearing surfaces and mixed in accordance with the manufacturer's instructions before application.

PART 3 EXECUTION

3.01 PREPARATION

- A. Sweep and clean surface to eliminate loose material and dust.

3.02 APPLICATION

A. Apply paint after asphalt paving has cured and minimum ambient temperature is 40 degrees F. Apply paint to clean, dry surfaces, and protect surfaces from traffic until dry.

B. The following items are to be painted with the colors noted below:

1. Parking Stall Stripping: White, unless otherwise noted on drawings.
2. Handicap Symbols: Per local code.
3. Pedestrian Crosswalks: White.
4. Fire Lanes: White or per local code.

C. Lines shall be 4 inches wide, uniform, straight, evenly spaced and accurately aligned, with sharply defined edges.

D. Apply lines at a wet film thickness of 15 mils by means of conventional traffic line stripping equipment. Use templates or employ skilled sign personnel for handicap space markings to be provided at each handicap parking space.

E. All markings shall be sufficiently dry before opening to traffic.

3.03 TOLERANCE AND APPEARANCE

- A. Markings shall be of the dimensions shown on the Plans. No marking shall be less than the specified width.
- B. All markings shall present a clean-cut, uniform, and workmanlike appearance. All markings which fail to have a uniform, satisfactory appearance shall be correct by the Contractor at this expense. Continued deviation from required dimensions will be cause for stopping the work and correcting the non-conforming markings as specified in Section 3.04.

3.04 CORRECTIVE MEASURES

- A. All work shall be subject to checks of dimensions and application rates of paint. All markings which fail to meet the requirements given herein shall be corrected at the Contractor's expense. All areas of misted, dripped, and /or splattered paint shall be removed to the satisfaction of the Engineer. In all instances, when it is necessary to remove paint, it shall be done by means satisfactory to the Engineer and which do not damage the underlying pavement.

END OF SECTION

SECTION 321823 – INFIELD CLAY FOR SPORT FIELDS

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:
 - 1. Preparing subgrades for skinned infield areas.
 - 2. Excavating and backfilling skinned infield areas.
 - 3. Providing clay portions of infield.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Course compacted below sand/clay mix.
- C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- E. Fill: Soil materials used to raise existing grades.
- F. Geotextile Fabric: Woven fabric of material made of polyolefins, polyesters or polyamides with minimum properties determined by ASTM D 4759.
- G. Infield Clay: Mixture of sand and clay on compacted base in ball fields.
- H. Sand: Clean, sharp sand (washed concrete same) free of all organic material with less than 2% passing a #200 sieve.

- I. Soil Surface Conditioner: Stone particles mixed into the top portion of infield clay.
- J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services.

1.4 SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 - 1. Geotextiles.
- B. Product Samples: For the following:
 - 1. Infield clay mix, in 3 1-gallon samples in clean, sealed bags, for Owner approval prior to installation.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than ¼-inch in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ¾-inch maximum stones.
- E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ¾-inch maximum stones.
- F. Infield Clay: Mixture of sand and clay, as follows:
 - 1. Product: Clay/Sand Infield Mix as provided by Glasscock Co., Inc., Sumter, SC, (843) 455-6828.

- G. Geotextile Fabric: Woven fabric of material made of polyolefins, polyesters or polyamides with minimum properties determined by ASTM D 4759.
- H. Surface Soil Conditioner:
 - 1. Provide calcined, illite and silica clay, with the following characteristics:
 - a. Porosity: Total 74%, with 39% Capillary and 34% Non Capillary.
 - b. pH range: 7.0 ± 2.5 .
 - c. CEC: 33.6 mEq/100g.
 - d. Particle Stability: Sulfate Soundness testing (ASTM C-88) not more than 4% loss over 20 years.
 - e. Bulk Density: 34 ± 2 lb/ft.
 - f. Color Range: Red, Tan, Gray.
 - 2. Product: Turface MVP by Turface Athletics / Profile Products, LLC.

2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect utilities and infield areas from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by adjacent operations.
- B. Protect and maintain erosion and sedimentation controls during infield operations.
- C. Preparation of subgrade for earthwork operations is specified in Division 31 Section "Earthwork."

3.2 EXCAVATION

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
- B. Excavation for Skinned Areas: Excavate surfaces under infield areas to indicated lines, cross sections, elevations and subgrades.
 - 1. Edge grass areas such that all edges are clean and sharp. If excessive lip is created during edging, fill with sand/clay mix to bring lip within 3/4-inch of finished grade.

3.3 SUBGRADE INSPECTION

- A. Proof-roll subgrade with heavy pneumatic equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.4 SURPLUS SOIL MATERIALS AND UTILITY MARKING

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- B. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- C. Install warning tape directly above utilities, on base before geotextile fabric and clay mixture.

3.5 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under infield areas, use satisfactory soil material.

3.6 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 - 1. Under clay infield areas, scarify and re-compact top 6 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.

3.7 BASE COURSES

- A. Place base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place base course as follows:
 - 1. Shape base course to required crown elevations and cross-slope grades.
 - 2. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.8 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Infield Areas: Plus or minus 1/2 inch, laser-graded.

3.9 SPREADING CLAY

- A. Place 12 inches of sharp sand and spread, rake and roll to a uniform depth. Place geotextile fabric on top of sand and then place non-lumped sand/clay mix 4 inches with 6-inch depth at home plate and bases.

3.10 INSTALLATION OF SOIL SURFACE CONDITIONER

- A. Strictly comply with manufacturer's installation instructions and recommendations for roto-tilled, nail dragged or top dressed application of soil surface conditioner. Use the following formula to determine the amount of surface conditioner to incorporate into the skinned infield mix. Infield mixes should be amended at 20 percent by volume, 4 inches deep. Install materials at the following application rates:
 - 1. Formula for Calculating Amount of Surface Conditioner Needed to Amend Soil: Take the square feet of the area to be amended multiplied by the depth in inches you wish to amend the soil and divide by 12 to obtain the cubic feet of soil. Divide the cubic feet of soil by 27 to obtain the cubic yards of soil. ($sq\ ft \times 4\ inches / 12 = cu\ ft / 27 = cu\ yds$).
 - 2. Take the cubic yards of soil and multiply by the percent of amendment desired (20% = .2) = volume of amendment needed measured in cubic yards ($cu\ yds \times \% \text{ of amendment desired} = cu\ yds \text{ of amendment}$).
 - 3. Cubic yards of amendment multiplied by the bulk density of the amendment equals cubic yards in pounds. Take the pounds divided by 2,000 = Tons required to amend the soil ($cu\ yd \times bulk\ density\ in\ pounds\ per\ cu\ yd / 2,000 = Tons\ of\ amendment\ required$).
- B. Thoroughly wet the skinned area and allow water to soak into the material.
- C. Roll entire area.

3.11 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.12 DISPOSAL OF WASTE MATERIALS

- A. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

3.13 STOCKPILE

- A. Provide a stockpile of 4 cu. yd. of clay/sand mix and soil surface conditioner in an on-site location designated by Owner.

3.14 CLEANING

- A. Upon completion of the work, clean site. Remove excess materials and stockpile excess clean clay in located designated by Owner.

END OF SECTION 321823

SECTION 323114 - CHAIN LINK FENCES AND GATES (PVC COATED)

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 is for fences and gates and includes the following:
 - 1. PVC-coated, steel chain-link fabric.
 - 2. Polymer-coated steel framework
 - 3. Grounding and bonding.

1.3 DEFINITIONS

- A. CLFMI: Chain Link Fence Manufacturers Institute.

1.4 SUBMITTALS

- A. Product Data: Material descriptions, construction details, dimensions of individual components and profiles, and finishes for the following:
 - 1. Fence and gate posts, rails, and fittings.
 - 2. Chain-link fabric, reinforcements, and attachments.
 - 3. Gates and hardware.
- B. Shop Drawings: Show locations of fence, each gate, posts, rails, and tension wires and details of extended posts, extension arms, gate swing, or other operation, hardware, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, elevations, sections, gate swing and other required installation and operational clearances, and details of post anchorage and attachment and bracing.
- C. Samples: For the following products, in sizes indicated, showing the full range of color, texture, and pattern variations expected. Prepare Samples from the same material to be used for the Work.
 - 1. PVC-coated steel wire (for fabric) in 6-inch lengths.
 - 2. Polymer coating in 6-inch length of steel shape.
- D. Product Certificates: Signed by manufacturers of chain-link fences and gates certifying that products furnished comply with requirements, including gage of chain link fabric.
- E. Maintenance Data: For the following to include in maintenance manuals specified in Division 01:
 - 1. Polymer finishes.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations for Chain-Link Fences and Gates: Obtain each color, grade, finish, type, and variety of component for chain-link fences and gates from one source with resources to provide chain-link fences and gates of consistent quality in appearance and physical properties.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Utility Service: Do not interrupt utility services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of utility services.
 - 2. Do not proceed with interruption of utility services without Owner's written permission.
- B. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

- A. Steel Chain-Link Fence Fabric: Fabricated in one-piece widths for fencing 12 feet and less in height to comply with Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual" and with requirements indicated below:
 - 1. Height: As indicated on Drawings
 - 2. Mesh and Wire Size: 2-inch mesh, 0.148-inch diameter (9 gage).
 - 3. Zinc-Coated Fabric: ASTM A392, with zinc coating applied to steel wire before weaving according to ASTM A817, Type II, zinc coated (galvanized) with the following minimum coating weight:
 - a. Class 1: Not less than 1.2 oz/sq ft of uncoated wire surface.
 - 4. PVC-Coated Fabric: ASTM F 668, Class 2a, over metallic-coated steel wire.
 - a. Metallic Coating: Zinc.
 - b. Color: Black.
 - 5. Coat selvage ends of fabric that is metallic during the weaving process with manufacturer's standard clear protective coating.
- B. Selvage: Twisted at top selvage and knuckled at bottom.

2.2 INDUSTRIAL FENCE FRAMING

- A. Round Steel Pipe: Standard weight, Schedule 40, galvanized steel pipe complying with ASTM F 1083. Comply with ASTM F 1043, Material Design Group IA, external and internal coating Type A, consisting of not less than 1.8-oz./sq. ft. zinc; and the following strength and stiffness requirements:
 - 1. Line, End, Corner, and Pull Posts and Top Rail: Per requirements for Light Industrial Fence.
- B. Roll-Formed Steel Shapes: C-sections or other shape, produced from structural steel. Comply with ASTM E 1043, Material Design Group II, with minimum yield strength of 45,000 psi; and the following coating and strength and stiffness requirements:
 - 1. Coatings: Type A, consisting of a minimum of 2.0 oz./sq. ft. average zinc coating per ASTM A123/A 123M or 4.0 oz./sq. ft. zinc coating per ASTM A 653/A653M.
 - 2. Line, End, Corner, and Pull Posts and Top Rail: Per requirements for Light Industrial Fence.
- C. Top Rails: Fabricate top rail from lengths 21 feet or longer, with swaged-end or fabricated for expansion-type coupling, forming a continuous rail along top of chain-link fabric.
- D. Protective Coating for Steel: Protect posts, rails, and frames with 3 mil electrostatically applied polyester powder coating.

2.3 TENSION WIRE

- A. General: Provide horizontal tension wire at the following locations:
 - 1. Location: Extended along bottom of fence fabric.
- B. Metallic-Coated Steel Wire: 0.177-inch- diameter, marcelled tension wire complying with ASTM A 824 and the following:
 - 1. Coating: Type II, zinc coated (galvanized) by the hot-dip process, with Class 2 coating weighing not less than 1.2 oz./sq. ft.

2.4 INDUSTRIAL SWING GATES

- A. General: Comply with ASTM F 900.
- B. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1083 and ASTM F 1043 for materials and protective coatings.
- C. Frames and Bracing: Fabricate members from round tubing with outside dimension and weight according to ASTM F 900 for the following gate fabric height:
 - 1. Gate Fabric Height: 6 feet or less.
- D. Frame Corner Construction: Welded.
- E. Gate Posts: Fabricate members from round galvanized steel pipe with outside dimension and weight according to ASTM F 900 for gate fabric heights and leaf widths as shown on drawings.

- F. Hardware: Latches permitting operation from both sides of gate, hinges, gate stops and, for each gate leaf more than 5 feet wide, keepers. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

- 1. Owner furnished padlocks.

2.5 FITTINGS

- A. General: Provide fittings for a complete fence installation, including special fittings for corners. Comply with ASTM F 626.
- B. Post and Line Caps: Hot-dip galvanized pressed steel or hot-dip galvanized cast iron. Provide weathertight closure cap for each post.
- C. Rail and Brace Ends: Hot-dip galvanized pressed steel or hot-dip galvanized cast iron. Provide rail ends or other means for attaching rails securely to each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
 - 1. Top Rail Sleeves: Hot-dip galvanized pressed steel or round steel tubing. Not less than 6 inches long.
- E. Tension and Brace Bands: Hot-dip galvanized pressed steel.
- F. Tie Wires, Clips, and Fasteners: Provide the following types according to ASTM F 626:
 - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
 - a. Hot-Dip Galvanized Steel: 0.106-inch- diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.
 - 2. Round Wire Hog Rings: Hot-dip galvanized steel or aluminum for attaching chain-link fabric to horizontal tension wires.
- G. Pipe Sleeves: For posts set into concrete, provide preset hot-dip galvanized steel pipe sleeves complying with ASTM A 53, not less than 6 inches long with inside dimensions not less than 1/2 inch more than outside dimension of post, and flat steel plate forming bottom closure.

2.6 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer for exterior applications.

2.7 FENCE GROUNDING

- A. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
 - 1. Material Above Finished Grade: Copper.
 - 2. Material On or Below Finished Grade: Copper.
 - 3. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
- B. Connectors and Ground Rods: Listed in UL 467.
 - 1. Connectors for Below-Grade Use: Exothermic welded type.
 - 2. Ground Rods: Copper-clad steel.

2.8 POLYMER FINISHES

- A. Supplemental Color Coating: In addition to specified metallic coatings for steel, provide fence components polymer coating.
- B. Metallic-Coated Steel Tension Wire: PVC-coated wire complying with ASTM F 1664, Class 2a.
- C. Metallic-Coated Steel Framing: Comply with ASTM F 1043 for polymer coating applied to exterior surfaces and, except for tubular shapes, to exposed interior surfaces.
 - 1. Polymer Coating: Not less than 3 mil thick polyester finish.
- D. Fittings and Accessories: Comply with ASTM F 626 for polymer coating applied to exterior surfaces and, except inside cap shapes, to exposed interior surfaces.
 - 1. Polymer Coating: Not less than 3 mil thick polyester finish.
- E. Color: Black.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance.
 - 1. Do not begin installation before final grading is completed, unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION, GENERAL

- A. General: Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.
- C. Post Setting: Hand-excavate holes for post foundations in firm, undisturbed or compacted soil. Set terminal, line and gate posts in concrete footing. Protect portion of posts aboveground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Using mechanical devices to set line posts per ASTM F 567 is permitted. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during placement and finishing operations until concrete is sufficiently cured.
 - 1. Dimensions and Profile: As indicated on Drawings.
 - 2. Concrete Footings: Unless otherwise indicated, extend concrete footings 2 inches above grade and trowel to a crown to shed water.

3.4 CHAIN-LINK FENCE INSTALLATION

- A. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567.
- B. Line Posts: Space line posts uniformly at 10 feet on center.
- C. Post Bracing Assemblies: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts. Locate horizontal braces at midheight of fabric on fences with top rail and at two-thirds fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- D. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric.
 - 1. Bottom Tension Wire: Install tension wire within 6 inches of bottom of fabric and tie to each post with not less than same gage and type of wire.
- E. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended by fencing manufacturer.
- F. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2 inches between finish grade or surface and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- G. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches on center.
- H. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts 12 inches on center. and to braces 24 inches on center.

- I. Fencing: Construct fence according to ASTM F 696.

3.5 GATE INSTALLATION

- A. General: Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

- B. Fence Grounding: Install at maximum intervals of 1500 feet except as follows:

1. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.

- a. Gates and Other Fence Openings: Ground fence on each side of opening.

- 1) Bond metal gates to gate posts.

2. Grounding Method: At each grounding location, drive a ground rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location.

- C. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.

- D. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Make connections with clean, bare metal at points of contact.
2. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.6 ADJUSTING

- A. Gate: Adjust gate to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

- B. Lubricate hardware and other moving parts.

END OF SECTION 323114

SECTION 2800 - SEEDING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all materials, equipment, and labor required to prepare soil, fertilizer, and other soil amendments specified, seed and mulch lawn areas indicated in plans, to establish seeded lawn as specified herein.

1.02 RELATED SECTIONS

- A. Section 02100 - Earthwork.

1.03 REFERENCES

- A. SCDOT SS - South Carolina Department of Transportation Standard Specifications for Highway Construction, latest edition.

1.04 DEFINITIONS

- A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, 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.

1.05 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer.

1.06 QUALITY ASSURANCE

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

1.07 DELIVERY, STORAGE AND HANDLING

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

1. Store seed and fertilizer in manner to prevent wetting and deterioration.

1.08 PROJECT CONDITIONS

- A. Protect existing utilities, paving, and other facilities from damage caused by seeding operations.
- B. Restrict traffic from lawn areas until grass is established. Erect signs and barriers as necessary.

1.09 PLANTING DATES

- A. Sow seed during the following seasons:

1. Season 1 - March 16 to August 31

2. Season 2 - September 1 to March 15

1.10 WARRANTY

- A. Provide a uniform stand of grass by mowing and maintaining seeded areas until final acceptance. Areas which fail to provide a uniform stand of grass shall be re-seeded with specified materials until all affected areas are accepted by Owner.

PART 2 PRODUCTS

2.01 SEED MIXTURE

A. Season 1

60% Common Bermuda (hulled)
40% Tall Fescue

B. Season 2

50% Common Bermuda (unhulled)
50% Rye Grain

Note: Growth of Ryegrass in early spring must be suppressed to prevent rye from choking out permanent grass.

2.02 SOIL MATERIALS

- A. Topsoil: Excavated from site and free of weeds.

2.03 ACCESSORIES

- A. Fertilizer: FS O-F-241, Recommended for grass, with fifty percent of the elements derived from organic sources, of proportion necessary to eliminate any deficiencies of topsoil, to the following proportions: Nitrogen 10 percent, phosphoric acid 10 percent, soluble potash 10 percent or as directed by the Owner/Engineer.
- B. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.
- C. Lime: Ground limestone containing not less than 85% of total carbonates. Lime shall be ground such that at least 50% will pass through a 100 mesh sieve and 90% will pass through a twenty mesh sieve.
- D. Straw Mulch: Clean oat or wheat straw well seasoned before bailing, free from mature seed-bearing stalks or roots.
- E. Erosion Fabric: Wood Excelsior Blanket or Jute matting as specified on the drawings or approved by the Engineer.

PART 3 EXECUTION

3.01 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.

3.02 PREPARATION

- A. Ensure that fine grading is completed.
- B. Scarify topsoil of lawn area to be seeded to a minimum depth of 4". Remove all stones, sticks, roots, rubbish, and extraneous vegetable and foreign non-organic materials.
- C. Grade to eliminate rough, low, or soft areas, to ensure positive drainage and to create a smooth, even surface free of stones or soil clods over 1" in diameter.

3.03 FERTILIZING AND LIMING

- A. Apply lime at a rate of 3,000 lbs/acre.
- B. Apply fertilizer at a rate of 1,000 lbs/acre.
- C. Apply after smooth raking of topsoil.
- D. Apply fertilizers by mechanical rotary or drop type distributor, thoroughly and evenly incorporated with soil, to a depth of two to four inches.
- E. Restore prepared area to a fine grade prior to applying seed.

3.04 SEEDING

- A. Seed immediately after preparation of bed.
- B. Seed indicated areas within contract limits and areas adjoining contract limits disturbed as a result of construction operations.
- C. Seed when soil is dry and when winds do not exceed five miles per hour velocity.
- D. Acceptable application methods:
- E. Apply seed with rotary or drop type distributor. Install evenly by sowing equal quantities in two (2) directions, at right angles to each other.
- F. Apply with hydroseeding machine.
- G. Sow grass seed at a rate of 8 lbs/1000 square feet.
- H. After seeding, lightly rake and roll seed into top 1/4 inch of top soil, if applied by rotary or drop spreader.

3.05 MULCHING

- A. Place straw mulch on seeded areas within twenty four hours after seeding.
- B. Place straw mulch uniformly in a continuous blanket at the rate of one and one-half tons per acre, where hydroseeding method is not used.

3.06 SEED PROTECTION

- A. Cover seeded slopes in drainage swales and along pond slopes with erosion fabric to prevent wash out of seed. Roll fabric onto slopes without stretching or pulling.

- B. Lay fabric smoothly on surface. Provide 12 inch overlap of adjacent rolls.
- C. Secure outside edges and overlaps at 36 inch intervals with stakes.
- D. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.

3.07 MAINTENANCE

- A. Maintain seeded areas until completion and acceptance of the areas by the Owner.
- B. Maintain seeded areas including watering, spot weeding, application of herbicides, fungicides, insecticides, and re-seeding until a full, uniform stand of grass, free from weeds, undesirable grass species, diseases and insects is achieved and accepted by the Owner.
 - 1. Repair, re-work, and re-seed all areas that have washed out, are eroded, or do not germinate.
 - 2. Mow seeded areas as soon as top growth reaches three inches in height. Cut back to two inches in height.
 - 3. After first mowing of grass, and substantial coverage is achieved (at least 85%), responsibility for mowing shall become the Owner's. However, mowing by Owner does not indicate acceptance and seeded areas shall not be accepted until coverage requirements are met.
 - 4. Temporary seeding for erosion control during early stages of construction shall be maintained entirely by contractor.

3.08 CLEANING

- A. Perform cleaning during installation of work and upon completion of the work. Remove from site all excess materials, debris, and equipment.

3.09 ACCEPTANCE

- A. Seeded areas shall be inspected by Owner and shall not be accepted until seeded areas are free of bare spots over one square foot or unacceptable coverage totaling more than 2% of individual area.
- B. Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and the winter weather and be capable of reestablishment in the spring.
- C. Upon acceptance, the Owner will assume all maintenance.

END OF SECTION

SECTION 329200 - TURF AND GRASSES

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. Section Includes:
 - 1. Seeding.
 - 2. Hydroseeding.
 - 3. Sodding.
 - 4. Erosion-control material(s).

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.
- A. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
- B. Certification of Sod: From sod vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the grower's name, year of production and date of packaging.
- C. Qualification Data: For qualified landscape Installer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.
 - 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 - 2. Experience: Three years' experience in turf installation.
 - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 4. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
 - 5. Pesticide Applicator: State licensed, commercial.

- B. Sod Producer: Company specializing in sod production and harvesting with a minimum 5 years' experience and certified by the State of South Carolina, Georgia or North Carolina.
- C. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- D. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant- nutrient content of the soil.
 - 1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
 - 2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. Six representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes (one per athletic field).
 - 3. Report suitability of tested soil for turf growth.
 - a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable turf.
 - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 01 "Project Meetings".

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.6 PROJECT CONDITIONS

- A. Planting Restrictions: Coordinate installation of seed and sprigging during normal planting seasons for each type of plant material required.

- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.7 MAINTENANCE SERVICE

- A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until Final Completion of project.

1.8 WARRANTY

- A. It is the responsibility of the Contractor to make known any site conditions which may be harmful or growth inhibiting to the plant materials specified, prior to acceptance or installation of said materials.
- B. Special Warranty: Installer agrees to repair or replace turf and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner during 12-month warranty period, or incidents that are beyond Contractor's control. Warranty shall cover any plant loss due to weather damage to plants installed out of normal planting season.
 - 2. Warranty Periods from Date of Substantial Completion:
 - a. Seed, Hydroseed, and New Sod (provided in this contract): 12 months.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species: State-certified seed of grass species as follows:
 - 1. Full Sun: Bermudagrass (*Cynodon dactylon*), unhulled.
 - 2. Sun and Partial Shade: Proportioned by weight as follows:
 - a. 50 percent Bermudagrass (*Cynodon dactylon*), unhulled.
 - b. 50 percent perennial ryegrass (*Lolium perenne*).

2.2 SOD

- A. Sod: Certified approved nursery grown grade; cultivated grass sod; minimum age 18 months; type indicated on Drawings with fibrous root system, free of stones, burned or bare spots, disease, nematodes, soil borne insects and containing no more than 5 weeds per 1000 square feet.

1. Tifway 419 Bermuda.

2.3 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
 2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Aluminum Sulfate: Commercial grade, unadulterated.
- E. Perlite: Horticultural perlite, soil amendment grade.
- F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.
- G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.
- H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
- I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.4 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 1. Organic Matter Content: 50 to 60 percent of dry weight.
 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.
- C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.
- D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.
- E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.5 FERTILIZERS

- A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.6 PLANTING SOILS

- A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 4 > percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

2.7 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.8 EROSION-CONTROL MATERIALS

- A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.
- B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.
- C. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 3-inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Invisible Structures, Inc.; Slopetame 2.
 - b. Presto Products Company, a business of Alcoa; Geoweb.

- c. Tenax Corporation - USA; Tenweb.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
 - 2. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

- A. Limit turf subgrade preparation to areas to be planted.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Apply superphosphate fertilizer directly to subgrade before loosening.
 - 2. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil to a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
- C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.
 - a. Apply superphosphate fertilizer directly to surface soil before loosening.
 3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in "Turf Area Preparation" Article.
- B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.
- C. Fill cells of erosion-control mat with planting soil and compact before planting.
- D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.
- E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - 1. Do not use wet seed or seed that is moldy or otherwise damaged.
 - 2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at a total rate of 2 lb/1000 sq. ft.
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets installed and stapled according to manufacturer's written instructions.
- E. Protect seeded areas with erosion-control mats where shown on Drawings; install and anchor according to manufacturer's written instructions.
- F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
 - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
 - 2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.
- G. Protect seeded areas from hot, dry weather or drying winds by applying mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.6 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
 - 1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
 - 2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.
 - 3. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1000 lb/acre.

3.7 SODDING

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- C. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to

subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

- 1) Lay sod across angle of slopes exceeding 1:3.
 - 2) Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
- D. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 4 inches below sod.

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow bermudagrass to a height of 1/2 to 1 inch.
2. Mow perennial ryegrass to a height of 1 to 2 inches.

- D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.8 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.9 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- C. Remove non-degradable erosion-control measures after grass establishment period.

END OF SECTION 329200

SECTION 329300 – PLANTS

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. Section Includes:

1. Trees.
2. Shrubs.
3. Ground cover.
4. Plants.
5. Tree stabilization.
6. Edging.

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum laced as recommended by ANSI Z60.1.
- C. Balled and Potted Stock: Exterior plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of exterior plant required.
- D. Bare-Root Stock: Exterior plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of exterior plant required.
- E. Clump: Where three or more young trees were planted in a group and have grown together as a single tree having three or more main stems or trunks.
- F. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of exterior plant required.
- G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted exterior plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of exterior plant.

- H. Finish Grade: Elevation of finished surface of planting soil.
- I. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- J. Multi-Stem: Where three or more main stems arise from the ground from a single root crown or at a point right above the root crown.
- K. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- L. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.
- M. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each of the following:
 - 1. Edging materials and accessories, of manufacturer's standard size, to verify color selected.
- C. Qualification Data: For qualified landscape Installer.
- D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
 - 1. Manufacturer's certified analysis for standard products.
 - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- E. Material Test Reports: For existing surface soil and imported topsoil.
- F. Planting Schedule: Indicating anticipated planting dates for exterior plants.
- G. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of exterior plants during a calendar year. Submit before expiration of required maintenance periods.
- H. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
 - 1. Report suitability of topsoil for plant growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
- D. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."
 - 1. Selection of exterior plants purchased under allowances will be made by Architect, who will tag plants at their place of growth before they are prepared for transplanting.
- E. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above the ground for trees up to 4-inch caliper size, and 12 inches above the ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
- F. Observation: Architect may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
 - 1. Notify Architect of sources of planting materials seven days in advance of delivery to site.
- G. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver exterior plants freshly dug.
 - 1. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.
- B. Do not prune trees and shrubs before delivery except as approved by Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery and handling.
- C. Handle planting stock by root ball.
- D. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants and trees in shade, protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.7 PROJECT CONDITIONS

- A. Planting Restrictions: Plant or install materials during normal planting seasons for each type of plant material required. Do not plant or install materials while plants are dormant or when temperature is less than 40 degrees F.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed according to manufacturer's written instructions and warranty requirements.
- C. Coordination with Lawns: Plant trees and shrubs after finish grades are established and before planting lawns unless otherwise acceptable to Architect.
 1. When planting trees and shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.

1.8 WARRANTY

- A. Special Warranty: Installer's standard form in which Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, abuse by Owner, or incidents that are beyond Contractor's control.
 - b. Structural failures including plantings falling or blowing over.
 - c. Faulty operation of tree stabilization or edgings.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 2. Warranty Periods from Date of Substantial Completion:
 - a. Trees and Shrubs: One year.
 - b. Ground Cover and Plants: Six months.
 3. Include the following remedial actions as a minimum:
 - a. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
 - b. Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each exterior plant will be required except for losses or replacements due to failure to comply with requirements.
 - d. Provide extended warranty for replaced plant materials; warranty period equal to original warranty period.

1.9 MAINTENANCE SERVICE

- A. Initial Maintenance Service for Trees and Shrubs: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin watering and maintenance immediately after each area is planted and continue until Owner accepts and signs off, but for not less than the following periods:
 - 1. Watering and Maintenance Period: 12 months from date of planting completion.
- B. Initial Maintenance Service for Ground Cover and Plants: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin watering and maintenance immediately after each area is planted and continue until Owner accepts and signs off, but for not less than the following periods:
 - 1. Watering and Maintenance Period: 12 months from date of planting completion.
- C. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 TREE AND SHRUB MATERIAL

- A. General: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
- B. Provide trees and shrubs of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- C. Label each tree and shrub with securely attached, waterproof tag bearing legible designation of botanical and common name.

2.2 SHADE AND FLOWERING TREES

- A. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
 - 1. Provide container trees, unless otherwise indicated on Drawings.
- B. Small Upright Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:
 - 1. Stem Form: Single trunk.
 - 2. Provide container trees, unless otherwise indicated on Drawings.
- C. Small Spreading Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:

1. Stem Form: Single trunk.
2. Provide container trees, unless otherwise indicated on Drawings.

2.3 DECIDUOUS SHRUBS

- A. Form and Size: Shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.
1. Shrub sizes indicated are sizes after pruning.
 2. Provide container shrubs, unless otherwise indicated on Drawings.

2.4 CONIFEROUS EVERGREENS

- A. Form and Size: Specimen quality as described, symmetrically shaped coniferous evergreens.
1. Shearing Designation: Natural, never sheared (N).
 2. Provide container trees, unless otherwise indicated on Drawings.

2.5 BROADLEAF EVERGREENS

- A. Form and Size: Normal-quality, well-balanced, broadleaf evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.
- B. Form and Size: Specimen quality as described, symmetrically shaped broadleaf evergreens.
1. Shearing Designation: Natural, never sheared (N).
 2. Provide container trees, unless otherwise indicated on Drawings.

2.6 GROUND COVER PLANTS

- A. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.

2.7 PLANTS

- A. Perennials: Provide healthy, field-grown plants from a commercial nursery, of species and variety shown or listed, complying with requirements in ANSI Z60.1.
- B. Vines: Provide vines of species indicated complying with requirements in ANSI Z60.1 as follows:
1. Two-year plants with heavy, well-branched tops, with not less than 3 runners 18 inches or more in length, and with a vigorous well-developed root system.
 2. Provide field-grown vines. Vines grown in pots or other containers of adequate size and acclimated to outside conditions will also be acceptable.

2.8 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.
 - 1. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - a. Surface soil may be supplemented with imported or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.9 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural limestone containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - 1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
 - 2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
 - 3. Provide lime in form of dolomitic limestone.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Aluminum Sulfate: Commercial grade, unadulterated.
- E. Perlite: Horticultural perlite, soil amendment grade.
- F. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.
- G. Sand: Clean, washed, natural or manufactured, free of toxic materials.
- H. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
- I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.10 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60 percent of dry weight.

2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- B. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.
- C. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.
- D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
 1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.
- E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.11 FERTILIZER

- A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.12 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
 1. Type: Shredded Hardwood Mulch.

2.13 WEED-CONTROL BARRIERS

- A. Polyethylene Sheeting: ASTM D 4397, black, 0.006-inch minimum thickness.

2.14 TREE STABILIZATION MATERIALS

- A. Stakes and Guys:
 1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2-by- 2-inch nominal by length indicated, pointed at one end.
 2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.

3. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch in diameter.
4. Hose Chafing Guards: Reinforced rubber or plastic hose at least 1/2 inch in diameter, black, cut to lengths required to protect tree trunks from damage.
5. Guy Cables: 5-strand, 3/16-inch- diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.
6. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.
7. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Arborbrace; ArborBrace Tree Guying System.
 - 2) DeepRoot.; ArborTie Staking and Guying System.

2.15 LANDSCAPE EDGINGS

- A. Trench Edging: As indicated on Drawings.
- B. Steel Edging: Standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
 1. Edging Size and Layout: As indicated on Drawings.

2.16 MISCELLANEOUS PRODUCTS

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- B. Trunk-Wrap Tape: Two layers of crinkled paper cemented together with bituminous material, 4-inch- wide minimum, with stretch factor of 33 percent.

2.17 PLANTING SOIL MIX

- A. Planting Soil Mix: Mix topsoil with soil amendments and fertilizers as recommended by soil testing laboratory.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before planting. Make minor adjustments as required.
- D. Lay out exterior plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.
- E. Trunk Wrapping: Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling.
- F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- G. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING BED ESTABLISHMENT

- A. Loosen subgrade of planting beds to a minimum depth of 6 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.
 - 2. Spread planting soil mix to a depth of 8 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil mix.
- B. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- C. Before planting, restore planting beds if eroded or otherwise disturbed after finish grading.

3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.
 - 1. Excavate approximately three times as wide as ball diameter for balled and burlapped stock.
 - 2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
 - 3. If drain tile is shown or required under planted areas, excavate to top of porous backfill over tile.
- B. Subsoil removed from excavations may be used as backfill.
- C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
 - 1. Hardpan Layer: Drill 6-inch- diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.
- D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE AND SHRUB PLANTING

- A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.
- B. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball as indicated on Drawings.
 - 1. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- C. Organic Mulching: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of planting pit or trench. Do not place mulch within 3 inches of trunks or stems.
- D. Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling.
- E. Trunk Wrapping: Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling.

3.6 TREE AND SHRUB PRUNING

- A. Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character.

3.7 TREE STABILIZATION

- A. Trunk Stabilization: Unless otherwise indicated, provide trunk stabilization as follows:
 - 1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip-out. Use a minimum of 2 stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend one third of trunk height above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
 - 2. Use 2 stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; 3 stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.
 - 3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
 - 4. Support trees with two strands of tie wire encased in hose sections at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
- B. Guying and Staking: Guy and stake trees exceeding 14 feet in height and more than 3 inches in caliper unless otherwise indicated. Securely attach no fewer than 3 guys to stakes 30 inches long, driven to grade.
 - 1. For trees more than 6 inches in caliper, anchor guys to pressure-preservative-treated deadmen 8 inches in diameter and 48 inches long buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.
 - 2. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
 - 3. Support trees with strands of cable or multiple strands of tie wire encased in hose sections at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
 - 4. Attach flags to each guy wire, 30 inches above finish grade.
 - 5. Paint turnbuckles with luminescent white paint.

3.8 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover and plants as indicated.
- B. Dig holes large enough to allow spreading of roots and backfill with planting soil.
- C. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- E. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 PLANTING BED MULCHING

- A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches.
 - 1. Material and Seam Treatment: Polyethylene sheeting with seams taped.
- B. Mulch backfilled surfaces of planting beds and other areas indicated. Provide mulch ring around trees in lawn areas.
 - 1. Organic Mulch: Apply 3-inch average thickness of organic mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems.

3.10 EDGING

- A. Trench Edging: Install trench edging where indicated.
- B. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.

3.11 PLANT MAINTENANCE

- A. Tree and Shrub Maintenance: Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, adjusting and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.
- B. Ground Cover and Plant Maintenance: Maintain and establish plantings by watering, weeding, fertilizing, mulching, and other operations as required to establish healthy, viable plantings.

3.12 CLEANUP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

3.13 DISPOSAL

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 329300

SECTION 02500 - STORM DRAINAGE SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Storm drainage piping and accessories.
- B. Catch basins, drop inlets, curb inlets, and junction boxes.

1.02 RELATED SECTIONS

- A. Section 02100 - Earthwork.
- B. Section 03250 - Concrete.

1.03 REFERENCES

- A. AASHTO M252 Corrugated Polyethylene Drainage Tubing.
- B. AASHTO M294 Corrugated Polyethylene Pipe, 12" to 36" Diameter.
- C. ASTM A 497 Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
- D. ASTM A 615/A 615M Deformed and Plain Billet-Steel Bars for Concrete.
- E. ASTM B 745/B 745M Corrugated Aluminum Pipe for Sewers and Drains.
- F. ASTM B 788 Installing Factory-Made Corrugated Aluminum Culverts and Storm Sewer Pipe.
- G. ASTM C 32 Sewer and Manhole Brick (Made from Clay or Shale).
- H. ASTM C 62 Building Brick (Solid Masonry Units Made from Clay or Shale).
- I. ASTM C 76 Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- J. ASTM C 139 Concrete Masonry Units for Construction of Catch Basins and Manholes
- K. ASTM C 150 Portland Cement.
- L. ASTM C 270 Mortar for Unit Masonry.
- M. ASTM C 476 Grout for Masonry.
- N. ASTM C 478 Precast Reinforced Concrete Manhole Sections.
- O. ASTM F 477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.04 SUBMITTALS

- A. Submit the product data as specified.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inspect pipe materials delivered to site for damage; store with minimum of handling. Store plastic piping and jointing materials and rubber gaskets under cover and out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.
- B. Check metal items upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.

1.06 HANDLING

- A. Handle pipe, fittings, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care not to damage coating on pipe and fittings; if damaged, make repairs. Carry, do not drag pipe to trench.

PART 2 PRODUCTS

2.01 PIPELINE MATERIALS

- A. Reinforced Concrete Pipe: ASTM C 76, Class III, bell and spigot end joints with bituminous mastic coating at joints. Fittings and specials shall conform to the applicable requirements specified for the pipe and shall be of the same strength as the pipe. Cement used in manufacturing conforming to ASTM C 150.
- B. Corrugated Aluminum Pipe and Fittings: ASTM B 745, Type I helical corrugations, sheet thickness 0.060 inches (16 gage) for pipe 18 to 24 inches in diameter and 0.075 inches (14 gage) for pipe 30 to 36 inches in diameter. Corrugation size shall be 2- 2/3" x 1/2". Fabricate fittings of the same material as the pipe, of strength at least comparable to that of the pipe, and the same size and shape of corrugations as the pipe. Coupling bands shall have the same size and shape corrugations as the piping to which the bands are to be connected and shall conform to ASTM B 745. For tightening each coupling band, provide four 1/2-inch diameter zinc-coated steel rod hoops with silo lugs.
- C. Perforated Corrugated Aluminum Piping: ASTM B 745, Type III.

2.02 DRAINAGE STRUCTURES

- A. Construct of clay brick, solid concrete masonry units or provide precast concrete structures. Pipe-to-wall connections shall be mortared to produce smooth transitions and watertight joints. Provide a 4-inch layer of clean gravel bedding with a maximum size of 1.5 inches.
- B. Precast Concrete Structures: ASTM C 478, except as specified herein. Provide an air content of 6 percent, plus or minus 2 percent and a minimum wall thickness of 5 inches. ASTM A 615/A 615M reinforcing bars. ASTM A 497 welded wire fabric.
- C. Masonry Materials
 - 1. Brick: ASTM C 32, Grade MS, or ASTM C 62-, Grade SW, except that the absorption test will be waived.
 - 2. Concrete Masonry Units: ASTM C 139.
 - 3. Mortar: ASTM C 270, Type M.
 - 4. Water: Water for masonry mortar shall be fresh, clean, potable.
 - 5. Grout: ASTM C 476.

2.03 FRAMES, COVERS, AND GRATINGS

- A. ASTM A48 Class 30 gray cast iron designed for 25,000 lb wheel load.

1. Grate Type Inlet: Frame and Grate: 24 inch by 36 inch with a minimum inlet flow of 10 cubic feet per second with and unobstructed opening area and 6 inches of ponded water.
2. Junction Box: 24 inch diameter Cast Iron Ring and Cover.

2.04 FLARED ENDS

- A. Flared end sections shall be same material as pipe material except that only reinforced concrete flared ends shall be provided for concrete pipe. Flared ends are included in the lengths of pipe indicated.

2.05 GEOTEXTILE

- A. Nonwoven, needle punched fabric weighing 6 oz/sy minimum, and conforming to the following minimum standards:
 1. Grab Tensile Strength 180 lbs. ASTM D 4632
 2. Grab Elongation 50% ASTM D 4632
 3. Trapezoidal Tear 75 lbs. ASTM D 4533
 4. Mullen Burst 330 psi ASTM D 3786
 5. Puncture 100 lbs. ASTM D 4833
 6. Water Flow Rate 110 gpm/sf ASTM D 4491
 7. Coefficient of Permeability 0.34 cm/sec ASTM D 4491

2.06 EROSION CONTROL RIPRAP

- A. Provide non-erodible rock not exceeding 15 inches in its greatest dimension and choked with sufficient small rocks to provide a dense mass with a minimum thickness as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on the drawings.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION - PIPE

- A. Perform earthwork operations in accordance with Section 02100, "Earthwork".
- B. Inspect each pipe and fitting before and after installation; remove those found defective from site and replace with new. Provide proper facilities for lowering sections of pipe into trenches.
- C. Lay pipe, beginning at lot point in system, to slope gradients noted in the plans.
- D. Lay pipe with the bell & groove ends in the upgrade direction.
- E. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads.
- F. Corrugated Aluminum Pipe: Install in accordance with the general requirements for installation of pipelines and with the recommendations of ASTM B 788 except as otherwise specified in the other subparagraphs hereunder.

3.03 INSTALLATION - DRAINAGE STRUCTURES

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Construct base slab of cast-in-place concrete or use precast concrete base sections.
- C. For cast-in-place concrete construction, either pour bottom slabs and walls integrally or key and bond walls to bottom slab.
- D. For precast concrete construction, make joints between sections with the gaskets specified for this purpose; install in the manner specified for installing joints in concrete piping. Give a smooth finish to inside joints of precast concrete manholes and catch basins.
- E. Establish elevations and pipe inverts for inlets and outlets as indicated. Cut existing pipe so that pipe ends are approximately flush with the interior face of manhole wall, but not protruding beyond into the manhole.
- F. Mount lid and frame level in grout, secured to top section to elevation indicated on the drawings.

3.04 FIELD QUALITY CONTROL

- A. The Engineer will conduct field inspections and witness field test specified in this section. The Contractor shall perform field test and provide labor, equipment, and incidentals required for testing. Be able to produce evidence, when required, that each item of work has been constructed properly in accordance with the drawings and specifications.
- B. Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line.
- C. Deflection of pipe in the installed pipeline under external loads shall not exceed 4.5 percent of the average inside diameter of pipe. Determine whether the allowable deflection has been exceeded by use of a pull-through device or a deflection measuring device.

3.05 WARRANTY

- A. All Work performed under this section shall be guaranteed to be free from defects in material and workmanship for a period of one (1) year from the date of final acceptance of such Work by the Owner.
- B. Latent defects arising during this period shall, upon notification by the Owner, be promptly corrected by the Contractor at no additional cost to the Owner.

END OF SECTION

SECTION 02600 - SANITARY SEWER GRAVITY SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Gravity sewer piping, fittings, and accessories.
- B. Connection of building sanitary sewer system to municipal sewers.
- C. Manholes and accessories.

1.02 RELATED SECTIONS

- A. Section 02100 - Earthwork.
- B. Section 02650 – Sewage Pumping Station.
- C. Section 03250 - Concrete.

1.03 REFERENCES

- A. ANSI/AWWA C150/A21.50 - Thickness Design of Ductile-Iron Pipe.
- B. ANSI/AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or other Liquids.
- C. ANSI/AWWA C104/A21.4 - Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
- D. ANSI/AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron and Grey-Iron Pressure Pipe and Fittings.
- E. ANSI/AWWA C110/A21.10 - Ductile-Iron Fittings and Grey-Iron Fittings, 3 in. through 48 in., for Water and other Liquids.
- F. ASTM D 2729 - Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- G. ASTM D 3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- H. ASTM D 2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- I. UNI-B-6-90 - Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe.
- J. ASTM C 76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- K. ASTM A 48 - Gray Iron Castings.
- L. ASTM C 478 - Precast Concrete.

1.04 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work for this Section.

1.05 SUBMITTALS

- A. Submit product data to Engineer and Georgetown County Water & Sewer District in accordance with Section 01300 for pipe, pipe accessories, manholes, manhole accessories, cleanouts and cleanout accessories.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. U.S. Pipe.
- B. American Cast Iron Pipe Company.
- C. Griffin Pipe Products Company.
- D. J M Eagle.
- E. East Jordan Iron Works, Inc.
- F. U.S. Foundry & Manufacturing Corporation.
- I. Taylor Precast Inc.

2.02 GENERAL

- A. Intermixing of different types of pipe will not be permitted unless specified on the drawings or by approved written permission by the Engineer.
- B. All pipe shall be of first quality with smooth interior and exterior surfaces, free from cracks, blisters, honeycombs and other imperfections, and true to theoretical shapes and forms throughout the full length.
- C. All pipe shall be subject to the inspection of the engineer at the pipe plant, trench, or point of delivery, for purpose of culling and rejecting pipe (independent of laboratory test), which does not conform to the requirements of these specifications. Such pipe shall be marked by the Engineer, and the Contractor shall remove it from the project site upon notice being received of its rejection.
- D. Ductile iron pipe shall be used at depths of 14 feet and deeper, as well as where shown on the drawings.
- E. Gravity lines 36 inches in diameter and larger shall be reinforced concrete pipe.

2.03 GRAVITY SEWER PIPE MATERIALS

- A. Ductile Iron Pipe: ANSI/AWWA C151/A21.51, Class 50, cement mortar lined pipe; inside nominal diameter as shown on drawings. Joints shall be mechanical, push on, flanged, or boltless ball, as needed or as shown on the drawings.
- B. Ductile Iron Pipe Joint Device: ANSI/AWWA C111/A21.11 rubber gasket joint device.
- C. Polyvinyl Chloride (PVC) Plastic Pipe: ASTM D 3034, SDR 35, Type PSM, polyvinyl Chloride (PVC) material; inside nominal diameter as shown. Bell and spigot style. Bed in accordance with ASTM D 2321 and drawings. Laying length shall be 20 feet.

- D. Polyvinyl Chloride (PVC) Fittings: ASTM D 3034 with minimum wall thickness of SDR 35. Fittings in sizes through 8" shall be molded in one piece with elastomeric joints and minimum socket depths as specified in sections 6.2 and 7.3.2. Fittings 10" and larger shall be molded or fabricated in accordance with section 7.11 with manufacturer's standard pipe bells and gaskets. Gaskets shall have a minimum cross sectional area of 0.20 sq. in. and conform to ASTM F 477. PVC material shall have a cell classification of 12454-B or C as defined in ASTM D 1784.
- E. Reinforced Concrete Pipe: ASTM C 76, Class 3, 4, or 5 concrete pipe with mesh reinforcement and inside nominal diameter as shown on the drawings. All RCP shall be high alkaline type pipe. All joints shall be O-ring gasket type and grouted inside and out.

2.04 PIPE ACCESSORIES

- A. Fittings: Same material as pipe, molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps, and other configurations required unless otherwise shown on drawings.
- B. All services or lateral lines shall be connected to mainline sewers with in line service wyes only. Saddle wyes are not acceptable on new construction.
- C. Link Seal: Wall seals for all pipe entering pump stations shall be installed in accordance with the manufacturer's installation instructions. All link seals shall be grouted in place after pipe placement.

2.05 MANHOLES

- A. Frame and Cover: Iron casting conforming to ASTM A 48, Class 30C iron. Minimum manhole cover diameter shall be 24 inches, and the manhole ring and cover assembly shall not weigh less than 300 pounds. Frames and covers shall be US Foundry & Manufacturing Corporation Model USF 579 Ring and DC-SSG Cover.
- B. Shaft Construction and Eccentric Cone Top Section: Reinforced precast or cast-in-place concrete sections, lipped male-female, "O" ring gasket type joints; cast steel ladder rungs into shaft sections at 12 inches; nominal shaft diameter of 48, 60, 72, 96 inches as shown on the drawings.
- C. Drop manholes and drop connections shall be built at locations shown on the drawings or as directed by the Engineer, and shall conform to the details on the drawings.
- D. Manhole Steps: Cast into manhole wall, 11 inches square and project from the wall 6 inches. Minimum weight 8 pounds each. Steps to be similar to Sumter Machinery's Manhole Step No. 2, or Dewey Brothers MH-ST-18-A.
- E. Rubber Boots: All manholes to be equipped with rubber boots and all stainless steel bands at each pipe portal.

2.06 FILL MATERIAL

- A. Ductile Iron Pipe: Approved subsoil as specified in Section 02100.
- B. Polyvinyl Chloride (PVC) Plastic Pipe: Bed in accordance with bedding detail on drawings using material specified in Section 02100.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall furnish all material and labor, and construct the gravity sewer as shown on the drawings, including all clearing, grubbing, excavating, sheathing, backfilling, foundations, manholes, and other appurtenances.
- B. The work shall include all ditching, diking, pumping, bailing, draining, flushing, testing, and all provisions necessary to protect and maintain buildings, fences, water and gas pipes, drainage culverts, power and telephone lines and cables, and other structures.
- C. The Contractor shall be responsible for the cleaning away of all rubbish and surplus materials upon completion of the work required to build and put in complete working order the specified sewer and all structures appertaining thereto.
- D. All sewers and appurtenances shall be cleared of all foreign debris.

3.02 ORDER OF WORK

- A. The Owner reserves the right to direct the Contractor as to which portions of work should be constructed first, and upon order of the Engineer, to verify that any complete portion of work is as specified and acceptable for service.

3.03 HIGHWAYS, STREETS, AND PUBLIC PROPERTY

- A. The Contractor shall fully adhere to the State Highway Department Encroachment Permit while operating in any state right-of-way and all construction techniques shall comply with the current edition of the State Highway Department Standard Specifications and Traffic Control Manual.
- B. Through traffic shall be maintained at all times during construction of sewer across all streets and highways. If the open cut method is used, two separate cuts must be made and one lane of traffic must be open at all times.
- C. The Contractor shall obtain, by agreement with property owner, any additional space required for construction on private property at no cost to the Owner of the project.

3.04 EXISTING UTILITIES AND STRUCTURES

- A. Any existing utilities, structures, monuments, etc. damaged by the Contractor shall be repaired or replaced by the Contractor at his own expense.
- B. The approximate position of certain known underground lines are shown on the drawings for information only.

3.05 POTABLE WATER PROTECTION

- A. Adequate provision shall be made for the protection of potable water supplies from possible leakage from sewer located near water lines.
- B. There shall be no physical connection between a public water supply system and a sewer system.
- C. Where possible, sewer mains should be located at least ten (10) feet horizontally from existing or proposed water mains. If local conditions prevent a lateral ten (10) foot separation or a sewer is to cross a water main then:
 - 1. Sewer will be laid in a separate trench, with the elevation of the top of the sewer main at least eighteen (18) inches below the bottom of the water main, or:

2. Sewer will be laid in the same trench as the water main with the water main located on a bench of undisturbed earth, and with the elevation of the top of the sewer at least eighteen (18) inches below the bottom of the water main, or:
 3. If local conditions prevent the eighteen (18) inch vertical separation, then the sewer will be laid under the water main and both the water and sewer shall be constructed of ductile iron pipe for a distance of ten (10) feet on each side of the crossing. The water and sewer lines will be pressure tested to assure water tightness prior to backfilling.
- D. When conditions require a sewer line to cross over a water main, both the water main and sewer line shall be constructed of ductile iron pipe for a distance of ten (10) feet on each side of the crossing. The sewer main pipe shall be centered at the crossing and both water and sewer lines will be pressure tested to assure water tightness prior to backfilling.
 - E. If conditions arise which prevent application of the above techniques, Contractor shall obtain written approval from the Engineer prior to construction of the specific problem area.

3.06 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fill material of fine aggregate.
- B. Remove large stones or other hard matter which could damage the pipe or impede consistent backfilling or compaction.

3.07 INSTALLATION - PIPE

- A. Pipe shall be protected during handling against impact shocks and free fall. Pipe shall be kept clean at all times.
- B. Install pipe, fittings, and accessories in accordance with ASTM D 2321, and manufacturer's instructions.
- C. Lay pipe to slope gradient noted on drawings. Pipe laying shall begin at the lowest grade point with spigot ends pointing down grade and forming a uniform invert.
- D. Pipe shall be bedded in Class I, one-fourth inch (1/4") to one and one-half inch (1 2") graded stone bedding material for depths of eighteen feet (18') or less. Pipe will be installed in bedding placed six inches (6") below the pipe barrel and brought up to the top of the pipe.
- E. Pipe shall not be placed on blocking at any time unless approved by the Engineer, and then only at manholes or other structures where temporary blocking may facilitate installation of the pipe. After the pipe has been installed, all blocking shall be removed and all voids filled with select material and compacted in place.
- F. Connect to municipal sewer system with all required fittings, cleanouts, pipe and accessories.
- G. All end line pipe, temporary or permanent, shall be fully protected with a water tight stopper to prevent water, earth, or other foreign debris from entering the pipe.
- H. Pipe of different material shall not be joined together unless directly specified by the Engineer. Changes in pipe material shall be made at manholes only.

3.08 INSTALLATION - MANHOLES

- A. Minimum diameter of manholes shall be 4'-0" (48"0) and recast manholes shall conform to all the requirements of ASTM C 478.
- B. Form bottom of excavation clean and smooth to correct elevation. Establish elevations and pipe inverts for inlets and outlets as indicated.
- C. All invert channels shall be smooth and semi-circular in shape, conforming to the inside of the adjacent sewer pipe section. Changes in direction of flow shall be made with a smooth curve, as large in radius as the size of the manhole will allow. Changes in the size and grade of the channels shall be formed directly in the concrete of the manhole base. The floor of the manhole outside the channels shall be smooth and shall slope toward the channels not less than one inch per foot nor more than two inches per foot.
- D. Mount lid and frame level in grout, secured to top cone section at elevation indicated.

3.09 SEWER SERVICES

- A. Services, unless otherwise directed, shall extend from the main sewer line to the property line or street right-of-way.
- B. All service lines will have a watertight plug at the designated termination point with a 5' long, 4" square, grade 2 treated wood post buried at the plug with 2' extending above finished grade.
- C. All services shall be a minimum of 6 inches in diameter, unless otherwise directed.
- D. Services shall be of the same material as the main line sewer unless shown otherwise.

3.10 INSPECTION

- A. All work done and materials furnished shall be subject to the inspection of the Engineer and his Inspector. The Engineer reserves the right to mark rejected materials to distinguish them as such.
- B. All improper work shall be reconstructed at the Contractor's expense.
- C. All materials which do not conform to the requirements of the specifications shall be removed and replaced with approved materials at the Contractor's expense.

3.11 PIPE TESTING

- A. Mandrel:
 - 1. A mandrel shall be pulled through PVC line sections at any time prior to or during the one year warranty period. A 5% mandrel shall be used on any line which has been constructed for less than thirty days. After 30 days a 7-1/2% mandrel will be allowed.
 - 2. An approved mandrel, proving ring, pulling ropes and cables shall be provided by the Contractor for testing PVC pipe at no additional cost to the Owner.
 - 3. The mandrel shall be hand pulled through the pipe using no wrenched or other mechanical devices except a pulley at the manhole invert. The pulley allows the mandrel to be pulled from ground level rather than from inside the manhole.

4. If, at any point in the pipe in question, one (1) man is unable to hand pull the mandrel through the pipe, then the pipe will be deemed unacceptable. The failed pipe shall be re-excavated and the problem solved at the Contractor's expense.

B. Limits of Infiltration/Exfiltration:

1. Measurements of infiltration/exfiltration will be made before sewage flows are allowed in the sewers.
2. Measurements for infiltration shall be made using a V-notch weir or by measuring the volume directly. Measurements for exfiltration shall be made by bulk heading the sewer at the end of the upper end and computing the volume of leakage from the extent of the diminished volume of water in the manhole during the test period. (This method only for dry soil conditions).
3. All infiltration/exfiltration tests shall be made by the Contractor in the presence of the Engineer.
4. All expenses of tests shall be paid by the Contractor.
5. Allowable limit of exfiltration and ground water infiltration for the entire system of new sewer or any one trunk, interceptor or outfall sewer line, including connecting laterals, shall not exceed 150 gallons per day per inch of pipe diameter per mile of pipe. This rate will be applied to any length of pipe in order to isolate excessive infiltration/exfiltration areas.

C. Low Pressure Air Testing of Gravity Sewers:

1. Conform and adhere to Grand County Water and Sewer District's Sewer System Standards and Specifications.

3.12 FIELD QUALITY CONTROL

- A. Field inspection will be performed by the Engineering firm and Georgetown County Water & Sewer District.

3.13 PROTECTION

- A. Protect pipe from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 02700 - WATER DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water main piping, fittings, and accessories.
- B. Water service line piping, fittings, and accessories.
- C. Pressure testing and disinfection.

1.02 RELATED SECTIONS

- A. Section 02100 – Earthwork.

1.03 REFERENCES

- A. ASTM B 62 - Composition Bronze or Ounce Metal Castings.
- B. ASTM D 2241 - Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- C. ASTM D 2466 - Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- D. ASTM D 2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
- E. ASTM D 2737 - Polyethylene (PE) Plastic Tubing.
- F. ASTM D 2774 - Underground Installation of Thermoplastic Pressure Piping.
- G. ASTM D 2855 - Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
- H. ASTM D 3139 - Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- I. ASTM F 402 - Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings.
- J. ASTM F 477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- K. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
- L. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and other Liquids.
- M. AWWA C111/21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- N. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water and other Liquids.
- O. AWWA C153/A21.53 - Ductile-Iron Compact Fittings, 3 in. Through 16 in., for Water and Other Liquids.
- P. AWWA C500 - Gate Valves for Water and Sewerage Systems.
- Q. AWWA C502 - Dry-Barrel Fire Hydrants.

- R. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 in. Through 24 in. NPS.
- S. AWWA C509 - Resilient-Seated Gate Valves for Water and Sewerage Systems.
- T. AWWA C600 - Installation of Ductile-Iron Water Mains and their Appurtenances.
- U. AWWA C651 - Disinfecting Water Mains.
- V. AWWA C800 - Underground Service Line Valves and Fittings.
- W. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution.
- X. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe, 14 in. through 36 in., for Water Distribution
- Y. AWWA C906 - High Density Polyethylene Pipe for Water Distribution.
- Z. AWWA M23 - PVC Pipe - Design and Installation.
- AA. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.
- BB. UBPPA UNI-B-3 - Installation of Polyvinyl Chloride (PVC) Pressure Pipe.
- CC. UBPPA UNI-B-8 - Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe.

1.04 SUBMITTALS

- A. Submit product data for pipe, valves, fire hydrants, and accessories.

1.05 GENERAL

- A. All material or products which come into contact with drinking water shall be third party certified as meeting the specifications of the American National Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects. The certifying party shall be accredited by the American National Standards Institute.
- B. Steel pipe and asbestos cement pipe shall not be used in potable water systems. Asbestos cement pipe may be used in the repair of existing asbestos cement lines.
- C. Natural rubber or other material which will support microbiological growth may not be used for any 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.
- D. Lubricants which will support microbiological growth shall not be used for slip-on joints. The use of vegetable shortening is prohibited.
- E. The use of solvent-weld PVC pipe and fittings in water mains 4-inch and larger is prohibited.
- F. Any pipe, solder, or flux which is used in the installation or repair of any public water system, used in any plumbing, which provides water through connection to a public water system, for human consumption, shall be lead free. Lead free, for solder and flux, means those containing not more than 0.2% lead. Lead free, for pipes and pipe fittings, means those containing not more than 8.0% lead. Leaded joints necessary for the repair of CIP shall be exempt from the above.
- G. No flushing device shall be directly connected to any sewer.

- H. Chambers, pits or manholes containing valves, blow-offs, meters, air relief valves, or other such appurtenances to a distribution system, shall not be connected directly to any storm drain or sanitary sewer.
- I. All pipe, fittings, packing, jointing materials, valves and fire hydrants shall conform to Section C of the AWWA Standards.
- J. Water mains which have been previously used for conveying potable water may be reused provided they meet applicable criteria from AWWA Section C, ANSI/NSF 61, and ASTM D 1785 or D 2241. The mains must be thoroughly cleaned and restored practically to their original condition.
- K. All water mains shall be detectible within 3 feet with electronic locating equipment.
- L. All water mains shall be provided with a minimum of 30 inches of cover, unless pipe material is ductile iron, or other approved materials, and if exposed should be insulated to prevent freezing.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage: Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials, and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.
- B. Handling: Handle fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry, do not drag pipe to the trench. Store rubber gaskets and plastic piping and jointing materials that are not to be installed immediately, under cover out of direct sunlight.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. U.S. Pipe.
- B. Griffin Pipe Products Company.
- C. American Cast Iron Pipe Company.
- D. McWane Cast Iron Pipe Company.
- E. J M Eagle.
- F. Clow Corporation.
- G. Mueller Company.
- H. M & H.
- I. Rockwell International.

2.02 WATER MAIN MATERIALS

A. Ductile-Iron Piping

1. Pipe and Fittings: Pipe, except flanged pipe, shall conform to AWWA C151/A21.51 and shall be Pressure Class 350 for pipe sizes 12-inch and smaller and Pressure Class 250 for pipe sizes 14-inch and larger. Flanged pipe shall conform to AWWA C115/A21.15. Fittings shall conform to AWWA C110/A21.10 or AWWA C153/A21.53. Fittings shall have pressure rating at least equivalent to that of the pipe. Ends of pipe and fittings shall be suitable for the specified joints. Pipe and fittings shall have cement-mortar lining conforming to AWWA C104/A21.4, standard thickness.
2. Joints and Jointing Material: Joints for pipe shall be push-on; joints for fittings shall be mechanical joints, except that, where indicated, joints shall be flanged. Shape of pipe ends, gaskets, and lubricant for push-on joint assembly shall conform to AWWA C111/A21.11. Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets for mechanical joints shall conform to AWWA C111/21.11. Bolts, nuts, and gaskets for flanged connections shall be as recommended in the Appendix to AWWA C115/21.15.

B. PVC Plastic Water Pipe and Associated Fittings

1. Pipe and Fittings: Pipe 4-inch and smaller shall conform to ASTM D 2241 and shall be plain end gasket bell end, Pressure Class 160 (DR26) with cast-iron-equivalent OD. Pipe 4-inch through 12-inch, shall conform to AWWA C900 and shall be plain end gasket bell end, Pressure Class 150 (DR18) with cast-iron-pipe-equivalent OD. Pipe 14-inch through 36-inch shall conform to AWWA C905 and shall be plain end gasket bell end, Pressure Class DR18 with cast-iron-pipe equivalent OD. Fittings shall be gray-iron or ductile-iron conforming to AWWA C110/A21.10 or AWWA C153/A21.53, and shall have cement-mortar lining conforming to AWWA C104/A21.4, standard thickness.
2. Joints and Jointing Material: Joints for pipe shall be push-on joints as specified in ASTM D 3139. Joints between pipe and metal fittings, valves, and other accessories shall be mechanical-joints as specified in AWWA C111/A21.11. Provide each joint connection with an elastomeric gasket suitable for the bell with which it is to be used. Gaskets for push-on joints for pipe shall conform to ASTM F 477. Gaskets for mechanical joints for joint connections between pipe and metal fittings, valves, and other accessories shall be as specified in AWWA C111/A21.11.

C. Polyethylene (PE) Plastic Piping

1. Pipe and heat-fusion fittings shall conform to AWWA C906.

D. Valves, Hydrants, and Other Water Main Accessories

1. Gate Valves: Unless specified otherwise, valves conforming to AWWA C509 shall be nonrising stem type, wedge type gate, designed for a hydraulic working pressure of 200 psi, and shall have mechanical-joint ends. Material for the valves shall conform to the reference standards specified in AWWA C500. Valves shall open counterclockwise rotation of the valve stem. Stuffing as to permit easy removal of parts for repair. Valves shall be of one manufacturer.
2. Check Valves: Swing-check type conforming to AWWA C508. Valves shall have iron or steel body and cover, shall have flanged ends, and be designed for a

working pressure of 200 psi. Valves shall have clear port opening. Valves shall be of one manufacturer.

3. Fire Hydrants: Dry-barrel type. Dry-barrel type hydrants shall conform to AWWA C502, "Base Valve" design, and shall have 6-inch inlet, 5-1/4-inch valve opening, one 2-inch pumper connection, and two 2-inch hose connections. Inlet shall have mechanical-joint end; end shall conform to the applicable requirements as specified for the joint. Size and shape of the operating nut, cap nuts, and threads on hose and pumper connections shall be as specified in AWWA C502. Traffic type hydrant shall have special couplings joining upper and lower sections of hydrant barrel and upper and lower sections of hydrant stem and shall be designed to have the special couplings break from a force not less than that which would be imposed by a moving vehicle; hydrants shall operate properly under normal conditions.
4. Post Hydrants: Dry-barrel type conforming to AWWA C502, "Base Valve" design, and shall have 2 1/8-inch main valve opening, and one 2-inch hose connection. Inlet shall have mechanical-joint end; end shall conform to the applicable requirements as specified for the joint. Size and shape of the operating nut, cap nut, and threads on hose connection shall be as specified in AWWA C502.
5. Valve Boxes: Provide a valve box for each gate valve. Valve boxes shall be of cast iron of a size suitable for the valve on which it is to be used and shall be adjustable. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches. Each cast-iron box shall have a heavy coat of bituminous paint.
6. Tracer Wire for Nonmetallic Piping: Tracer wire shall be #12 gauge blue insulated cooper wire, provided in sufficient length to be continuous over each separate run of nonmetallic pipe.

2.03 WATER SERVICE LINE MATERIALS

A. Piping Materials

1. Polyvinyl Chloride (PVC) Plastic Piping: ASTM D 2241, with SDR as required to provide 160 psi minimum pressure rating. Fittings shall conform to ASTM D 2466. Pipe and fittings shall be of the same PVC plastic material. Plastic pipe and fittings shall bear the seal of approval of the National Sanitation Foundation for potable water service. Plastic Pipe and fittings shall be supplied from the same source.
2. Polyethylene (PE) Tubing: Tubing shall conform to ASTM D 2737, Pressure Class 200 psi (DR9), CTS or IPS as indicated. Tubing shall bear the seal of the National Sanitation Foundation for potable water service.

B. Water Service Line Appurtenances

1. Corporation Stops: Ground key type: made of bronze conforming to ASTM B 62 and suitable for the working pressure of the system. Threaded ends for inlet and outlet of corporation stops shall conform to AWWA C800.
2. Service Fittings: Compression type or grip ring (Insta-Tite) conforming to ASTM B 62 to fit CTS or IPS as indicated.
3. Gate Valves: MSS SP-80, Class 150, solid wedge, nonrising stem, 2-inch size and smaller. Valves shall have threaded end connections. Provide operating nut for 2-inch size valve; handwheel operator for valves smaller than 2-inch size.

4. Valve Boxes: Provide a valve box for each gate valve. Valve boxes for 2-inch size valve shall be of cast iron, shaft diameter 5 1/4 inches, and shall be adjustable. Provide a round head. Cast the word "WATER" on the lid. Each cast-iron box shall have a heavy coat of bituminous paint. Valve boxes for valves smaller than 2-inch size shall be of plastic.

PART 3 EXECUTION

3.01 INSTALLATION OF PIPELINE

- A. Location of Water Lines: The work covered by this section shall be as indicated on the drawings.

1. Water Piping Installation Parallel with Sanitary Sewer Piping

- a. Normal Conditions. Water Piping shall be laid at least 10 feet horizontally from a sewer, sewer manhole, or force main whenever possible. Distance shall be measured edge to edge.
- b. Unusual Conditions. When local conditions prevent a horizontal separation of 10 feet, water piping may be laid closer to a sewer, sewer manhole, or force main provided:
 - (1) Bottom (invert) of the water piping shall be at least 18 inches above the top (crown) of the sewer piping.
 - (2) Where this vertical separation cannot be obtained, sewer piping shall be constructed of AWWA-approved water pipe, pressure tested in place without leakage prior to backfilling.
 - (3) Sewer manhole shall be watertight construction and tested in place.
- c. Drain-Fields and Spray-Fields. No water piping shall be laid less than 25 feet horizontally from any portion of a waste-water tile-field or spray-field.

- Installation of Water Piping Crossing Sanitary Sewer Piping

- a. Normal Conditions. Water piping crossing above sewer piping shall be laid to provide a separation of at least 18 inches between the bottom of the water piping and the top of the sewer piping.
- b. Unusual Conditions. When local conditions prevent a vertical separation described above, the following construction shall be used:
 - (1) Sewer piping passing over or under water piping shall be constructed of AWWA-approved water piping, pressure tested in place without leakage prior to backfilling.
 - (2) Water piping passing under sewer piping shall, in addition, be protected by providing the following. A vertical separation of at least 18 inches between bottom of sewer piping and top of water piping; adequate

structural support for sewer piping to prevent excessive deflection of joints and settling on and breaching of water piping; and that the length (minimum 18 feet) of water piping be centered at the point of crossing so that joints shall be equidistant and as far as possible from sewer piping.

- c. Sanitary Sewer Piping or Sanitary Sewer Manholes. No water piping shall pass through or come in contact with any part of a sewer manhole.

B. Earthwork: Perform earthwork operations in accordance with Section 02100, "Earthwork."

C. Pipe Laying and Jointing: Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or other water line material into trenches. Cut pipe accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with bell end pointing in the direction of laying. Grade pipeline in straight lines; avoid formation of dips and low points. Support pipe at proper elevation and grade, and secure firm, uniform support. Wood support blocking will not be permitted. Provide continuous and uniform bedding in the trench for the pipe. Lay pipe so that full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells and joints. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. Place backfill material in maximum 8-inch lifts. Tamp to compact each lift to a sufficient height above the pipe to adequately support and protect the pipe. Ensure that stones, other than crushed bedding, do not come in contact with the pipe and are not located within 6 inches of the pipe. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions or trench or weather prevents installation. Depth of cover over top of pipe shall not be less than 3 feet. Pipe shall not be used above grade.

D. Installation of Tracer Wire: Install a continuous length of tracer wire for full length of each run of nonmetallic pipe. Attach wire to top of pipe in such manner that it will not be displaced during construction operations. Terminate tracer wire at each valve and arrange to allow connection of equipment for tracking pipe and to prevent interference of operating the valve. Standard underground type electrical wire connectors are to be used where splicing is required. All terminals are to be taped for corrosion and underground deterioration protection.

E. Connection to Existing Water Lines: Make connections to existing water lines with a minimum interruption of service on the existing line. Use tapping and mechanical joint type sleeves for connections to be made under pressure. Bolt sleeves around mains; bolt valve conforming to AWWA C509 to the branch. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, all without interruption of service. Furnish all materials required to make connections into the existing water supply systems and perform all excavation, backfilling, and other incidental labor as required.

F. Cross Connection Control: There shall be no connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contamination materials may be discharged or drawn into the system. No by-passes shall be allowed, unless the bypass is also equipped with an equal, approved backflow prevention device. High hazard category cross connection shall require an air gap

separation or an approved reduced pressure back flow preventer. Reduced pressure principal backflow prevention assemblies shall not be installed in any area location subject to possible flooding. This includes pits or vaults which are not provided with a gravity drain to the ground=s surface that is capable of exceeding the discharge rate of the relief valve. If installed in a pit, the drain line shall be 2 times the size of the line entering the backflow prevention device. The drain cannot empty into any type of ditch, storm drain, or sewer which could flood water back into the pit. All piping up to the inlet of the backflow prevention device must be suitable for potable water. The pipe must be AWWA or NSF approved. Fire line sprinkler systems and dedicated fire lines, except those in the high hazard category shall be protected by an approved double check valve assembly.

G. Air Relief Valve: Provide air relief valves at high points in the water main as required. Automatic air relief valves shall not be used in situations where flooding of the manhole or chamber may occur.

H. Installation of Water Mains

1. Special Requirements for Ductile-Iron Piping

a. Installation, General: Unless otherwise specified in the following subparagraphs, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.

b. Jointing:

(1) Make push-on joints with the gaskets and lubricant previously specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly.

(2) Make mechanical joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly and with recommendations of Appendix A to AWWA C111/A21.11.

(3) Make flanged joints with gaskets, bolts, and nuts previously specified for this type joint. Make flanged joints up tight; avoid strain on flanges, fittings, and valves. Align bolt holes for each flanged joint. Use full size bolts for the bolt holes; use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted. Do not allow adjoining flange faces to be out of parallel to such degree that the flanged joint cannot be made watertight without straining the flange. When any flanged pipe or fitting has dimensions that do not allow the making of a proper flanged joint as specified, replace it by one of proper dimensions.

c. Pipe Anchorage: Provide joint restraints as indicated for pipe anchorage at all tees, bends, plugs and hydrants on lines 2 inches in diameter and larger.

d. Above-Water Crossings: The pipe shall be adequately supported and anchored, protected from damage and freezing, accessible for repair or replacement.

e. Underwater Crossings: A minimum of 2 feet of cover shall be provided over the pipe. When crossing water courses that are greater than 15 feet in width, the following shall be provided:

(1) The pipe joints shall be designed appropriately.

(2) Valves shall be located so the section can be isolated for testing or repair; the valves on both sides of the crossing shall be easily accessible and not subject to flooding.

(3) supply service.

A blow-off shall be provided on the side opposite the

2. Special Requirements for PVC Plastic Water Main.

a. Installation, General: Unless otherwise specified in the following subparagraphs, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and requirements of UBPPA UNI-B-3 for laying of pipe, joining PVC pipe to fittings and accessories, and setting hydrants, valves, and fittings; and with recommendations for pipe joint assembly and appurtenance installation in AWWA M23, Chapter 7, "Installation." PVC pipe shall not used above grade.

b. Jointing: Make push-on joints with elastomeric gaskets specified for this type joint, using elastomeric-gasket bell-end pipe. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel. Use an approved lubricant recommended by the pipe manufacturer for push-on joints. Assemble push-on joints for pipe-to-pipe joint connections in accordance with the requirements of UBPPA UNI-B-3 for laying the pipe and the recommendations in AWWA M23, Chapter 7, "Installation," for pipe joint assembly. Make mechanical-joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories, with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111/A21.11. Cut off spigot end of pipe for mechanical-joint connections and do not re-bevel.

c. Pipe Anchorage: Provide joint restraints as indicated for pipe anchorage at all tees, bends, plugs and hydrants on lines 2 inches in diameter and larger.

3. Installation of Valves and Hydrants

a. Installation of Valves: Install gate valves conforming to AWWA C509 in accordance with AWWA C600 for valve-and -fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C509. Install gate valves on PVC water mains in addition in accordance with the recommendations of AWWA M23 for appurtenance installation in AWWA M23, Chapter 7, "Installation." Install check valves in accordance with the applicable requirements of AWWA C600 for valve-and-fitting installation.

b. Installation of Hydrants: Install hydrants in accordance with the requirements of AWWA C600 for hydrant installation and as indicated.

Installation of Water Service Piping

Location: Terminate water service lines approximately 5 feet from the building line or at the points indicated.

Service Line Connections to Water Mains: Connect service lines to the main by a service saddle as indicated. Connect service lines to PVC plastic water mains in accordance with UBPPA UNI-B-8 and the recommendations of AWWA M23, Chapter 9, "Service Connections."

Special Requirements for Installation of Plastic Piping

Plastic Piping Installation, General: Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the applicable requirements of ASTM D 2774 and ASTM D

2855, unless otherwise specified. Handle solvent cements used to join plastic piping in accordance with ASTM F 402.

Jointing: Make solvent-cemented joints for PVC plastic piping using the solvent cement specified for this material; assemble joints in accordance with ASTM D 2855. Make plastic pipe joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

Plastic Pipe Connections to Appurtenances: Connect plastic pipe service lines to corporation stops and gate valves in accordance with the recommendations of the plastic pipe manufacturer or as indicated.

3.02 DISINFECTION

- A. Flush and disinfect new potable water lines and affected portions of existing potable water lines in accordance with AWWA C651. Apply chlorine by the continuous feed method. Chlorinate water lines with not less than 25 milligrams per liter of available chlorine. Water from the existing distribution system or other source of supply shall be controlled so as to flow slowly in to the newly laid water lines during the application of chlorine. The solution shall be retained in the pipelines for not less than 24 hours. Flush the solution from the systems with clean water until maximum residual chlorine content is not greater than 0.2 parts per million or residual chlorine content of domestic water supply. Obtain a minimum of two samples from each sampling site for total coliform analysis. The number of sites depends on the amount of new construction but must include all dead-end lines, be representative of the water in the newly constructed mains, and shall be collected a minimum of every 1,200 linear feet. Prior to sampling, the chlorine residual must be reduced to normal system residual levels or be non-detectable in those systems not chlorinating. These samples must be collected at least 24 hours apart and must show the water lines to be absent of total coliform bacteria. The chlorine residual must also be measured and reported. If the membrane filter method of analysis is used for the coliform analysis, non-coliform growth must also be reported. If the non-coliform growth is greater than 80 colonies per 100 millimeters, the sample result is invalid and must be repeated. All samples must be analyzed by a State certified laboratory.

3.03 TESTING PROCEDURE

- A. Test water mains and water service lines in accordance with the applicable specified standard for hydrostatic testing.
- B. The water main shall be subjected to a hydrostatic pressure of 150 pounds per square inch for a period of two hours.
- C. The leakage during the test shall not be more than shown on the Leakage Allowance Table or AWWA C600.
- D. Any cracked or defective pipes, fittings, or valves discovered in consequence of the pressure test shall be removed and replaced by the Contractor at his own expense. The water line is to be retested at the required pressure for two hours.
- E. Where pipeline construction ties into existing lines, and where it is not practicable to make a hydrostatic pressure test, the Contractor shall leave this section of pipeline uncovered at each applicable joint for inspection for a period of 48 hours after the connection has been

made and the line is placed in service. The Contractor shall make the necessary restraints to make sure that the water line does not blow apart at these uncovered joints. Any leakage discovered in these joints shall be immediately corrected by the Contractor.

- F. All pressure tests must be witnessed for the two hour duration by the Engineer and/or a qualified Inspector. The Contractor is to notify the Engineer a minimum of 24 hours prior to the pressure test.

**LEAKAGE ALLOWANCE TABLE IN U.S. GALLONS
PER 1000 FEET (FOR 50 JOINTS) PER TWO HOURS
(for a 150 psi Pressure Test)**

Pipe Diameter	2"	3"	4"	6"	8"	10"	12"	
Leakage Allowable (DIP)		0.37	0.55	0.74	1.10	1.47	1.84	2.21
Leakage Allowable (PVC)	0.33	0.50	0.66	0.99	1.32	1.66	1.99	

Any other leakage allowance can be obtained by the following formulas:

Ductile Iron:

$$L = [SD(P)^2] / 133,200$$

- L = allowable leakage (gals./hr)
- S = length of the pipeline tested (feet)
- D = diameter of pipe (inches)
- P = average test pressure (psig)

PVC:

$$L = [ND(P)^2] / 7,400$$

- L = allowable leakage (gals./hr)
- N = # of joints in pipeline being tested
- D = diameter of pipe (inches)
- P = average test pressure (psig)

3.04 FIELD QUALITY CONTROL

- A. Field Inspections: The Engineer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when required, that any item of work has been constructed properly in accordance with the drawings and specifications.

END OF SECTION