Project Manual

St. Andrew School

Panama City, Florida

Quina Grundhoefer Architects
November 30, 2023

Project Manual

Project: **St. Andrew School**
Panama City, Florida
Date: November 30, 2023

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REQUEST FOR BIDS

General Contractor bids to be accepted at the offices of the Architect, Quina Grundhoefer Architects, 400 W Romana Street, Pensacola, Florida 32502 and will be opened and evaluated by the Architect and the Destination Panama City Board on the date and times listed below for the construction of the following project:

St Andrew School Destination Panama City – The historic school is located at 3001 15th Street in Historic St. Andrews, Panama City, Florida. Digital copies of plans and specifications will be available on request from the office of **Quina Grundhoefer Architects, P.A.**, 400 West Romana Street, Pensacola, FL 32502 (850-433-5575) or may be requested by emailing qg@qgarchitects.com. **Submittal Opening: Wednesday, February 28, 2024, at 2:00 p.m., Central time. Bids may be emailed, mailed, or delivered to the Architect's office.**

PLEASE NOTE, a Pre-Submittal Zoom Meeting will be held on **Thursday, January 25, 2023, at 10:00 am, Central** time and potential contractors may schedule a site visit during the week after January 25th. Please contact the Owner's Representative Jennifer Vigil at the Destination Panama City office (850) 215-1700 (Jennifer@DestinationPanamaCity.com) to make an appointment. Contractors are encouraged to join the meeting. Minority Contractors are encouraged to participate. All questions should be sent by email to qg@qgarchitects.com. All questions should be submitted by **February 21, 2024.** Responses to questions will be shared with all interested contractors. Any submittal received after the above-mentioned date and time will not be considered. Partial funding for this project is from the State of Florida, Division of Historic Resources. The contractor must be fully bondable for the project amount. The Owner reserves the right to waive formalities in the process and reject any/and or all submittals. Selection recommendations to the Church Administrative Board are pending subject to final review and verification of required documents.

INSTRUCTIONS TO BIDDERS

1. BID FORMS: The Proposal Form is included in these specifications. Separate Proposal Forms will be furnished to prospective bidders upon request.

   Bid documents shall be sealed and clearly labeled with the words "Bid Documents", the project name, name of bidder and date and time of opening so as to guard against premature opening of any bid.

   The Owner may consider as nonconforming any bid on which there is an alteration of or departure from the Proposal Form hereto attached.

   The Bid shall be based upon the completion of the Work according to the contract documents, together will all addenda thereto, under the lowest proposal submitted by a responsive bidder.

2. UTILIZATION OF SUBCONTRACTORS: ***A complete list of subcontractors to be used for this project shall be submitted within one week after the bid date and time listed on the Proposal Form.*** Licensure of subcontractors is specified under paragraph 3.

3. LICENSURE: In accordance with Chapter 489.113, Florida Statutes, all individuals or entities engaging in and providing construction services shall be licensed in the State of Florida for that activity. This license requirement includes general and sub-contractors.

   The successful low bidder shall be required to submit a current license certificate and a list of all contractors to be involved in said project with applicable license numbers (see form included in these documents), including a photographic copy of current license certificates. Submittal of proof of license shall be made with, and as a part of signed contract.

   Failure to submit required proof of license shall be cause for Owner to reject bid as non-responsive, and award bid to second lowest qualified bidder.

4. INTERPRETATION: No oral interpretation will be made to any bidder as to the meaning of the drawings or specifications. Every interpretation made to a bidder will be in the form of an addendum to the specifications. Addenda will be furnished to each bidder, but it shall be the bidder's responsibility to make inquiry as to addenda issued. All such addenda shall become part of the contract and all bidders shall be bound by such addenda whether or not received by the bidders.

5. FAMILIARITY WITH LAWS: It is the bidder's responsibility to be familiar with all Federal, State and local laws, ordinances, rules and regulations that in any manner, affect the work. Ignorance thereof on the part of the bidder will in no way relieve him from responsibility.

6. PERMITS AND INSPECTIONS: It is the bidder’s responsibility to obtain and pay the cost of necessary permits and inspections from either the County or City Building Inspection departments.

7. EXAMINATION OF DOCUMENTS AND SITE: Before submitting his proposal, bidder shall visit the site of the proposed work and familiarize himself with the nature and extent of the work and any local conditions that may in any manner affect the work to be done and the equipment, materials, and labor required. He shall also examine the drawings, specifications, and other contract documents to inform himself thoroughly regarding any and all conditions and requirements that may in any manner affect the work to be performed under the contract.

8. RIGHT TO REJECT PROPOSAL: The Owner reserves the right to reject any or all proposals, to waive technical errors, and to accept any bids in part.

9. TIME OF COMPLETION: The successful bidder will be required to complete the project within the time stated in the Proposal Form and General Conditions. When projects are bid as a group, it is expected that the successful Contractor will have the manpower capabilities to complete all projects concurrently. A completion time listed in the Contract Documents is for completion of all projects unless specified otherwise.

10. FORM OF AGREEMENT: The Contract form shall be "Standard Form of Agreement between Owner and Contractor", AIA document A101 2017.

11. BID GUARANTEE: The bidder's proposal shall be accompanied by a bid bond, cashier's check or certified check in the amount of 5% of the total of the bid and drawn in favor of the Owner. Such bid bond or check is given with the understanding and agreement that it guarantees: (1) that the bidder will not withdraw his bid for period of 45 consecutive calendar days commencing from the bid date; (2) that, if his bid is accepted, the bidder will enter into the written Contract with the Owner and furnish the required insurance certificates, and insurance within 10 consecutive days after receipt of notice of acceptance of his bid. In the event the bidder fails to comply with any of these conditions and requirements in whole or in part, the full amount of the bond or check shall be automatically forfeited to the Owner as damages on account of the default of the bidder. Within seven days after formal opening of bids, bid bonds and checks shall be returned to all except the three lowest bidders. The bid bonds or checks of the lowest bidders will be returned within three days after the execution of the Contract and submission to and approval by the Owner of all documentation and executed bonds.

12. SECURITY: Where Contractor is required by the nature of the work to have access to the interior of the facility, the Contractor shall be responsible for maintaining building security, and the Contractor shall be responsible for replacement or repair of items and or equipment stolen, lost or damaged while the building security is under the care of the Contractor. The Contractor shall be responsible for having the job superintendent present wherever subcontractors are working in connection with the Contractor's basic contract.

13. SALVAGE: The Owner reserves the right/option to take possession of any items salvaged.

14. UTILITY SPOTTING: The Contractor shall employ the use of Ground Penetrating Radar Equipment to locate, identify and protect all underground utilities. This cost shall be in the base bid. Please refer to the Division of Trenching and Excavation.

END OF SECTION

BID FORM

TO: City of Panama City, Florida
501 Harrison Ave
Panama City, FL 32401

BID DATE: February 28,2024

REFERENCE: **St. Andrew School**
Panama City, Florida

BIDDER: _____
(name of Firm submitting Bid)

Gentlemen:
I have received the Bidding Documents consisting of Drawings and Specifications (Project Manual) entitled **St. Andrew School,** dated November 30, 2023, prepared by Quina Grundhoefer Architects.

I have also received Addenda Numbers _____
and have included their provisions in my Bid. I have examined both the Bidding Documents and the site.

I will construct this project for the lump sum price of:

BASE BID: _____
(write out amount)
_____

($_____)

I will construct the project within the following number of days.

CONSTRUCTION TIME: _____

ALTERNATES:

Alternate No. 1: **Trellis:** The additive amount to construct the Trellis structure over the covered sidewalk around the Amphitheater as shown on the drawings.

Add: $ _____

GENERAL CONTRACTORS LICENSE: _____

BY: _____
(print name)

SIGNATURE: _____

TITLE: _____

DATE: _____

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

St. Andrew School

THE OWNER:
(Name, legal status and address)

THE ARCHITECT:
(Name, legal status and address)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

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G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

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§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

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§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

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§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

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§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

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delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

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specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

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§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

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§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

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ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

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§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

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.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

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§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

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§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

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.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

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§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

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§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

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.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

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promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act

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or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

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The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and

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approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

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§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- **.1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

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§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

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§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

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00065 - SUPPLEMENTAL GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

SECTION 1A:

1A.1 GENERAL CONDITIONS: "General Conditions of the Contract for Construction", 2017 Edition, Articles 1 through 14 inclusive, AIA Document A201, except as amended herein, shall by reference be made a part of these specifications.

1A.2 DEFINITIONS: The Owner noted in these documents is the **Destination Panama City,** Panama City, Florida.

1A.3 SPECIFICATIONS DIVISIONS: The specifications are divided into headings for the convenience of the Contractor. The Contractor shall, however, be held to the furnishing of a complete building according to the meaning and intent of the drawings and specifications whether all of the items involved under any trade are mentioned in one or several headings.

1A.4 CONTRACTOR'S INSURANCE: Article 11, "Insurance", of the General Conditions shall be amended and supplemented as follows:

A. Contractor shall not commence work under this contract until he has obtained all insurance required under this paragraph, certificates of insurance have been submitted, and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurance required of the subcontractor has been so obtained and approved. The successful Contractor shall be prepared at the time of contract award to provide the Owner with an insurance policy number.

B. COMPENSATION INSURANCE: Contractor shall take and maintain during the life of this contract, Workers' Compensation Insurance for all of his employees, employed at the site of the project. In case any work is sublet, Contractor shall require subcontractor similarly to provide Workers' Compensation Insurance for all the latter's employees unless such employees are covered by the protection afforded by the Contractor. Policy shall be in compliance with State of **Florida** statutes for Worker's Compensation which shall include employer's liability in an amount of not less than $100,000 each accident; $500,000 disease policy limit; and $100,000 disease - each employee. The coverage described herein shall be considered minimum requirements.

C. COMPREHENSIVE PUBLIC GENERAL LIABILITY INSURANCE: Contractor shall purchase and maintain during the life of this contract, public liability insurance against bodily injury, personal injury, property damage which shall include comprehensive general liability, contractual liability, products and completed operations liability in limits of not less than $1,000,000 per occurrence ***and $2,000,000 Aggregate.*** The contract shall protect him and any subcontractor performing the work covered by this contract, from claims for damages, which may arise from operations under this contract, whether such operations are by himself or by any subcontractor, or by anyone directly, or indirectly employed by either of them. The Contractor shall indemnify and hold harmless the Owner against any and all claims for personal injuries and/or property damage as a result of Contractor's ***and its Sub-Contractor*** acts, operations, or omissions and shall carry contractual liability and property damage insurance to cover such indemnification. The limits of contractual coverage shall agree with the limits stated above for Contractor's regular public comprehensive general liability coverage and property damage.

D. AUTOMOBILE LIABILITY INSURANCE: The Contractor shall maintain automobile liability insurance against bodily injury and property damage in the amount of $500,000 per occurrence. The Owner shall be named as an additional insured on the automobile policy.

F. ADDITIONAL INSURED CLAUSE: The Owner shall be added as an additional insured on all Contractor's liability policies.

G. BUILDER'S RISK INSURANCE: **To be provided by the Contractor.**

1A.5 PERFORMANCE BOND AND LABOR MATERIAL PAYMENT BOND: Paragraph 11.5.1 of the General Conditions is supplemented as follows:

The Contractor is required to furnish both a performance bond and a labor and material payment bond (two separate bonds) in the amount of not less than 100% of the contract price for each type of bond, covering faithful performance of the contract and the payment of all obligations arising thereunder.

1A.6 PERMITS: Paragraph 3.7 of the AIA Document A101 "General Conditions of the Contract for construction: 2007 Edition". The Contractor shall be responsible to obtain and pay for all required permits from the authority having jurisdiction. The cost of such permits shall be included in the base bid.

1A.7 LABOR: All Contractors and subcontractors employed under the work shall and will be required to conform to the Labor Laws of the State of **Florida**.

1A.8 TEMPORARY LIGHT AND POWER: The contractor shall provide temporary power for the construction activities for duration of the construction time unless a process to reimburse the owner is arranged for the contractor to pay for power supplied by the existing facilities.

1A.9 MATERIALS: When several materials are specified by name for one use, the Contractor may select for use any of those so specified. Whenever "or approved equal" is indicated, items proposed for use shall be submitted for Architect's approval. Wherever an item or class of material is specified exclusively by trade name or by name of the maker or by catalog reference, only such items shall be used.

1A.10 SHOP DRAWINGS: Shop drawings shall be submitted for manufactured or fabricated materials and equipment as called for in the various sections of the specifications, showing dimensions, materials, design data, finishes, quantities, installation methods and other pertinent data. Submit at least five copies of each item soon enough to allow reasonable time for checking by the Architect. **Digital copies may be submitted to the Architect. One hard copy is to be provided at the end of the project for the owner's use**.

1A.11 CONTRACTOR'S FIELD OFFICES: Trailers may be used for field offices, but their use as living quarters for personnel shall be limited to one staff member such as a night watchman or superintendent. Contractor shall provide suitable space in his field office, or in a separate unit, for review of the construction drawings by the Owner and Architect.

1A.12 WATER FOR CONSTRUCTION: **The owner will allow the contractor to use water from the facility for the construction duration.**

1A.13 GRADES LINES AND LEVELS: The Contractor shall verify all grades, lines, levels and dimensions as shown on the drawings and shall report any errors or inconsistencies in the above to the Architect before commencing work.

1A.14 SCHEDULE OF VALUES: Within ten (10) days after receipt of signed Contract, the Contractor shall submit to the Architect/Engineers and the Owner a correct, complete, itemized Schedule of Values: the different materials or subdivisions of the contracted work, giving quantities and costs for labor and materials. Each item shall include its due proportion of expense and profit, all arranged in a satisfactory form. Total of all items shall equal the total

contract sum.

1A.15 PROGRESS CHART OR SCHEDULE: Within 10 days after receipt of signed contract Contractor shall file with the Architect a progress chart showing the order in which the Contractor proposes to begin the various parts of the work and the dates he contemplates completing them. Progress chart shall be updated at request of Architect/Owner and when completion date changes.

1A.16 TIME FOR COMPLETION: Time for Substantial Completion of all work included in this contract shall be as follows:
1. To be determined as part of the bid,

The number of days allowed includes an allowance for calendar days missed due to weather.

1A.17 LIQUIDATED DAMAGES: Liquidated Damages will be assessed for the failure to complete the construction in the time allowed at a rate of $1,000 per day until the project is substantially complete.

1A.18 CHANGES IN WORK (CHANGE ORDERS): Maximum percentages of overhead and profit which may be added by the Contractor to proposed costs of such changes in the work are specifically set forth as follows:

For all work done by the General Contractor: Contractor may add up to **10%** of proposed costs for combined overhead and profit.

For all work done by subcontractors to the General Contractor: subcontractors may add up to **10%** of proposed costs for combined overhead and profit, and the General Contractor may add up to **5%** of the above subcontractor's cost for his overhead and profit or a total of **15%** overhead and profit.

The Contractor shall submit receipts or other evidence showing his costs and his right to the payment claims. Labor costs shall include supervision, estimation, layout, mechanic's and laborer's wages including payroll taxes and assessments and insurance premiums. Material, equipment and equipment rental costs shall be the trade discount costs plus state sales tax where applicable. The Contractor shall utilize the AIA standard Change Order form.

1A.19 APPLICATION FOR PAYMENT: Paragraph 9.3 of the "General Conditions" referred to above is supplemented as follows: "Application for payment shall be made monthly. This application shall be submitted as follows: On or about the 25th day of each month 90% of the value, based on the Contract Prices, or labor and materials incorporated in the work and of materials suitably stored at the site thereof up to the last day of that month as estimated by the Architect, less the aggregate of previous payments. Upon substantial completion of the entire work, application for a sum sufficient to increase the total payment of 90% of the Contract Price shall be made." No payment will be made for materials stored off-site, unless material storage can be substantiated with proof of insurance and identified as property of the Contractor or Owner. An amount equal to **5%** of all labor and material incorporated in the work shall be retained. Retainage shall not be paid until satisfactory completion of the project. Monthly Applications for Payment shall be submitted to the Architect in triplicate by the Contractor utilizing AIA Document G702, 1992 Edition (Application and Certificate for Payment).

1A.20 WARRANTIES AND OPERATING INSTRUCTIONS: Where guarantees are required, secure warranties, countersign and deliver to the Owner prior to request for final payment. Contractor warrants all work performed by him directly and all work performed for him by others. Except where longer periods are specified, all materials, equipment and workmanship incorporated in the work shall be guaranteed for a period of one **(1) year** from date of final acceptance. Any

work, material or equipment which during the guarantee period is, in the opinion of the Owner, defective or inferior and not in accordance with the drawings and specifications shall be made good at no additional cost to the Owner, including any other work which may have been damaged because of such deficiencies. The Contractor shall be the contact person and the person responsible for coordinating all warranty work for the Owner.

End of Section 00065.

AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor *where the basis of payment is a Stipulated Sum*

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

St. Andrew School

The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[ ] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

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[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[ ] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

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ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment. *(Federal, state or local laws may require payment within a certain period of time.)*

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- **.1** That portion of the Contract Sum properly allocable to completed Work;
- **.2** That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

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§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

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§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

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§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

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[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

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AIA® Document G701™ – 2017

Change Order

PROJECT: *(Name and address)*
St. Andrew School

CONTRACT INFORMATION:
Contract For: General Construction
Date:

CHANGE ORDER INFORMATION:
Change Order Number: 001
Date:

OWNER: *(Name and address)*

ARCHITECT: *(Name and address)*

CONTRACTOR: *(Name and address)*

THE CONTRACT IS CHANGED AS FOLLOWS:
(Insert a detailed description of the change and, if applicable, attach or reference specific exhibits. Also include agreed upon adjustments attributable to executed Construction Change Directives.)

The original Contract Sum was	$	0.00
The net change by previously authorized Change Orders	$	0.00
The Contract Sum prior to this Change Order was	$	0.00
The Contract Sum will be increased by this Change Order in the amount of	$	0.00
The new Contract Sum including this Change Order will be	$	0.00

The Contract Time will be increased by Zero (0) days.
The new date of Substantial Completion will be

NOTE: This Change Order does not include adjustments to the Contract Sum or Guaranteed Maximum Price, or the Contract Time, that have been authorized by Construction Change Directive until the cost and time have been agreed upon by both the Owner and Contractor, in which case a Change Order is executed to supersede the Construction Change Directive.

NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER.

ARCHITECT *(Firm name)*	CONTRACTOR *(Firm name)*	OWNER *(Firm name)*
SIGNATURE	SIGNATURE	SIGNATURE
PRINTED NAME AND TITLE	PRINTED NAME AND TITLE	PRINTED NAME AND TITLE
DATE	DATE	DATE

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AIA® Document G702® – 1992

Application and Certificate for Payment

TO OWNER:

PROJECT: St. Andrew School

APPLICATION NO: 001
PERIOD TO:
CONTRACT FOR: General Construction
CONTRACT DATE:
PROJECT NOS: / /

Distribution to:
OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER : ☐

FROM CONTRACTOR:

VIA ARCHITECT:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
AIA Document G703®, Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM	$0.00
2. NET CHANGE BY CHANGE ORDERS	$0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2)	$0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)	$0.00
5. RETAINAGE:	
a. 0 % of Completed Work (Column D + E on G703)	$0.00
b. 0 % of Stored Material (Column F on G703)	$0.00
Total Retainage (Lines 5a + 5b or Total in Column I of G703)	$0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)	$0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)	$0.00
8. CURRENT PAYMENT DUE	$0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)	$0.00

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$0.00	$0.00
Total approved this Month	$0.00	$0.00
TOTALS	$0.00	$0.00
NET CHANGES by Change Order		$0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED $0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

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AIA® Document A312™ – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONSTRUCTION CONTRACT
Date:
Amount: $ 0.00
Description:
(Name and location)
St. Andrew School

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 16

CONTRACTOR AS PRINCIPAL	**SURETY**
Company: *(Corporate Seal)*	Company: *(Corporate Seal)*
Signature: _____	Signature: _____
Name and Title:	Name and Title:

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

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User Notes: (1212239728)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

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User Notes: (1212239728)

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

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§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:	_____	Signature:	_____
Name and Title:		Name and Title:	
Address:		Address:	

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User Notes: (1212239728)

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with this certification at 15:47:23 ET on 07/22/2022 under Order No. 2114247905 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A312™ – 2010, Performance Bond, as published by the AIA in its software, other than changes shown in the attached final document by underscoring added text and striking over deleted text.

_____

(Signed)

_____

(Title)

_____

(Dated)

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Payment Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONSTRUCTION CONTRACT
Date:
Amount: $ 0.00
Description:
(Name and location)
St. Andrew School

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 18

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

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User Notes: (1500735856)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

.2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

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User Notes: (1500735856)

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- **.1** the name of the Claimant;
- **.2** the name of the person for whom the labor was done, or materials or equipment furnished;
- **.3** a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- **.4** a brief description of the labor, materials or equipment furnished;
- **.5** the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- **.6** the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- **.7** the total amount of previous payments received by the Claimant; and
- **.8** the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

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§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:	_____	Signature:	_____
Name and Title:		Name and Title:	
Address:		Address:	

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Certification of Document's Authenticity

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I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with this certification at 15:47:49 ET on 07/22/2022 under Order No. 2114247905 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A312™ – 2010, Payment Bond, as published by the AIA in its software, other than changes shown in the attached final document by underscoring added text and striking over deleted text.

_____

(Signed)

_____

(Title)

_____

(Dated)

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AIA® Document G704® – 2017

Certificate of Substantial Completion

PROJECT: *(name and address)* St. Andrews School	**CONTRACT INFORMATION:** Contract For: General Construction Date:	**CERTIFICATE INFORMATION:** Certificate Number: 001 Date:
OWNER: *(name and address)*	**ARCHITECT:** *(name and address)*	**CONTRACTOR:** *(name and address)*

The Work identified below has been reviewed and found, to the Architect's best knowledge, information, and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated below is the date established by this Certificate.
(Identify the Work, or portion thereof, that is substantially complete.)

ARCHITECT *(Firm Name)*	**SIGNATURE**	**PRINTED NAME AND TITLE**	**DATE OF SUBSTANTIAL COMPLETION**

WARRANTIES
The date of Substantial Completion of the Project or portion designated above is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:
(Identify warranties that do not commence on the date of Substantial Completion, if any, and indicate their date of commencement.)

WORK TO BE COMPLETED OR CORRECTED
A list of items to be completed or corrected is attached hereto, or transmitted as agreed upon by the parties, and identified as follows:
(Identify the list of Work to be completed or corrected.)

The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first. The Contractor will complete or correct the Work on the list of items attached hereto within ( ) days from the above date of Substantial Completion.

Cost estimate of Work to be completed or corrected: $

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and other items identified below shall be as follows:
(Note: Owner's and Contractor's legal and insurance counsel should review insurance requirements and coverage.)

The Owner and Contractor hereby accept the responsibilities assigned to them in this Certificate of Substantial Completion:

CONTRACTOR *(Firm Name)*	**SIGNATURE**	**PRINTED NAME AND TITLE**	**DATE**
OWNER *(Firm Name)*	**SIGNATURE**	**PRINTED NAME AND TITLE**	**DATE**

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SECTION 01010 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. The Project: **St Andrew School Destination Panama City**

Complete Contract Documents, dated 11-30-2023, were prepared for the Project by:

Quina Grundhoefer Architects	Architect
Jerry Pate Design	Landscape Architect
Panhandle Engineering	Civil Engineer
Joe DeReuil Engineering	Structural Engineer
HM Yonge and Associates	Plumbing, HVAC and Electrical Engineers

A. Project Summary:

The work includes the following:

1. **Renovations to the Historic School Building – Building 1:** Renovations to the existing single-story National Register Historic school building of approximately 17,200 square feet.
2. **Renovations to the Reception Hall – Building 2:** The work includes demolition of the existing 1,800 square foot library, renovations to the 2,700 square feet cafeteria and addition of exterior covered walkways. All structures are single-story.
3. **Other structures and sitework:** Other work includes a new amphitheater, a new restroom to be located in the existing pavilion, site utilities, pavement and landscaping improvements.

B. An anticipated timeframe is the following: (To be verified by Destination Panama City)

1. Anticipated Notice to Proceed:	**February 2, 2024**
2. Contractor access to site:	**December 5, 2023**
Substantial Completion and Owner Occupancy:	**TBD**
3. Final Completion:	**TBD**

1.2 CONTRACTOR USE OF PREMISES

A. The Work of the Contract is subject to all applicable governing regulations, including the State of Florida, the City of Panama City, and Bay County, Florida. Partial funding for the project is from the State of Florida Division of Historic Resources and procurement methods required in the grant award agreement are to be followed.

1. Use of premises: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited by the Owner's right to perform work or to retain other contractors on portions of the Project. Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

END OF SECTION 01010.

SECTION 01027 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.

B. The Contractor's Construction Schedule and Submittal Schedule are included in Section "Submittals".

1.3 SCHEDULE OF VALUES

A. Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.

B. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

1. Contractor's construction schedule.
2. Application for Payment form.
3. List of subcontractors.
4. Schedule of alternates.
5. List of products.
6. List of principal suppliers and fabricators.
7. Schedule of submittals.

C. Submit the Schedule of Values to the Architect at the earliest feasible date, but in no case later than 7 days before the date scheduled for submittal of the initial Application for Payment.

D. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values.

E. Identification: Include the following Project identification on the Schedule of Values:

1. Project name and location.
2. Name of the Architect.
3. Project number.
4. Contractor's name and address.
5. Date of submittal.

F. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:

1. Generic name.
2. Related Specification Section.
3. Name of subcontractor.
4. Name of manufacturer or fabricator.
5. Name of supplier.
6. Change Orders (numbers) that have affected value.
7. Dollar value.
8. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.

G. Provide a breakdown of the 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.

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

I. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT:

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.

The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Application for Payment.

D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.

2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

E. Waivers of Mechanics Lien: With each Application for Payment submit waivers of mechanics liens from subcontracts or sub-subcontractors and suppliers for the construction period covered by the previous application.

1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.

2. When an application shows completion of an item, submit final or full waivers.

3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.

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

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values.
4. Contractor's Construction Schedule (preliminary if not final).
5. Submittal Schedule
6. Certificates of insurance and insurance policies.

G. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

H. Administrative actions and submittals that shall proceed or coincide with this application include:

I. Occupancy permits and similar approvals.

1. Warranties (guarantees) and maintenance agreements.
2. Test/adjust/balance records.
3. Maintenance instructions.
4. Meter readings.
5. Start-up performance reports.
6. Change-over information related to owner's occupancy, use operation and maintenance.
7. Final cleaning.
8. Application for reduction of retainage, and consent of surety.
9. Advice on shifting insurance coverages.
10. Final progress photographs.
11. List of incomplete work, recognized as exceptions to Architect's Certificate of Substantial Completion.

J. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:

Completion of Project closeout requirements.
Completion of items specified for completion.
Assurance that Work not complete and accepted will be completed without undue delay.
Transmittal of required Project construction records to Owner.
Removal of temporary facilities and services.
Removal of surplus materials, rubbish and similar elements.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01027.

SECTION 01040 - PROJECT COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:

Coordination.
Administrative and supervisory personnel.
Protection of Work and Property
General installation provisions.
Cleaning and protection.

B. Progress meetings: Hold regular weekly coordination meetings at a time convenient to all parties involved. Resolve coordination problems, distribute minutes to those in attendance and those affected by decisions resulting from the meetings.

1.3 COORDINATION

A. Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.

1. 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 the sequence required to obtain the best results.

2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

4. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
Preparation of schedules.
Installation and removal of temporary facilities.
Delivery and processing of submittals.
Progress meetings.
Project Close-out activities.

1.4 PROTECTION OF WORK AND PROPERTY

A. The services of a watchman is not a Contract requirement, however, it is the responsibility of the Contractor to protect all new and existing construction work and materials from damage or theft for the duration of the Contract. The Contractor shall provide watchman services as he deems necessary for such protection.

B. Openings in exterior walls and roof shall be enclosed to prevent unauthorized entry. Enclosed access openings shall be provided with operating hardware and shall be locked during non-working hours.

C. The Contractor shall protect all existing construction from damage, including the existing building, adjoining building, streets, sidewalks, curbs, fire hydrants, utility poles, existing site improvements, and other property and equipment on or adjacent to the project site. The Contractor shall repair any damage to such items to the satisfaction of the Architect, without cost to the Owner.

D. The Contractor shall provide all temporary protection required to protect all persons from injury within the area of the operations of the Contract for the duration of the Contract.

E. The Contractor shall provide all temporary construction and safeguards including planking, runways, bridges, fences, guard rails, barricades, lights and warning signs, necessary for the protection of the site improvements, existing building, adjacent property, the workmen, occupants of the existing building, and the public, and as required by local authorities.

F. The Contractor shall provide protection against rain, wind, snow, frost, and heat, to protect the interior of the existing building, and all new work and materials, from damage for the duration of the Contract, and to allow the work to proceed without interruption. The Contractor shall repair any damage to such items to the satisfaction of the Architect, without cost to the Owner.

G. The Contractor shall construct and maintain all necessary temporary drainage facilities and perform all pumping necessary to keep excavations, floors, pits and trenches free of water from any source for the duration of the Contract. Water removal shall be accomplished by such methods which will not damage adjacent property, any item of permanent site improvements, or the existing building.

H. Maintain the sidewalk fronting the premises free of construction debris, ice, and snow, at all times.

I. Conduct all building operations in accordance with "Good Practice Requirements for Building Construction Operations" of the National Fire Protection Association.

1.5 SUBMITTALS

A. Coordination Drawings: Prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.

B. Show the interrelationship of components shown on separate Shop Drawings.

C. Indicate required installation sequences.

D. Comply with requirements contained in Section "Submittals."

E. Refer to Division-15 Section "Mechanical Requirements," and Division-16 Section "Electrical Requirements" for specific coordination Drawing requirements for mechanical and electrical installations.

F. Staff Names: Within 15 days of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.

G. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

F. Recheck measurements and dimensions, before starting each installation.

G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

3.2 CLEANING AND PROTECTION

A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

END OF SECTION 01040

SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for cutting and patching.

B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1. Requirements of this Section apply to mechanical and electrical installations. Refer to Division-15 and Division-16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 SUBMITTALS

A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.

2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.

3. List products to be used and firms or entities that will perform Work.

4. Indicate dates when cutting and patching is to be performed.

5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.

6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.

7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.4 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:

Foundation construction.
Bearing and retaining walls.
Structural concrete.
Structural steel.
Lintels.
Timber and primary wood framing.
Structural decking.
Stair systems.
Miscellaneous structural metals.
Exterior curtain wall construction.
Equipment supports.
Piping, ductwork, vessels and equipment.

B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:

Shoring, bracing, and sheeting.
Primary operational systems and equipment.
Air or smoke barriers.
Water, moisture, or vapor barriers.
Membranes and flashings.
Fire protection systems.
Noise and vibration control elements and systems.
Control systems.
Communication systems.
Conveying systems.
Electrical wiring systems.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1. If possible retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

Processed concrete finishes.
Ornamental metal.
Matched-veneer woodwork.
Window wall system.
Stucco and ornamental plaster.
Finished wood flooring.
HVAC enclosures, cabinets or covers

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1 INSPECTION

A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

B. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.

4. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

4. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.

5. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.4 CLEANING

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.02 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.03 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 SCHEDULE OF ALTERNATES:

1. **Alternate No. 1 - Trellis:** The additive amount to construct the trellis over the curved sidewalk as shown on the drawings and specified. Rough-in utilities and surface pavers as shown on drawings are to be included in the Base Bid if the alternate is not accepted.

END OF SECTION 01230

SECTION 01300 - SUBMITTALS

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including;

1. Contractor's construction schedule.
2. Submittal schedule.
3. Daily construction reports.
4. Shop Drawings.
5. Product Data.
6. Samples.

B. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

Permits.
Applications for payment.
Performance and payment bonds.
Insurance certificates.
List of Subcontractors.

C. The Schedule of Values submittal is included in Section "Applications for Payment."

D. Inspection and test reports are included in Section "Quality Control Services."

1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

3. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.

1. Allow three weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Architect will promptly advise the Contractor when a submittal being processed must be delayed for coordination.

2. If an intermediate submittal is necessary, process the same as the initial submittal.

3. Allow two weeks for reprocessing each submittal.

4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

C. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Include the following information on the label for processing and recording action taken.

Project name.
Date.
Name and address of Architect.
Name and address of Contractor.
Name and address of subcontractor.
Name and address of supplier.
Name of manufacturer.
Number and title of appropriate Specification Section.
Drawing number and detail references, as appropriate.

D. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

1.4 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar- chart type Contractor's construction schedule. Submit within 30 days of the date established for "Commencement of the Work".

1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".

2. Within each time bar indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.

3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.

4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.

5. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.

6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.

B. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner prior to Substantial Completion.

C. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.

D. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.

E. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.

F. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.5 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.

1. Prepare the schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:

Scheduled date for the first submittal.
Related Section number.
Submittal category.
Name of subcontractor.
Description of the part of the Work covered.
Scheduled date for resubmittal
Scheduled date the Architect's final release or approval.

B. Distribution: Following response to initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.6 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Architect at weekly intervals:

List of subcontractors at the site.
Approximate count of personnel at the site.
High and low temperatures, general weather conditions.
Accidents and unusual events.
Meetings and significant decisions.
Stoppages, delays, shortages, losses.
Meter readings and similar recordings.
Emergency procedures.
Orders and requests of governing authorities.
Change Orders received, implemented.
Services connected, disconnected.
Equipment or system tests and start-ups.
Partial Completions, occupancies.
Substantial Completions authorized.

1.7 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:

1. Dimensions.
2. Identification of products and materials included.
3. Compliance with specified standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.
6. Sheet Size: Except for templates, patterns and similar full- size Drawings, Submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 36" x 48".
7. Submittal: Submit one correctable translucent reproducible print and two blue or black-line prints for the Architect's review; the reproducible print will be returned.

C. Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.

1. Preparation of coordination Drawings is specified in section "Project Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.
2. Submit coordination Drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.

1.8 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

B. Mark each copy to show applicable choices and options. Where printed Product Data includes

C. Information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

i. Manufacturer's printed recommendations.
ii. Compliance with recognized trade association standards.
iii. Compliance with recognized testing agency standards.
iv. Application of testing agency labels and seals.
v. Notation of dimensions verified by field measurement.
vi. Notation of coordination requirements.

D. Do not submit Product Data until compliance with requirements of the Contract
   a. Documents have been confirmed.

E. Submittals: Submit 3 copies of each required submittal; submit 4 copies where required for maintenance manuals. The Architect will retain one and will return the other marked with action taken and corrections or modifications required.

F. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

i. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.

ii. Do not permit use of unmarked copies of Product Data in connection with construction.

1.9 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

B. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect's Sample. Include the following:
   1. Generic description of the Sample.
   2. Sample source.
   3. Product name or name of manufacturer.
   4. Compliance with recognized standards.
   5. Availability and delivery time.

C. Where variation in color, pattern, texture or other characteristics are Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

1. Inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
2. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.

D. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.

1. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
2. Sample sets may be used to obtain final acceptance of the construction associated with each set.

1.10 ARCHITECT'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. Approved: Where submittals are marked "Approved", that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
2. Approved as Corrected: When submittal is marked "Approved as Corrected", that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
3. Revise and Resubmit: When submittal is marked "Revise and Resubmit", do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
4. Rejected: When submittal is marked "Rejected", do not proceed with that part of the Work covered by the submittal, including fabrication, delivery, or other activity. Prepare a new submittal in accordance with the Contract Documents and submit without delay.
5. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Action Not Required".

2.0 PART 2 - PRODUCTS (Not Applicable).
3.0 PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01300

SECTION 01400 - QUALITY CONTROL SERVICES

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for quality control services.

B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Architect.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

1. Specific quality control requirements for individual construction activities are specified in the Section that specifies those activities. Those requirements, including inspections and tests cover production of standard products as well as customized fabrication and installation procedures.
2. Inspections, tests and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Documents requirements.
3. Requirements for the Contractor to provide quality control services required by the Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 RESPONSIBILITIES:

A. Contractor's Responsibilities: The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.

1. The Contractor shall employ and pay an independent agency to perform specified quality control services.
2. The Contractor is to engage and pay for the services of an independent agency to perform the following inspections and tests:

Soil Compaction Testing
Concrete Testing

B. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the owner.

C. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:

1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
2. Providing the agency with a preliminary design mix proposed for use for materials mixes that required control by the testing agency.

D. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual specifications Sections shall cooperate with the Architect and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the Architect and Contractor promptly of irregularities or deficiencies observed on the Work during performance of its services.
2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
3. The agency shall not perform any duties of the Contractor.

E. Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services for the project shall coordinate the sequence of their activities so as to accommodate required services with a minimum of delay in the progress of the work. In addition, the Contractor and each independent testing agency shall coordinate their work so as to avoid the necessity of removing and replacing work to accommodate inspections and tests.

F. The Contractor is responsible for scheduling times for inspections, tests, taking of samples and similar activities.

G. Schedule of Inspections and Tests: Submit a schedule of inspections, tests and similar services required by the Contract Documents within 45 days of the date of the Notice to Proceed.

1.4 SUBMITTALS

A. General: The independent testing agency shall submit a certified written report of each inspection, test or similar service, directly to the Architect and owner, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, Submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

1. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to the following:

Date of Issue
Project title and number
Name, address and telephone number of testing agency
Dates and locations of samples and tests or inspections
Names of individuals making the inspection or test
Designation of the Work and test method
Identification of product and Specification Section
Complete inspection or test data
Test results and an interpretation of test results
Ambient conditions at the time of sample-taking and testing
Comments or professional opinion as to whether inspected or tested Work complies with Contract Documents requirements.
Name and signature of laboratory inspector
Recommendations on retesting

1.5 QUALITY ASSURANCE

A. Qualifications for Service Agencies: Engage inspection and testing services agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

2.0 PART 2 - PRODUCTS (Not Applicable).

3.0 PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching".
B. Protect construction exposed by or for quality control service activities, and protect repaired construction.
C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION 01400

SECTION 01500 - TEMPORARY FACILITIES

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.

B. Temporary utilities required include but are not limited to:

Water service and distribution.
Temporary electric power and light.
Telephone service.
Storm and sanitary sewer.

C. Temporary construction and support facilities required include but are not limited to:

Temporary heat.
Field offices and storage sheds.
Sanitary facilities, including drinking water.
Dewatering facilities and drains.
Temporary enclosures.
Hoists.
Temporary Project identification signs and bulletin boards.
Waste disposal services.
Rodent and pest control.
Construction aids and miscellaneous services and facilities.

D. Security and protection facilities required include but are not limited to:

Temporary fire protection.
Barricades, warning signs, lights.
Environmental protection.

E. Contractor to maintain a security program for the building and materials for the duration of the project.

1.3 SUBMITTALS

A. Temporary Utilities: Submit reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Submit a schedule indicating implementation and termination of each temporary utility within 15 days of the date established for commencement of the Work.

1.4 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:

Building Code requirements.
Health and safety regulations.
Utility company regulations.
Police, Fire Department and Rescue Squad rules.
Environmental protection regulations.

B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.

2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials; if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Water: Provide potable water approved by local health authorities.

2.2 EQUIPMENT

A. General: Provide new equipment; if acceptable to the Architect, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.

B. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures were exposed to moisture.

C. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.

D. First Aid Supplies: Comply with governing regulations.

E. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. Locate sanitary facilities and other temporary construction and support facilities for easy access.

a. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.

B. Temporary Field Office: Provide a temporary field trailer equipped with telephone communication. Field office to have a desk with a set of construction documents present at all times for the contractor's, subcontractors', architect's and owner's use. Documents include drawings, specifications, change orders, architect's supplementary instructions and approved shop drawings.

1. The field trailer is to be sized adequate to accommodate weekly subcontractor coordination meetings, including a table and chairs for attendees.
2. Post all applicable permits, licenses, notices and safety procedures required in a conspicuous location.

C. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.

D. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fire-retardant treated material for framing and main sheathing.

E. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated. Remove at the completion of the project.

F. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

G. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Architect.

B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

C. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.

D. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.

1. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:

    1. Replace air filters and clean inside of ductwork and housings.
    2. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
    3. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION 01500

SECTION 01631 - PRODUCT SUBSTITUTIONS

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. 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 in writing by the Architect, prior to award of Contract, are considered as included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.

2. Revisions to Contract Documents requested by the Owner or Architect.

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 and approved by the architect and owner.

1.4 SUBMITTALS

A. Substitution Request Submittal:

1. Submit 3 copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals.

2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

B. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.

C. Samples, where applicable or requested.

D. 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.

E. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors, which will become necessary to accommodate the proposed substitution.

F. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.

G. Cost information, including a proposal of the net change, if any in the Contract Sum.

H. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the publication indicated. Include the Contractor's waiver of rights to additional payment or time, which may subsequently become necessary because of the failure of the substitution to perform adequately.

2.0 PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Conditions: The Contractor's substitution request will be received and considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.

1. Proposed changes are in keeping with the general intent of Contract Documents.

2. The request is timely, fully documented and properly submitted.

B. The Contractor's submittal and Architect'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.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01631

SECTION 01700 - PROJECT CLOSEOUT

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Inspection procedures.
2. Project record document submittal.
3. Operating and maintenance manual submittal.
4. Submittal of warranties.
5. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions-2 through -16.

1.3 SUBSTANTIAL COMPLETION

A. Prerequisites to Substantial Completion: Before requesting inspection for certification of Substantial Completion, complete and/or submit the following:

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.

    a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

2. Advise Owner of pending insurance change-over requirements.

3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.

6. Deliver tools, spare parts, extra stock, and similar items.
7. Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.

8. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
9. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedures: At the contractor's request, the Architect will either proceed with Inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued. Architect will repeat inspection when advised Work is Substantially Complete. Results of completed inspection make-up initial "punch-list" for Final Acceptance.

1.4 FINAL ACCEPTANCE

A. Prerequisites to Final Acceptance: Before requesting final inspection for certification of final acceptance and final payment, complete the following, listing exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect.

4. Submit consent of surety to final payment.

5. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. On receiving Contractor's notice that Work is complete, including punch list items and excluding items delayed because of acceptable circumstances, the Architect will re-inspect the Work, and prepare a Certificate of Final Acceptance, or will advise Contractor of unfulfilled obligations. If necessary, procedure will be repeated.

1.5 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect's reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

3. Note related Change Order numbers where applicable.

4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

5. Provide record drawings in PDF format.

C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.

D. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

1. Upon completion of mark-up, submit complete set of record Product Data to the Architect for the Owner's records.

E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Architect and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.

F. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:

Emergency instructions.
Spare parts list.
Copies of warranties.
Wiring diagrams.
Recommended "turn around" cycles.
Inspection procedures.
Shop Drawings and Product Data.
Fixture lamping schedule.

2.0 PART 2 - PRODUCTS (Not Applicable)

3.0 PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES: Provide a minimum or (3) three sets of closeout documents.

A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

Maintenance manuals.
Record documents.
Spare parts and materials.
Tools.
Lubricants.
Fuels.
Identification systems.
Control sequences.
Hazards.
Cleaning.
Warranties and bonds.
Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures:

Start-up.
Shutdown.
Emergency operations.
Noise and vibration adjustments.
Safety procedures.
Economy and efficiency adjustments.
Effective energy utilization.

3.2 FINAL CLEANING

A. General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

a. Remove labels that are not permanent labels.

b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

C. Pest Control: Engage an experienced exterminator to make a final inspection, and rid the Project of rodents, insects and other pests.

D. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01700

SECTION 01740 - WARRANTIES AND BONDS

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

   a. Contractor is to provide **one year warranty** for all the Work, established from the date of substantial completion.

      1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.

      2. Refer to each individual Section of the Specifications for specific warranties which require a longer warrantee period.

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, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 DEFINITIONS

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4 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 Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefitted from use of the Work through a portion of its anticipated useful service life.

D. Owner's 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 Contract Documents.

The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.5 SUBMITTALS

A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's 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 Architect.

B. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

PART 2 - PRODUCTS (not applicable).

PART 3 - EXECUTION (not applicable).

END OF SECTION 01740

SECTION 02070 - SELECTIVE DEMOLITION

PART 1 - GENERAL SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of a building or structure.
2. Repair procedures for selective demolition operations.
3. Interior removal of partitions and fixtures.

1.02 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.03 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.04 SUBMITTALS

A. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Locations of temporary partitions and means of egress.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

D. Pre-demolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

E. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.05 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA/DEP notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

1.06 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

C. Owner assumes no responsibility for condition of areas to be selectively demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site will not be permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.01 REPAIR MATERIALS

A. Use repair materials identical to existing materials.

1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
2. Use materials whose installed performance equal or surpasses that of existing materials.

B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES

A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.

B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.

1. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.

C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated utilities when requested by Contractor.
2. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.

3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.03 PREPARATION

A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Pest Control: Employ a certified, licensed exterminator to treat building and to control rodents and vermin before and during selective demolition operations.

C. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
3. Protect existing site improvements, appurtenances, and landscaping to remain.
4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

E. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

F. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.04 POLLUTION CONTROLS

A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.

1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.05 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.
10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

B. Existing Facilities: Comply with Owner's requirements for using and protecting stairs, walkways, loading docks, building entries and other building facilities during selective demolition operations.

C. Removed and Salvaged Items: Comply with the following:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.

3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items: Comply with the following:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

F. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.

G. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

H. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

I. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for roofing requirements.

J. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

3.06 PATCHING AND REPAIRS

A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Patching: Comply with Division 1 Section "Cutting and Patching."

C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.

D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

E. Floors and Walls: Where walls or partitions that are demolished extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of

uniform finish color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
2. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
3. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

F. Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.07 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 02110 - CLEARING AND GRUBBING

PART 1: GENERAL

1.1 General Description of Work

A. Clearing and grubbing on project site of trees, stumps, brush, roots, vegetation, logs, rubbish and other objectionable matter within limits described in specifications or as shown on plans.

B. Clearing and grubbing shall be in advance of grading and trenching operations except that in cuts over 3 feet in depth, grubbing may be done simultaneously with excavation, provided objectionable matter is removed as specified.

C. Disposal of all debris resulting from clearing and grubbing work.

1.2 Protection of Adjacent Work: Protect existing improvements, adjacent property, utilities and other facilities, and trees and plants which are not to be removed from injury or damage.

1.3 Protection from Erosion

A. Contractor shall protect all disturbed areas from erosion and sediment migration off-site.

B. Repair any areas damaged by erosion.

C. Clean erosion sediment from affected areas.

D. Comply with all Florida Department of Environmental Protection (FDEP) and United States Environmental Protection Agency (EPA) requirements for management of stormwater during construction activities.

PART 2: PRODUCTS

2.1 Materials: Provide materials required to perform work as specified.

PART 3: EXECUTION

3.1 Clearing

A. Clear all areas covered by, roads, structures and embankments within project limits unless otherwise shown in plans.

B. Remove all saplings, brush, downed-timber and debris unless shown or directed otherwise.

C. Removal of trees and shrubs shall include removal of stumps and roots to the extent that no root greater than three (3) inches in diameter remains within five (5) feet of an underground structure or utility or under footings or paved areas.

3.2 Grubbing

A. Trees, stumps, root systems, rocks and other obstructions shall be removed to the depths shown when they fall within the construction boundary. Grubbing in open areas shall include removal of stumps and three (3) inch roots to two feet below finish grade elevations.

B. Blasting is not permitted.

3.3 Removal of Debris and Cleanup

A. All debris resulting from stripping and demolition operations shall be removed from the Owners property at frequent intervals to prevent debris from accumulating on-site.

B. Burning of debris on-site will not be permitted.

C. Materials cleared and grubbed shall be the property of the Contractor and shall be his responsibility for disposal.

D. Protection of existing trees – Contractor shall exercise extreme caution in protection of trees designated to remain. Any tree not specifically shown to be removed is designated to remain.

PART 4: MEASUREMENT AND PAYMENT

4.1 Clearing and Grubbing

A. When not listed as a separate contract pay item, clearing and grubbing shall be considered as incidental work, and the cost thereof shall be included in such contract pay items as are provided in the proposal contract.

B. Compensation, whether by contract pay item or incidental work will be for furnishing all materials, labor, equipment, tools and incidentals required for the work, all in accordance with the plans and these specifications.

END OF SECTION 02110

SECTION 02200 - EARTHWORK

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 and grading subgrades for slabs-on-grade, walks, pavements, and landscaping.
   2. Excavating and backfilling for buildings and structures.
   3. Base course for walks and pavements.
   4. Subsurface drainage backfill for walls and trenches.
   5. Excavating and backfilling trenches within building lines.
   6. Excavating and backfilling for underground mechanical and electrical utilities and appurtenances.

B. Related Sections: The following Sections contain requirements that relate to this Section.
   1. Division 32 Section "Landscape Establishment" for finish grading, including placing and preparing topsoil for lawns and planting.
   2. Division 03 Section "Concrete" for concrete encasings, cradles, and appurtenances for utility systems.

1.3 DEFINITIONS

A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.

B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below base, drainage fill, or topsoil materials.

C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.

D. Base Course: The layer placed between the subbase and surface pavement in a paving system.

E. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by A/E or Owner. Unauthorized excavation, as well as remedial work directed by A/E or Owner, shall be at the Contractor's expense.

F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.

G. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.4 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 01 Specification Sections.

B. Test Reports: In addition to test reports required under field quality control, submit the following:

1. Laboratory analysis of each soil material proposed for fill and backfill from on-site and borrow sources.

2. One optimum moisture-maximum density curve for each soil material.

3. Report of actual unconfined compressive strength and/or results of bearing tests of each stratum tested.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.

B. Testing and Inspection Service: Employ a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing. Should any work or materials fail to meet the requirements set forth in the plans and specifications, Contractor shall pay for retesting of same.

1.6 PROJECT CONDITIONS

A. Site Information: Data in subsurface investigation reports was used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood the Engineer/Architect will not be responsible for interpretations or conclusions drawn there from by the Contractor. Data is made available to the Contractor.

B. Existing Utilities: Do not interrupt existing utilities except when permitted in writing by the Owner and then only after acceptable temporary utility services have been provided.

1. Provide a minimum 48-hours notice to Owner and receive written notice to proceed before interrupting any utility.

C. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shutoff services if lines are active.

D. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

1. Operate warning lights as recommended by authorities having jurisdiction.

2. Protect structures, utilities, sidewalks, pavements, and facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.

B. Satisfactory Soil Materials: ASTM D 2487 USCS soil classification groups GW, GP, GM, SW, SP, and P-SM; and SP-SC free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter. The fill material shall have a Modified Proctor (ASTM D1557) maximum Dry Density of at least 100 pcf, contain less than 10% fines passing the No. 200 sieve, and be Non-Plastic (NP). Materials not meeting these specifications shall not be used as structural fill.

C. Unsatisfactory Soil Materials: ASTM D 2487 USCS soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.

D. Backfill and Fill Materials: Satisfactory soil materials.

E. Base Material: Graded Aggregate Base per FDOT Specification 204, Standard Specifications for Road and Bridge Construction, latest edition.

F. Engineered Fill: Base materials.

G. Bedding Material: Base materials with 100 percent passing a 1 inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Filtering Material: For stormwater filter applications filter material is to be clean or washed sand with Uniformity Coefficient 1.5 – 4.0, grain size 0.2 – 0.55 mm, coefficient of permeability 2.0 to 5.0 feet per hour.

I. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

PART 3 - EXECUTION

3.1 PREPARATION

A. The site shall be stripped of existing structures, all organic materials, all vegetation, root systems, organic topsoil, debris, and any other deleterious material, in phases, so as to prevent and impede erosion and sedimentation. The exposed sub-grade shall be compacted to a minimum soil density of 95% of the Modified Proctor Density (ASTM D1557) with large traffic sized non-vibratory equipment. Any areas of unsuitable or compressible

material shall be removed or undercut to a stable sub-grade material or if a stable sub-grade is not encountered a minimum of three feet below the compacted sub-grade. The undercut area should then be backfilled with clean course sand fill materials and compacted to 95% of the Modified Proctor Test (ASTM D1557). The site can be filled, by placing and mechanically compacting 6-8 inch lifts with large traffic sized non-vibratory equipment. Each lift should be compacted to a minimum soil density of 95% of the Modified Proctor Test unless specified otherwise, prior to placement of successive lifts. The top 12 inches of sub-grade should be compacted to a minimum soil density of 95% of the Modified Proctor Test, unless specified otherwise. See geotechnical report for additional information and recommendations.

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

C. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

D. 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.

3.2 DEWATERING

A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

C. The Contractor shall prevent the accumulation of water in the excavated areas, and shall remove by pumping or other means, any water that accumulates in the excavation. The Contractor shall prevent the accumulation of water in both structural and trench excavations and shall remove by well point system or by other means, water which accumulates in the excavation. The Contractor shall provide, install, operate and maintain pumps, well points, sumps, suction and discharge lines, and other de-watering system components necessary to convey water away from excavations.

1. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.
2. No sanitary sewer shall be used for disposal of water in either trench or structural excavations.

D. The Contractor shall be responsible for and ensure all effluent water from the de-watering operations meets or exceeds FDEP and ACOE water quality standards prior to entering jurisdictional water bodies.

3.3 EXCAVATION

A. Explosives: Do not use explosives.

B. Unclassified Excavation: Excavation is unclassified and includes excavation to required subgrade elevations regardless of the character of materials and obstructions encountered.

3.4 STABILITY OF EXCAVATIONS

A. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations. Comply with all OSHA trench safety requirements.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1.2 inches. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Method of excavation at Contractor's option subject to the approval of the Engineer.

B. The Contractor will use caution when excavating under tree roots and under and around structures and utilities. Excavate by hand when necessary or appropriate.

C. Excavate trenches to indicated slopes, lines, depths, and invert elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

D. Excavate trenches to uniform widths as narrow as possible and yet provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: As indicated

E. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading.

1. For pipes or conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.

2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.

3.8 SHEETING, SHORING AND BRACING

A. Provide as necessary, to hold walls of excavation, prevent damage to adjacent structures, and to protect workmen and property.

B. Leave sheeting and shoring in place where removal might cause damage to work or as otherwise indicated on drawings.

C. When moveable trench shield is used below spring line of pipe, it shall be lifted prior to any forward movement to avoid pipe displacement.

3.9 APPROVAL OF SUBGRADE

A. Notify A/E and Owner of any subgrade conditions which appear unsatisfactory.

B. When A/E and Owner determine that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

1. Unforeseen additional excavation and replacement material will be paid according to the Contract provisions for changes in Work.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by A/E and Owner.

3.10 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to A/E and Owner.

1. Fill unauthorized excavations under other construction as directed by A/E and Owner.

B. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by A/E and Owner.

3.11 STORAGE OF SOIL MATERIALS

A. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.12 BACKFILL

A. Backfill excavations promptly, but not before completing the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Surveying locations of underground utilities for record documents.

3. Testing, inspecting, and approval of underground utilities.

4. Concrete formwork removal.

5. Removal of trash and debris from excavation.

3.13 UTILITY TRENCH BACKFILL

A. Place and compact bedding course after bottom of trench has been excavated to proper depth and grade. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches of footings. Place concrete to level of bottom of footings.

C. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.

1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

D. Coordinate backfilling with utilities testing.

E. Area under pavement and walks or within buildings shall be mechanically compacted to the top of the subgrade in 8 inch lifts to a minimum of 98 percent of the Modified Proctor Test.

F. Place and compact final backfill of satisfactory soil material to final subgrade.

G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

H. No trench shall be open over night.

3.14 FILL

A. Preparation: Remove vegetation, topsoil, debris, wet, and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.

1. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.

B. Place fill material in layers to required elevations for each location listed below.

1. Under grass, use satisfactory excavated or borrow soil material.

2. Under walks and pavements, use base material, or satisfactory excavated or borrow soil material.

    a. Fill soils beneath walks and pavements shall be compacted to a minimum soil density of 95% of the Modified Proctor Test.

3. Under steps and ramps, use base material.

    a. Fill soils beneath walks and pavements shall be compacted to a minimum soil density of 95% of the Modified Proctor Test.

4. Under footings and foundations, use engineered fill.

    a. Buildings: Prior to placing fill soils, the top 12 inches of ground surface shall be compacted with non-vibratory traffic sized equipment to a minimum soil density of 98% of the Standard Proctor Test. Structural fill soils should be placed in maximum 8 inch lifts compacted to a minimum soil density of 98% of the Modified Proctor Test. The top 8 inches of the building pad shall be compacted to a minimum soil density of 98% of the Modified Proctor Test.

    b. Footings: The soil immediately beneath footings shall be compacted with a large mechanical plate tamper or jumping jack to a minimum soil density of 98% of the Modified Proctor Test. If moisture conditions are elevated and pumping is encountered, the footings shall be undercut and backfilled with compacted soils. The depth of the undercutting will depend on the width of the footings, and the conditions present at the time of construction. If these condition are encountered, the Contractor shall contact the geotechnical engineer for the conditions to be evaluated and a recommendation made.

3.15 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, or scarify and air-dry satisfactory soil material that is too wet to compact to specified density. Only suitable material free from excessive moisture shall be used for fill or backfill.

    a. Stockpile or spread and dry removed wet satisfactory soil material.

3.16 COMPACTION

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy non – vibratory compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.

C. Percentage of Maximum Dry Density Requirements: Compact soil to not less than the following percentages of maximum dry density according to ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, compact the top 12 inches below subgrade and each layer of backfill or fill material at 98 percent maximum dry density.

2. Under walkways, compact the top 6 inches below subgrade and each layer of backfill or fill material at 95 percent maximum dry density.

3.17 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between existing adjacent grades and new grades.

2. Cut out soft spots, fill low spots, and trim high spots to conform to 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. Lawn or Unpaved Areas: Plus or minus 1. 2 inches.

2. Walks: Plus or minus 1/2 inch.

3. Pavements: Plus or minus 1/2 inch.

C. Grading Inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10 foot straightedge.

D. The finish floor elevation of concrete floor slabs on fill shall be at least 8 inches above the finish grade elevation at its highest elevation at any point around the building.

3.18 BASE COURSES

A. Under pavements and walks, place base course material on prepared subgrades.

1. Compact base courses at optimum moisture content to required grades, lines, cross sections and thickness to not less than 100 percent of ASTM D 1557 relative density.

2. Shape base to required crown elevations and cross-slope grades.

3. When thickness of compacted base course is 8 inches or less, place materials in a single layer.

3.19 FIELD QUALITY CONTROL

A. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.

1. Perform field in-place density tests according to ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTM D 2937 (drive cylinder method), as applicable.

    a. Field in-place density tests may also be performed by the nuclear method according to ASTM D 2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 3017.

    b. When field in-place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Engineer.

2. Footing Subgrade: At footing subgrades, perform at least one test of each soil stratum to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of each subgrade with related tested strata when acceptable to A/E and Owner.

3. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 5,000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.

4. Foundation Wall Backfill: In each compacted backfill layer, perform at least one field in-place density test for each 100 feet or less of wall length, but no fewer than two tests along a wall face.

5. Trench Backfill: In each compacted initial and final backfill layer, perform at least one field in-place density test for each 300 feet or less of trench, but no fewer than two tests.

B. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace material to depth directed by the Engineer; reshape and recompact at optimum moisture content to the required density.

C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

D. Erosion control: The Contractor shall be responsible for the prevention of erosion from the site, the control of turbidity generated on site and for maintaining graded surfaces, for the duration of the project. The Contractor shall take whatever steps necessary to prevent erosion and will be responsible for any damages that might occur to down-land properties as a result of increased run-off from the site during construction. Erosion control methods shall be in accordance with requirements of authorities having jurisdiction.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION 02200

SECTION 02280 – TERMITE CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. Provide soil poisoning beneath the building and the area around the perimeter of the building.

1.02 SUBMITTALS

A. Submit for approval product data, guarantee, and warranty.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

1.04 GUARANTEE

A. Furnish the Owner with a Certified Guarantee, stating the following: Treatment shall remain effective for not less than five (5) years from the date of the Certificate of Occupancy. The contractor shall furnish a written 5-year guarantee stating that if, at any time during the 5-year period, ground nesting termites occur, treatment will be applied to exterminate all infestations without cost to Owner. The School District Maintenance representative must be present at all re-treatments under the same conditions as treatment. There shall be no annual cost, to the Owner, to keep the policy in effect for the full five (5) year period. All correspondence during the five (5) year period related to re-treatments or guarantee shall be directed to the Maintenance Department at 469-5478. Do not contact the school.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Treat with a non-repellant subterranean termiticide, registered by EPA.

B. Termiticide used shall meet the following standards:

1. Active Ingredients: Fipronil:5-amino-1(2,6-dichloro-4(trifluoromethyl) pheny)4-(1,R,S)-(trifluoromethyl)sulfiny)-1-H-pyrazole-3-carbonitrile……..80%

PART 3 - EXECUTION

3.01 INSTALLATION

A. Soil treatment shall be strictly applied in accordance with the manufacturer’s label, the recommendations of the National Pest Control Association, and the Florida Department of

Agriculture & Consumer Services', Memorandum No. 685 dated October 29, 1997, as follows:

1. All aspects of the label shall be done according to the specific job site requirement.
2. Termiticides shall be mixed at the “maximum” ratio allowed as per individual label specifications.
3. All horizontal barriers shall be treated at the rate of one gallon per ten square feet.
4. All vertical barriers shall be treated at the rate of four gallons per ten linear feet (per foot of depth), not to exceed four feet of depth.
5. All void barriers shall be treated at the rate of two gallons per ten linear feet.
6. All critical areas, such as penetrations through slab, plumbing, conduit, electrical, etc. shall be treated at the rate of one gallon per square foot.
7. All foundation block shall be treated with termiticide before being filled with concrete.
8. Exterior applications shall be done before sidewalks, porches, patios, and driveways, etc. are completed.
9. All final vertical applications shall be done after final landscaping and grading is completed.
10. Applicator shall have dedicated tank. Tank that is used for applying repellant type termiticides will not be allowed.
11. The applicator shall prepare and show the District maintenance representative his calculations of application and the numbers will be verified by District maintenance representative.

B. A School District maintenance representative must be present when the soil is being treated for termites. Therefore, the School District Maintenance Department and the Office of Facilities Planning shall be notified at least 24 hours prior to the scheduled soil treatment. The General Contractor is responsible for contacting the Maintenance Department and the Office of Facilities Planning for each individual scheduled termiticide application. Maintenance can be reached at 469-5478, and Facilities Planning can be reached at 456-5660.

C. If the potential for a student’s safety exists due to overspray drift, pre-treatments may need to be scheduled for after school hours, (excluding weekends).

D. Applicator shall wait until maintenance staff has arrived before mixing any chemical. If not, chemical that has been mixed will not be accepted as being at the proper ratio and shall not be used.

E. Applicator shall use termiticide from its original sealed container and container shall be opened in the presence of the District maintenance representative.

F. Container shall have original label intact.

G. Applicator shall furnish label and MSDS sheets of termiticides being used at the time of application to the District maintenance representative.

H. Applicator shall provide sample of raw chemical and tank mix upon request of District maintenance representative.

I. Applicator shall add marking die to each tank mix to insure uniform coverage.

J. The Contractor shall be responsible for ensuring that the contracted Pest Control firm is called back to perform all final applications.

K. If sidewalks, porches, patios, driveways, etc. are poured adjacent to the structure before area has been treated with termiticide, they must be removed for the area to be treated and then built back. Patched drill holes in new construction will not be accepted.

L. The treatment of the soil shall be done in accordance with Memorandum No. 685 from the Florida Department of Agriculture as follows: "The application of horizontal and vertical barriers must be done at the full label concentration and in volumes (amounts) specified on the label." This may require three separate trips or more by the soil treatment contractor.

M. Do not begin treatment work until all excavation, filling and grading is completed. Do not apply treatment to frozen or excessively wet soils.

N. Post signs and other warning indicating that soil poisoning has been applied. Protect persons and property from injury or damage from soil treatment work.

END OF SECTION 02280

SECTION 02510 - WATER DISTRIBUTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The publications shall be the most current issue.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 536	Ductile Iron Castings
ASTM C 94	Ready-Mixed Concrete
ASTM D 1785	Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2466	Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2564	Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2774	Underground Installation of Thermoplastic Pressure Piping
ASTM D 2855	Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 3139	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM F 402	Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
ASTM F 477	Elastomeric Seals (Gaskets) for Joining Plastic Pipe

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C104/A21.4	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C110/A21.10	Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in. (75 mm Through 1200 mm), for Water and Other Liquids

AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
ANSI/AWWA C151/A21.51	Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
AWWA C153/A21.53	Ductile-Iron Compact Fittings, 3 in. Through 24 in. (76 mm Through 610 mm) and 54 in. Through 64 in. (1,000 mm Through 1,600 mm), for Water Service
AWWA C500	Metal-Seated Gate Valves for Water Supply Service
AWWA C502	Dry-Barrel Fire Hydrants
AWWA C508	Swing-Check Valves for Waterworks Service, 2 in. (50 mm) Through 24 in. (600 mm) NPS
AWWA C509	Resilient-Seated Gate Valves for Water and Sewerage Systems
AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C651	Disinfecting Water Mains
AWWA C800	Underground Service Line Valves and Fittings
AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution
AWWA C906	Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 63 in., for Water Distribution
AWWA M23	PVC Pipe - Design and Installation

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, INC. (MSS)

MSS SP-80	Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	Installation of Private Fire Service Mains and Their Appurtenances

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-3	Installation of Polyvinyl Chloride (PVC) Pressure Pipe

UBPPA UNI-B-8	Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe

UNDERWRITERS LABORATORIES INC. (UL)

UL 246	Hydrants for Fire-Protection Service
UL 262	Gate Valves for Fire-Protection Service
UL 312	Check Valves for Fire-Protection Service
UL 789	Indicator Posts for Fire-Protection Service

1.2 DESIGN REQUIREMENTS

1.2.1 Water Distribution Mains

Provide water distribution mains indicated as 4 through 12 inch diameter pipe sizes of ductile-iron or polyvinyl chloride (PVC) plastic pipe. Also provide water main accessories, gate valves and check valves as specified and where indicated.

1.2.2 Water Service Lines

Provide water service lines indicated as less than 4 inch lines from water distribution main to building service at the point indicated. Water service lines shall be polyvinyl chloride (PVC) plastic pipe. Provide water service line appurtenances as specified and where indicated.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00, SUBMITTALS, PRODUCTS, AND SUBSTITUTIONS:

SD-03 Product Data

Piping Materials

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Hydrants

Indicator posts

Corporation stops

Valve boxes

Water meters

Backflow preventers

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on and rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings.

SD-07 Certificates

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Shop-applied lining and coating

Lining

Fire hydrants

Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the intervals or frequency specified in the publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

SD-08 Manufacturer's Instructions

Installation procedures for water piping

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 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, fittings, valves and hydrants free of dirt and debris.

1.4.2 Handling

Handle pipe, 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 plastic piping, jointing materials and rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

PART 2 PRODUCTS

2.1 WATER DISTRIBUTION MAIN MATERIALS

2.1.1 Piping Materials

2.1.1.1 Ductile-Iron Piping

a. Pipe and Fittings: Pipe, ANSI/AWWA C151/A21.51, Thickness Class 51. Fittings, AWWA C110/A21.10 or AWWA C153/A21.53; fittings with push-on joint ends conforming to the same requirements as fittings with mechanical-joint ends, except that the bell design shall be modified, as approved, for push-on joint. 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, AWWA C104/A21.4, standard thickness.

b. Joints and Jointing Material:

(1) Joints: Joints for pipe and fittings shall be mechanical joints.

(2) Mechanical Joints: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets, AWWA C111/A21.11.

(3) Flange for setscrewed flanges shall be of ductile iron, ASTM A 536, Grade 65-45-12, and conform to the applicable requirements of ASME/ANSI B16.1, Class 250. Setscrews for setscrewed flanges shall be 190,000 psi tensile strength, heat treated and zinc-coated steel. Gasket for setscrewed flanges, in accordance with applicable requirements for mechanical-joint gaskets specified in AWWA C111/A21.11. Design of setscrewed gasket shall provide for confinement and compression of gasket when joint to adjoining flange is made.

2.1.1.2 Polyvinyl Chloride (PVC) Plastic Piping

a. Pipe and Fittings: Pipe, AWWA C900, shall be plain end or gasket bell end, Pressure Class 235 (DR 18) with cast-iron-pipe-equivalent OD. Fittings shall be gray iron or ductile iron, AWWA C110/A21.10 or AWWA C153/A21.53, and have cement-mortar lining, AWWA C104/A21.4, standard thickness. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except that bell design shall be modified, as approved, for push-on joint suitable for use with PVC plastic pipe specified in this paragraph.

b. Joints and Jointing Material: Joints for pipe shall be push-on joints, ASTM D 3139. Joints between pipe and metal fittings, valves, and other accessories shall be push-on joints ASTM D 3139, or compression-type joints/mechanical joints, ASTM D 3139 and AWWA C111/A21.11. Provide each joint connection with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets for push-on joints for pipe, ASTM F 477. Gaskets for push-on joints and compression-type joints/mechanical joints for joint connections between pipe and metal fittings, valves, and other accessories, AWWA C111/A21.11, respectively, for push-on joints and mechanical joints. Mechanically coupled joints using a sleeve-type mechanical coupling, as specified in paragraph entitled

"Sleeve-Type Mechanical Couplings," may be used as an optional jointing method in lieu of push-on joints on plain-end PVC plastic pipe, subject to the limitations specified for mechanically coupled joints using a sleeve-type mechanical coupling and to the use of internal stiffeners as specified for compression-type joints in ASTM D 3139.

2.1.1.3 Polyethylene (PE) Plastic Piping

Pipe and heat-fusion fittings shall conform to AWWA C906.

2.1.2 Valves, Hydrants, and Other Water Main Accessories

2.1.2.1 Gate Valves on Buried Piping

AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be nonrising stem type with double-disc gates and mechanical-joint ends or push-on joint ends as appropriate for the adjoining pipe, (2) AWWA C509 shall be nonrising stem type with mechanical-joint ends, and (3) UL 262 shall be inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of 200 psi, and shall have mechanical-joint ends or push-on joint ends as appropriate for the pipe to which it is joined. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have 0-ring stem seals. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair.

2.1.2.2 Gate Valves

AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: AWWA C509 shall be nonrising stem type with flanged ends and a working pressure of 200 psi. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair.

2.1.2.3 Check Valves

Swing-check type, AWWA C508 or UL 312. Valves conforming to: (1) AWWA C508 shall have iron or steel body and cover and flanged ends, designed for a working pressure of 200 psi. Valves shall have clear port opening. Valves shall be spring-loaded.

2.1.2.4 Fire Hydrants

Dry-barrel type. Paint hydrants with at least one coat of primer and two coats of yellow enamel paint, except use red enamel paint for tops of hydrants in non-potable water systems. Stencil hydrant number and main size on the hydrant barrel using black stencil paint.

a. Dry-Barrel Type Fire Hydrants: Dry-barrel type hydrants, AWWA C502 or UL 246, "Base Valve" design, shall have 6 inch inlet, 5 1/4 inch valve opening, one 4 1/2 inch pumper connection, and two 2 1/2 inch hose connections. Pumper connection and hose connections shall be individually valved with independent nozzle gate valves. Inlet shall have mechanical-joint end only; end shall conform to the applicable requirements as specified for the joint. Size and shape of operating nut, cap nuts, and threads on hose and pumper connections shall be as specified in AWWA C502. Hydrants indicated as "traffic type," shall have frangible sections as mentioned in AWWA C502. The traffic type hydrant shall have special couplings joining upper and lower sections of hydrant barrel 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; hydrant shall operate properly under normal conditions.

2.1.2.5 Indicator Posts

UL 789. Provide for gate valves where indicated.

2.1.2.6 Valve Boxes

Provide a valve box for each gate valve on buried piping, except where indicator post is shown. Valve boxes shall be of cast iron or precast concrete 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. Cast-iron box shall have a heavy coat of bituminous paint.

2.1.2.7 Sleeve-Type Mechanical Couplings

Couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects; the design shall provide for confinement and compression of the gaskets. For ductile iron and PVC plastic pipe, the middle ring shall be of cast-iron or steel; and the follower rings shall be of malleable or ductile iron. Gaskets shall be designed for resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in AWWA C111/A21.11. Bolts shall be track-head type, ASTM A 307, Grade A, with nuts, ASTM A 563, Grade A; or round-head square-neck type bolts, ANSI B18.5.2.1M and ANSI/ASME B18.5.2.2M with hex nuts, ASME/ANSI B18.2.2. Bolts shall be 5/8 inch in diameter. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint.

2.1.2.8 Tracer Wire for Nonmetallic Piping

Provide bare copper or aluminum wire not less than 0.10 inch in diameter in sufficient length to be continuous over each separate run of nonmetallic pipe.

2.2 WATER SERVICE LINE MATERIALS

2.2.1 Piping Materials

2.2.1.1 Plastic Piping

Plastic pipe and fittings shall bear the seal of the National Sanitation Foundation for potable water service. Plastic pipe and fittings shall be supplied from the same manufacturer.

a. Polyvinyl Chloride (PVC) Plastic Piping: ASTM D 1785, Schedule 40; or ASTM D 2241, with SDR as necessary to provide 150 psi minimum pressure rating. Fittings, ASTM D 2466. Pipe and fittings shall be of the same PVC plastic material and shall be one of the

following pipe/fitting combinations, as marked on the pipe and fitting, respectively: PVC 1120/PVC I; PVC 1220/PVC 12; PVC 2120/PVC II; PVC 2116/PVC II. Solvent cement for jointing, ASTM D 2564.

2.2.1.2 Insulating Joints

Joints between pipe of dissimilar metals shall have a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact between adjacent sections of piping.

2.2.2 Water Service Line Appurtenances

2.2.2.1 Corporation Stops

Ground key type; bronze, ASTM B 61 or ASTM B 62; and suitable for the working pressure of the system. Ends shall be suitable for solder-joint, or flared tube compression type joint. Threaded ends for inlet and outlet of corporation stops, AWWA C800; coupling nut for connection to flared copper tubing, ASME/ANSI B16.26.

2.2.2.2 Curb or Service Stops

Ground key, round way, inverted key type; made of bronze, ASTM B 61 or ASTM B 62; and suitable for the working pressure of the system. Ends shall be as appropriate for connection to the service piping. Arrow shall be cast into body of the curb or service stop indicating direction of flow.

2.2.2.3 Gate Valves on Buried Piping (3 Inches and Larger)

Gate valves 3 inch size and larger on buried piping AWWA C500 or UL 262 and of one manufacturer. Valves, AWWA C500, nonrising stem type with double-disc gates. Valves, UL 262, inside-screw type with operating nut, split wedge or double disc type gate, and designed for a hydraulic working pressure of 175 psi. Materials for UL 262 valves conforming to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have 0-ring stem seals and shall be bolted and constructed so as to permit easy removal of parts for repair.

2.2.2.4 Gate Valves on Buried Piping (Smaller Than 3 Inches)

Gate valves smaller than 3 inch size on buried Piping MSS SP-80, Class 150, solid wedge, nonrising stem. Valves shall have flanged or threaded end connections, with a union on one side of the valve.

2.2.2.5 Curb Boxes

Provide a curb box for each curb or service stop. Curb boxes shall be of cast iron of a size suitable for the stop on which it is to be used. Provide a round head. Cast the word "WATER" on the lid. Each box shall have a heavy coat of bituminous paint.

2.2.2.6 Valve Boxes

Provide a valve box for each gate valve on buried piping. 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.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES

3.1.1 General Requirements for Installation of Pipelines

These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements..." paragraphs.

3.1.1.1 Location of Water Lines

Terminate the work covered by this section at a point approximately 5 feet from the building, unless otherwise indicated. Do not lay water lines in the same trench with gas lines fuel lines or electric wiring.

a. Water Piping Installation Parallel With Sewer Piping

(1) Normal Conditions: Lay water piping at least 10 feet horizontally from a sewer or sewer manhole whenever possible. Measure the distance edge-to-edge.

(2) Unusual Conditions: When local conditions prevent a horizontal separation of 10 feet, the water piping may be laid closer to a sewer or sewer manhole provided that:

(a) The bottom (invert) of the water piping shall be at least 18 inches above the top (crown) of the sewer piping.

(b) Where this vertical separation cannot be obtained, the sewer piping shall be constructed of AWWA-approved water pipe and pressure tested in place without leakage prior to backfilling.

(c) The sewer manhole shall be of watertight construction and tested in place.

b. Installation of Water Piping Crossing Sewer Piping

(1) 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.

(2) Unusual Conditions: When local conditions prevent a vertical separation described above, use the following construction:

(a) Sewer piping passing over or under water piping shall be constructed of AWWA-approved ductile iron water piping, pressure tested in place without leakage prior to backfilling.

(b) Water piping passing under sewer piping shall, in addition, be protected by providing a vertical separation of at least 18 inches between the bottom of the sewer piping and the top of the water piping; adequate structural support for the sewer piping to prevent excessive deflection of the joints and the settling on and breaking of the water piping; and that the

length, minimum 20 feet, of the water piping be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the sewer piping.

c. Sewer Piping or Sewer Manholes: No water piping shall pass through or come in contact with any part of a sewer manhole.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 31 00 00, "Earthwork."

3.1.1.3 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 any 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 the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover over top of pipe shall not be less than 2 1/2 feet.

3.1.1.4 Installation of Tracer Wire

Install a continuous length of tracer wire for the 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.

3.1.1.5 Connections to Existing Water Lines

Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the pipe being tapped, except as otherwise specified, tap concrete pipe in accordance with AWWA M9 for tapping concrete pressure pipe.

3.1.2 Special Requirements for Installation of Water Mains

3.1.2.1 Installation of Ductile-Iron Piping

Unless otherwise specified, 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.

a. Jointing: 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 the recommendations of Appendix A to AWWA C111/A21.11. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer. Make insulating joints with the gaskets, sleeves, washers, bolts, and nuts previously specified for this type joint. Assemble insulating joints as specified for flanged joints, except that bolts with insulating sleeves shall be full size for the bolt holes. Ensure that there is no metal-to-metal contact between dissimilar metals after the joint has been assembled.

b. Pipe Anchorage: Provide concrete thrust blocks for pipe anchorage. Thrust blocks shall be in accordance with the requirements of AWWA C600 for thrust restraint, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength. Metal harness, if required, shall be in accordance with the requirements of AWWA C600 for thrust restraint, using tie rods and clamps as shown in NFPA 24, except as otherwise indicated.

3.1.2.2 Installation of PVC Plastic Water Main Pipe

Installation of PVC Plastic Water Main Pipe and Associated Fittings: Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines"; with the requirements of UBPPA UNI-B-3 for laying of pipe, joining PVC pipe to fittings and accessories, and setting of hydrants, valves, and fittings; and with the recommendations for pipe joint assembly and appurtenance installation in AWWA M23, Chapter 7, "Installation."

a. Jointing: Make push-on joints with the elastomeric gaskets specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel; for push-on joint connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint. 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. Assemble push-on joints for connection to fittings, valves, and other accessories in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories and with the applicable requirements of AWWA C600 for joint assembly. Make compression-type joints/mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously 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 compression-type joint/mechanical-joint connections and do not re-bevel. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.

b. Pipe Anchorage: Provide concrete thrust blocks for pipe anchorage. Thrust blocks shall be in accordance with the requirements of UBPPA UNI-B-3 for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.

3.1.2.3 Installation of Polyethylene (PE) Plastic Piping

PE pipes shall be installed in accordance with ASTM D 2774.

3.1.2.4 Installation of Valves and Hydrants

a. Installation of Valves: Install gate valves, AWWA C500 and UL 262, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C500. Install gate valves, AWWA C509, in accordance with the requirements of 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 accordance with the recommendations 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, except as otherwise indicated. Make and assemble joints to gate valves and check valves as specified for making and assembling the same type joints between pipe and fittings.

b. Installation of Hydrants: Install hydrants in accordance with AWWA C600 for hydrant installation and as indicated. Make and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Install hydrants with the 4 1/2 inch connections facing the adjacent paved surface. If there are two paved adjacent surfaces, contact the Owner for further instructions.

3.1.3 Installation of Water Service Piping

3.1.3.1 Location

Connect water service piping to the building service where the building service has been installed. Where building service has not been installed, terminate water service lines approximately 5 feet from the building line at the point indicated; such water service lines shall be closed with plugs or caps.

3.1.3.2 Service Line Connections to Water Mains

Connect service lines 2 inch size and smaller to the main by a corporation stop and gooseneck and install a service stop below the frostline. Connect service lines to ductile-iron water mains in accordance with AWWA C600 for service taps. 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."

3.1.4 Special Requirements for Installation of Water Service Piping

3.1.4.1 Installation of Plastic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the applicable requirements of ASTM D 2774, unless otherwise specified. Handle solvent cements used to join plastic piping in accordance with ASTM F 402.

a. Jointing: Make solvent-cemented joints for PVC plastic piping using the solvent cement previously 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.

b. 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.

3.1.5 Disinfection

Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 and 0.5 parts per million, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service. Disinfection of systems supplying nonpotable water is not required.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

The Owner 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 in accordance with the drawings and specifications.

3.2.2 Testing Procedure

Test water mains and water service lines in accordance with the applicable specified standard, except for the special testing requirements given in paragraph entitled "Special Testing Requirements." Test ductile-iron water mains in accordance with the requirements of AWWA C600 for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints shall not exceed the amounts given in AWWA C600; no leakage will be allowed at joints made by any other method. Test PVC plastic water mains and water service lines made with PVC plastic water main pipe in accordance with the requirements of UBPPA UNI-B-3 for pressure and leakage tests. The amount of leakage on pipelines made of PVC plastic water main pipe shall not exceed the amounts given in UBPPA UNI-B-3, except that at joints made with sleeve-type mechanical couplings, no leakage will be allowed.

3.2.3 Special Testing Requirements

For pressure test, use a hydrostatic pressure 50 psi greater than the maximum working pressure of the system, except that for those portions of the system having pipe size larger than 2 inches in diameter, hydrostatic test pressure shall be not less than 200 psi. Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

END OF SECTION 02510

SECTION 02530 - SANITARY SEWERS

PART 1 – GENERAL

1.1 DESCRIPTION:

Outside, underground sanitary sewer system, complete, ready for operation, including all gravity flow lines, pressure (force) lines, lift station, manholes, cleanouts, frames, covers, structures, appurtenances, and connections to new building and structure, service lines, existing sanitary sewer lines, and existing sanitary structures, and all other incidentals.

1.2 RELATED WORK:

A. Maintenance of Existing Utilities: Division 01, GENERAL REQUIREMENTS.

B. Excavation, Trench Widths, Pipe Bedding, Backfill, Shoring, Sheeting, Bracing: Section 31 00 00, EARTHWORK.

C. Concrete Work Reinforcing, Placement and Finishing; Section 03 30 53, CAST-IN-PLACE CONCRETE.

1.3 QUALITY ASSURANCE:

A. Products Criteria:

1. Multiple Units: When two or more units of the same type or class of materials or equipment are required, these units shall be products of one manufacturer.

2. Nameplates: Nameplate bearing manufacturer's name, or identifiable trademark, securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.

B. Comply with the rules and regulations of the Public Utility having jurisdiction over the connection to Public Sanitary Sewer lines and the extension, and/or modifications to Public Utility Systems.

1.4 SUBMITTALS:

A. Submit in accordance with Division 01, SAMPLES AND SHOP DRAWINGS.

B. Manufacturers' Literature and Data: Submit the following as one package:

1. Pipe, Fittings, and, Appurtenances.
2. Jointing Material.
3. Manhole and Structure Material.
4. Frames and Covers.
5. Steps and Ladders.
6. Gate Valves.
7. Valve Boxes.
8. Check Valves.
9. Pumps

10. Floats
11. Control Panel
12. Flow Meter

1.5 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

A48-94	Gray Iron Castings
A536-84	Ductile Iron Castings
A615-00	Deformed and Plain-Billet Steel Bars for Concrete Reinforcement
A746-99	Ductile Iron Gravity Sewer Pipe
C76-99	Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
C139-95	Concrete Masonry Units for Construction of Catch Basins and Manholes
C150-99	Portland Cement
C478-97	Precast Reinforced Concrete Manhole Sections
C857-95	Minimum Structural Design Loading for Underground Pre-cast Concrete Utility Structures
D698-91	Laboratory Compaction Characteristics of Soil Using Standard Effort (2,400 ft-lbf/ft^3 (600 kN-m/m^3))
D2321-89	Underground Installation of Flexible Thermoplastic Sewer Pipe (Rev A)
D2412-96	Determination of External Loading Characteristics of Plastic Pipe by Parallel Plate Loading
D2992-96	Practice for Obtaining Hydrostatic or Pressure Design Basis for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Fittings
D3034-98	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
D3212-96	Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
D3261-97	Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
D3350-99	Polyethylene (PE) Plastics Pipe and Fittings Materials
F477-99	Elastomeric Seals (Gaskets) for Joining Plastic Pipe
F679-00	Poly (vinyl chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
F714-97	Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
F794-99	Poly (Vinyl Chloride)(PVC) Ribbed Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
F894-98	Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
F949-99	Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with Smooth Interior and Fittings

C. American Water Works Association (AWWA):

C105-99 ..... Polyethylene Encasement for Ductile Iron Pipe Systems
C110-98 ..... Ductile-Iron and Gray-Iron Fittings, 80 mm (3 inches) Through 1200 mm (48 inches) for Water and Other Liquids
C111-95 ..... Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings
C116-98 ..... Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile Iron Pipe and Gray Iron Fittings for Water Supply Service
C151-96 ..... Ductile-Iron Pipe, Centrifugally Cast In Metal Molds or Sand-Lined Molds, for Water or other Liquids
C153-94 ..... Ductile Iron Compact Fittings, 76 mm Through 610 mm (3 Inches Through 24 Inches) and 1,400 mm Through 1,600 mm (54 Inches Through 64 Inches)
C508..... Swing Check Valves for Waterworks, 2 inches (50 mm) Through 24 inches (600 mm)
C509-94 ..... Resilient Seated Gate Valves for Water and Sewerage Systems
C512-99 ..... Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service
C550-90 ..... Protective Epoxy Interior Coatings for Valves and Hydrants
C600-99 ..... Installation for Ductile-Iron Water Mains and Their Appurtenances
C605-94 ..... Underground Installation of Polyvinyl (PVC) Pressure Pipe and Fittings for Water
C900-97 ..... Polyvinyl Chloride (PVC) Pressure Pipe, 100 mm (4 inches) Through 300 mm (12 inches) for Water Distribution
C905-97 ..... Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 350 mm Through 1,200 mm (14 Inches Through 48 Inches), for Water Transmission and Distribution
C906-99 ..... Polyethylene (PE) Pressure Pipes and Fittings, 100 mm Through 1575 mm (4 Inches Through 63 Inches), for Water Distribution

D. American Association of State Highway and Transportation Officials (AASHTO):

M198B-98..... Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets

E. Uni-Bell PVC Pipe Association:

Uni-B-6-98..... Recommended Practice Low Pressure Air Testing of Installed Sewer Pipe

PART 2 - PRODUCTS

2.1 PIPING:

A. Gravity Flow Lines (Pipe and Fittings):

1. Polyvinyl Chloride (PVC):

a. Pipe and Fittings, 100 to 375 mm (4 to 15 inches) in diameter, shall conform to ASTM D3034, Type PSM, SDR 35. Pipe and fittings shall have elastomeric gasket joints providing a watertight seal when tested in accordance with ASTM D 3212. Gaskets shall conform to ASTM F 477. Solvent welded joints shall not be permitted.

B. Pressure (Force) Lines (Pipe and Fittings):

1. All pipe and fittings used in the construction of force mains shall be rated for a minimum of 1035 kPa (150 psi).

2. Polyvinyl Chloride (PVC): PVC pipe 100 mm to 300 mm (4 to 12 inches) shall conform to AWWA C900, Class 150 (DR 18. Fittings for PVC pipe shall be ductile iron.

2.2 JOINTING MATERIAL:

A. Gravity Flow Lines:

1. Ductile Iron Pipe: Push-on or mechanical joints, AWWA C111, AWWA C110. Flange joints shall comply with AWWA C115. Flange joints shall only be used in vaults or above-grade.

2. Polyvinyl Chloride (PVC) Pipe (Gravity Use): Joints, ASTM D3212. Elastomeric gasket, ASTM F477.

3. High Density Polyethylene (HDPE) pipe and fitting joints, ASTM E-3212, elastomeric gaskets, ASTM F477.

B. Pressure (Force) Main:

1. All joints indicated on the drawings as being “restrained” shall be fully restrained and capable of restraining 50 percent above all loads acting on the joint, but not less than 1035 kPa (150 psi). Thrust blocks shall not be permitted.

2. Polyvinyl Chloride (PVC) Pipe (Pressure Use):

a. Push-on joints shall conform to AWWA C900, C905.

b. Push-on gaskets for pipe, ASTM F477.

c. Restrained joints shall comply with one of the following:

1) Joints to mechanical ductile iron fittings shall comply with the requirements for ductile iron pipe, except the mechanical joint restraint gland shall be specifically designed for use with PVC pipe.

2) Push-on bell and spigot joints shall be retained with retaining rings and thrust rods. The rings shall be ductile iron conforming to ASTM A536. The rings shall be split style with serrated inside face which grips the pipe when the halves of the ring is assembled together. The ring shall not bear directly on the back of the bell. The rods shall be of adequate size and number to resist all axial movement of the joint.

2.3 MANHOLES :

A. Manholes shall be constructed of precast concrete segmental blocks, precast reinforced concrete rings, precast reinforced sections, or cast-in-place concrete. The manholes and vaults shall be in accordance with State Department of Transportation or State Roads Commission standard details, and the following:

1. Precast Concrete Segmental Blocks: Blocks shall conform to ASTM C139 and shall not be less than 150 mm (6 inches) thick for manholes to a depth of 3.6m (12 feet); not less than

200 mm (8 inches) thick for manholes deeper than 3.6m (12 feet) deep. Blocks shall be not less than 200 mm (8 inches) in length. Blocks shall be shaped so that joints seal and bond effectively with cement mortar. Parge structure interior and exterior with 15 mm (1/2 inch) of cement mortar applied with a trowel and finished to an even glazed surface.

2. Precast Reinforced Concrete Rings: Rings or sections shall have an inside diameter as indicated on the drawings, and shall be not less than 1200 mm (48 inches) in diameter. Wall thickness shall conform to requirements of ASTM C76, except that lengths of the sections may be shorter as conditions require. Tops shall conform to ASTM C478. Top section shall be eccentric cone type. Steps on inside wall shall be in the same plane from bottom of structure to manhole cover.

3. Precast Reinforced Concrete Manhole Risers and Tops: Design, material and installation shall conform to requirements of ASTM C478. Top sections shall be eccentric. Steps on inside wall shall be in the same plane from bottom of structure to manhole cover.

4. Flat top manhole tops shall be reinforced concrete as detailed on the drawings.

5. Vaults: Reinforced concrete, as indicated on the plans, or precast reinforced concrete. Concrete for precast sections shall have a minimum compressive strength of 35 MPa (5,000 psi) at 28 days, ASTM A615, Grade 60 reinforcing steel, rated for AASHTO HS20-44 loading with 30 percent impact, and conform to ASTM C-857.

6. Mortar:

   a. Precast Concrete Segmental Block Structures: By volume, 1 part of Portland cement, l/4 part lime hydrate, and 3 parts sand.

   b. Precast Reinforced Concrete Ring and Riser Structures: By volume, 1 part of Portland cement and 2 parts sand. Water in mixture shall produce a stiff, workable mortar, but shall not exceed 21 L (5-l/2 gallons) per sack of cement.

7. Flexible sealing compound shall be packaged in extruded preformed shape, sized to completely fill the joint between precast sections, and form permanently flexible watertight seal. The sealing compound shall be non-shrink and meet AASHTO M-198B.

8. Frames and covers shall be gray cast iron conforming to ASTM A48. The frame and cover shall be rated for HS20-44 loading, have a studded pattern on the cover, and the words “sanitary sewer”. The studs and the lettering shall be raised 8 mm (5/16 inch). The cover shall be a minimum of 600 mm (24 inches) in diameter and shall have four 19 mm (3/4 inch) vent holes and two lifting slots. The bearing surface of the frame and cover shall be machine finished. The cover shall fit firmly on the frame without movement when subject to traffic.

9. Manhole steps shall be polypropylene plastic coated on a No. 4 deformed rebar conforming to ASTM C478, Polypropylene shall conform to ASTM D4101. Steps shall be a minimum of 250 mm (10 inches) wide and project a minimum of 125 mm (5 inches) away from the mall. The top surface of the step shall have a studded non-slip surface. Steps shall be placed at 300 mm (12 inch) centers.

10. Ladders, brackets and hardware shall be constructed of welded aluminum, rails shall be 10 mm (3/8 inch) by 63 mm (2-1/2 inches) spaced a minimum of 400 mm (16 inches) apart.

Rungs shall be 35 mm (1-3/8 inches) in diameter and have a non-slip surface. Standoffs shall offset the ladder 180 mm (7 inches) from the wall. The ladder assembly shall be rated for a minimum of 2200 N (500 pounds).

2.4 CONCRETE:

Concrete shall have a minimum compressive strength of 20 MPa (4000 psi) at 28 days. The cement shall be Type III conforming to ASTM C150. Concrete shall conform with the provisions of Division 3 of these specifications.

2.5 REINFORCING STEEL:

Reinforcing steel shall be deformed bars, ASTM A-615, Grade 40 unless otherwise noted.

2.6 GATE VALVES:

A. AWWA C509, resilient seated gate valves rated for 850 kPa (125 psi) WSP. Asbestos packing is prohibited. The interior and exterior of the valve shall be epoxy coated for AWWA C550.

B. Operation:

1. Shall turn counterclockwise to open.
2. Underground: 50 mm (2 inch) nut for socket wrench operation.
3. Above Ground and In Pits: Handwheels.

C. Joints: End of valve shall accommodate, or be adapted to, pipe furnished.

2.7 VALVE BOXES:

A. Cast iron extension box with screw or slide-type adjustment and flared base. Minimum thickness or metal shall be 5 mm (3/16 inch). Box shall be of such length as will be adapted, without full extension, to depth of cover required over pipe at valve location.

B. Cast the word "SEWER" on the cover.

C. Provide 2 "T" handle socket wrenches, of 16 mm (5/8 inch) round stock long enough to extend 600 mm (2 feet) above top of deepest valve box.

2.8 CHECK VALVES

Check valves shall be swing-check valves conforming to AWWA C508. The interior and exterior of the valve shall be epoxy coated per AWWA C550. The check valve shall be rated for minimum of 850 kPa (125 psi) working pressure.

2.9 CLEANOUT FRAMES AND COVERS:

Frames and covers shall be gray iron casting conforming to ASTM C48. The frame and cover shall be rated for HS20-44 wheel loading, have a studded pattern on its cover, vent holes, and lifting slots. The cover shall fit firmly on the frame without movement when subject to vehicular traffic. The word “SEWER” shall be cast on the cover.

2.10 WARNING TAPE:

Standard, 4-Mil polyethylene 76 mm (3 inch) wide tape detectable type, green with black letters and imprinted with “CAUTION BURIED SEWER LINE BELOW”.

PART 3 - EXECUTION

3.1 BUILDING SERVICE LINES:

A. Install sanitary sewer service lines to point of connection within approximately 1500 mm (5 feet) outside of buildings where service is required and make connections. Coordinate the invert and location of the service line with the Contractor installing the building lines.

B. Connections of service line to building piping shall be made after the new sanitary sewer system has been constructed, tested, and accepted for operation by the Resident Engineer. The Contractor shall install all temporary caps or plugs required for testing.

C. When building services have not been installed at the time when the sanitary sewer system is complete, provide temporary plugs or caps at the ends of all service lines. Mark the location and depth of the service lines with continuous warning tape placed 300 mm (12 inches) above service lines.

3.2 REGRADING:

A. Raise or lower existing manholes and structures frames and covers, cleanout frames and covers and valve boxes in regraded areas to finish grade. Carefully remove, clean and salvage cast iron frames and covers. Adjust the elevation of the top of the manhole or structure as detailed on the drawings. Adjust the elevation of the cleanout pipe riser, and reinstall the cap or plug. Reset cast iron frame and cover, grouting below and around the frame. Install concrete collar around reset frame and cover as specified for new construction.

B. During periods when work is progressing on adjusting manholes or structures cover elevations, the Contractor shall install a temporary cover above the bench of the structure or manhole. The temporary cover shall be installed above the high flow elevation within the structure, and shall prevent debris from entering the wastewater stream.

C. The Contractor shall comply with all OSHA confined space requirements when working within existing structures.

3.3 CONNECTIONS TO EXISTING MANHOLES:

A. Comply with all rules and regulations of the local Utility System.

B. The connection to the existing utility shall comply with the standard details and specifications of the public utility company, except as specifically modified on the plans and specifications.

3.4 PIPE SEPARATION:

A. Horizontal Separation - Water Mains and Sewers:

1. Existing and proposed water mains shall be at least 3 meters (10 feet) horizontally from any proposed gravity flow and pressure (force main) sanitary sewer or sewer service connection.

2. Gravity flow mains and pressure (force) mains may be located closer than 3 meters (10 feet) but not closer than 1.8 m (6 feet) to a water main when:

   a. Local conditions prevent a lateral separation of ten feet; and

   b. The water main invert is at least 450 mm (18 inches) above the crown of the gravity sewer or 600 mm (24 inches) above the crown of the pressure (force) main; and

   c. The water main is in a separate trench separated by undisturbed earth.

3. When it is impossible to meet (1) or (2) above, both the water main and sanitary sewer main shall be constructed of push-on or mechanical joint ductile iron pipe. The pipe for the sanitary sewer main shall comply with the specifications for pressure (force) mains, and the water main material shall comply with Section 33 11 00, Water Distribution. The sewer shall be pressure tested as specified for pressure (force) mains before backfilling.

B. Vertical Separation - Water Mains and Sewers at Crossings:

1. Water mains shall be separated from sewer mains so that the invert of the water main is a minimum of 600 mm (24 inches) above the crown of gravity flow sewer or 1200 mm (48 inches) above the crown of pressure (force) mains. The vertical separation shall be maintained within 3 meters (10 feet) horizontally of the sewer and water crossing. When these vertical separations are met, no additional protection is required.

2. In no case shall pressure (force) sanitary main cross above, or within 600 mm (24 inches) of water lines.

3. When it is impossible to meet (1) above, the gravity flow sewer may be installed 450 mm (18 inches) above or 300 mm (12 inches) below the water main, provided that both the water main and sewer shall be constructed of push-on or mechanical ductile pipe. Pressure (Force) sewers may be installed 600 mm (24 inches) below the water line provided both the water line and sewer line are constructed of ductile iron pipe. The pipe for the sewer shall conform to the requirements for pressure sewers specified herein. Piping for the water main shall conform to Section 33 11 00, WATER DISTRIBUTION.

4. The required vertical separation between the sewer and the water main shall extend on each side of the crossing until the perpendicular distance from the water main to the sewer line is at least 3 meters (10 feet).

3.5 GENERAL PIPING INSTALLATION:

A. Lay pipes true to line and grade. Gravity flow sewer shall be laid with bells facing upgrade. Pressure (force) mains shall have the bells facing the direction of flow.

B. Do not lay pipe on unstable material, in wet trench or when trench and weather conditions are unsuitable for the work.

C. Support pipe on compacted bedding material. Excavate bell holes only large enough to properly make the joint.

D. Inspect pipes and fittings, for defects before installation. Defective materials shall be plainly marked and removed from the site. Cut pipe shall have smooth regular ends at right angles to axis of pipe.

E. Clean interior of all pipe thoroughly before installation. When work is not in progress, open ends of pipe shall be closed securely to prevent entrance of storm water, dirt or other substances.

F. Lower pipe into trench carefully and bring to proper line, grade, and joint. After jointing, interior of each pipe shall be thoroughly wiped or swabbed to remove any dirt, trash or excess jointing materials.

G. Do not lay sewer pipe in same trench with another pipe or other utility. Sanitary sewers shall cross at least 600 mm (2 feet) below water lines.

H. Do not walk on pipe in trenches until covered by layers of shading to a depth of 300 mm (12 inches) over the crown of the pipe.

I. Warning tape shall be continuously placed 300 mm (12 inches) above sewer pipe

J. Install gravity sewer line in accordance with the provisions of these specifications and the following standards:

1. Polyvinyl Chloride (PVC) Piping: ASTM D2321.

K. Gravity Flow Lines with Secondary Containment:

1. Install per manufacturer's recommendations. Install all pipe centering devices to maintain an interstitial space below the invert of the carrier pipe. Both the carrier and containment pipe shall be tested for leaks.

L. Installation of Pressure (Force) Mains:

1. Sections of piping listed on the drawings shall be fully restrained using approved joint restraint devices. Joint restraint devices shall be installed in accordance with the manufacturer's recommendations. For devices with twist of nuts, the twist of nuts shall be placed on top of the fitting for the Engineer's inspection. The Contractor shall torque test all bolts, set screws, identified by the Resident Engineer.

2. Thrust blocks shall not be permitted.

3. Install pressure (force) mains in accordance with the provisions of these specifications and the following standards:

a. Polyvinyl Chloride (PVC) Piping: AWWA C605.

3.6 MANHOLES :

A. General:

1. Circular Structures:

a. Precast concrete segmental blocks shall lay true and plumb. All horizontal and vertical joints shall be completely filled with mortar. Parge interior and exterior of structure with 15 mm (1/2 inch) or cement mortar applied with a trowel and finished to an even glazed surface.

b. Precast reinforced concrete rings shall be installed true and plumb. The joints between rings and between rings and the base and top, shall be sealed with a preform flexible

gasket material specifically manufactured for this type of application. Adjust the length of the rings so that the eccentric conical top section will be at the required elevation. Cutting the conical top section is not acceptable.

c. Precast reinforced concrete manhole risers and tops. Install as specified for precast reinforced concrete rings.

2. Rectangular Structures:

a. Reinforced concrete structures shall be installed in accordance with Division 3.

b. Precast concrete structures shall be placed on a 200 mm (8 inch) reinforced concrete pad, or be provided with a precast concrete base section. Structures provided with a base section shall be set on 200 mm (8 inches) thick aggregate base course compacted to a minimum of 95 percent of the maximum density as determined by ASTM D 698. Set precast section true and plumb. Seal all joints with pre-form flexible gasket material.

3. Do not build structures when air temperature is 0 degrees C (32 degrees F), or below.

4. Invert channels shall be smooth and semicircular in shape conforming to inside of adjacent sewer section. Make changes in direction of flow with a smooth curve of as large a radius as size of structure will permit. Make changes in size and grade of channels gradually and evenly. Construct invert channels by one of the listed methods:

a. Forming directly in concrete base of structure.

b. Building up with brick and mortar.

5. Floor of structure outside the channels shall be smooth and slope toward channels not less than 1:12 (1-inch per foot) nor more than 1:6 (2 inches per foot). Bottom slab and benches shall be concrete.

6. The wall that support access rungs or ladder shall be 90 degrees vertical from the floor of structure to manhole cover.

7. Install steps and ladders per the manufacturer's recommendations. Steps and ladders shall not move or flex when used. All loose steps and ladders shall be replaced by the Contractor.

8. Install manhole frames and covers on a mortar bed, and flush with the finish pavement. Frames and covers shall not move when subject to vehicular traffic. Install a concrete collar around the frame to protect the frame from moving until the adjacent pavement is placed. In unpaved areas, the rim elevation shall be 50 mm (2 inches) above the adjacent finish grade. Install a 200 mm (8 inches) thick, by 300 mm (12 inches) concrete collar around the perimeter of the frame. Slope the top of the collar away from the frame.

3.7 SEWER AND MANHOLE SUPPORTS, CONCRETE CRADLES:

Reinforced concrete as detailed on the drawings. The concrete shall not restrict access for future maintenance of the joints within the piping system.

3.8 CLEANOUTS:

A. 150 millimeters (6 inches) in diameter and consisting of a ductile iron 45 degree fitting on end of run, or combination Y fitting and l/8 bend in the run with ductile iron pipe extension, water tight

plug or cap and cast frame and cover flush with finished grade. Center-set cleanouts, located in unpaved areas, in a 300 by 300 by 150 mm (12 by 12 by 6 inch) thick concrete slab set flush with adjacent finished grade. Where cleanout is in force main, provide a blind flange top connection. The center of the flange shall be equipped with a 50 mm (2 inches) base valve to allow the pressure in the line to be relieved prior to removal of the blind flange. Frames and covers for pressure (force) mains shall be 600 mm (24 inches) in diameter.

B. The top of the cleanout assembly shall be 50 mm (2 inches) below the bottom of the cover to prevent loads being transferred from the frame and cover to the piping.

3.9 SETTING OF GATE VALVES:

A. Avoid setting valves under pavement except where shown on the drawings.

B. Clean valve interior before installation.

C. Set valve plumb, restrain ends of valves when indicated on the drawing.

D. Set valve box cover flush with the finished grade. Valve box shall be centered over the operating nut.

3.10 SETTING OF CHECK VALVES:

A. Check valves shall be installed in a vault, direct burial of check valves shall not be permitted.

B. Check valves shall be set in the horizontal position, with adequate clearance to the structure to allow for movement of the lever and maintenance of the valve.

C. Clean the interior of the valve and check its operation prior to installation.

D. After installation, adjust the weight on the lever to provide proper operation in accordance with the manufacturer’s recommendations.

3.11 INSPECTION OF SEWERS:

Inspect and obtain the Resident Engineer's approval. Thoroughly flush out before inspection. Lamp test between structures and show full bore indicating sewer is true to line and grade. Lip at joints on the inside of gravity sewer lines are not acceptable.

3.12 TESTING OF SANITARY SEWERS:

A. Gravity Sewers and Manholes (Select one of the following):

1. Air Test: Vitrified Clay Pipe ASTM C828. PVC Pipe, Uni-Bell B-6. The line shall be pressurized to 4 psi and allowed to stabilize. After pressure stabilization, the pressure shall be dropped to 3.5 Psi greater than the average back-pressure of any groundwater above the sewer. The minimum test time shall be as specified in Uni-Bell B-6.

2. Exfiltration Test:

a. Subject pipe to hydrostatic pressure produced by head of water at depth of 900 mm (3 feet) above invert of sewer at upper manhole under test. In areas where ground water exists, head of water shall be 900 mm (3 feet) above existing water table. Maintain head of water for one hour for full absorption by pipe body before testing. During one hour

test period, measured maximum allowable rate of exfiltration for any section of sewer shall be 11 L (3.0 gallons) per hour per 30 m (100 feet).

b. If measurements indicate exfiltration is greater than maximum allowable leakage, take additional measurements until leaks are located. Repair and retest.

3. Infiltration Test: If ground water level is greater than 900 mm (3 feet) above invert of the upper manhole, infiltration tests are acceptable. Allowable leakage for this test will be the same as for the exfiltration test.

B. Pressure (Force) Mains: Test at 690 kPa (100 psi) for two hours. Leakage shall be per the following:

$L=J*D*\sqrt{P}/4500$

Where:

L = Maximum Allowable Leakage in Gallons per Hour

J = Number of Joints in Test Area

D = Diameter of Pipe in Inches

P = Average Test Pressure (Psi)

C. Testing of Fiberglass Sewage Holding Tanks: No leakage at 35 kPa (5 psi) air pressure test with 5:1 safety factor. Test by Contractor after installation.

D. Testing of Concrete Wet Well: No leakage with the wet well completely filled with water for a duration of 4 hours.

END OF SECTION 02530

SECTION 02630 - STORM DRAINAGE UTILITIES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The publications shall be the most current issue.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M198	Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
AASHTO M252	Corrugated Polyethylene Drainage Tubing

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)

ACPA 01-102	Concrete Pipe Handbook
ACPA 01-103	Concrete Pipe Installation Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 497	Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615/A 615M	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 32	Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C 62	Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 76M	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C 139	Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C 150	Portland Cement
ASTM C 270	Mortar for Unit Masonry
ASTM C 476	Grout for Masonry

ASTM D 2321	Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 2564	Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 3034	Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	Joints for Drain and Sewer Plastic Pipe Using Flexible Elastomeric Seals
ASTM D 4101	Propylene Plastic Injection and Extrusion Materials
ASTM F 477	Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 794	Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F 949	Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES:

SD-02 Shop Drawings

Precast concrete structures

Metal items

SD-03 Product Data

Concrete piping including fittings and jointing materials

Polyvinyl chloride (PVC) plastic piping including fittings and jointing materials

Corrugated plastic piping including fittings and jointing materials

Subsurface drainage piping including fittings and jointing materials

SD-07 Certificates

Pipeline and fittings, including factory-applied linings and joint materials

Cast-iron frames, covers, and gratings

Precast concrete structures

Submit certificates attesting that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the frequency or intervals specified in the publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

1.3.1.1 Piping

Inspect materials delivered to site for damage; store with minimum of handling. Store plastic piping and 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.

1.3.1.2 Metal Items

Check 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.

1.3.2 Handling

Handle pipe, fittings, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Carry, do not drag pipe to trench.

PART 2 PRODUCTS

2.1 PIPELINE AND CULVERT MATERIALS

2.1.1 Concrete Piping

2.1.1.1 Concrete Pipe and Fittings

Storm drainage pipe shall be reinforced concrete pipe conforming to ASTM C 76, Class III or Class IV per plans. Cement used in manufacturing pipe and fittings shall be Type II conforming to ASTM C 150.

2.1.1.2 Jointing Materials for Concrete Piping

Gaskets and pipe ends for rubber gasket joint shall conform to ASTM C 443. Gaskets shall be suitable for use with sewage.

2.1.2 Polyvinyl Chloride (PVC) Plastic Piping

2.1.2.1 PVC Plastic Pipe and Fittings

ASTM D 3034, shall be SDR 35, having ends adaptable for elastomeric gasket joints.

2.1.2.2 Joints and Jointing Material for PVC Plastic Piping

Joints shall conform to ASTM D 3212. Gaskets shall conform to ASTM F 477.

Polyvinyl Chloride (PVC) Pipe and Fittings, 10 Inch Diameter and Smaller: ASTM D 3034, SDR 35, with ends suitable for elastomeric gasket joints. ASTM F 949 with solvent cement joints or elastomeric gasket joints. ASTM D 3212 elastomeric gasket joints, ASTM D 2564 solvent cement joints and ASTM F 477 gaskets.

2.1.3 Corrugated Plastic Piping

2.1.3.1 Pipe and Fittings

Corrugated polyvinyl chloride (PVC) pipe conforming to ASTM F 794 or corrugated, high density polyethylene pipe (HDPE) conforming to AASHTO M252.

2.1.3.2 Joints and Jointing Materials

ASTM D 3212 for PVC pipe joints or manufacturer's recommendations for HDPE joints.

2.2 CONCRETE MATERIALS

Provide 4,000 PSI concrete as specified in Section 03 30 53, "Miscellaneous Cast-In-Place Concrete."

2.3 MISCELLANEOUS MATERIALS

2.3.1 Drainage Structures

Precast structures may be provided in lieu of cast-in-place concrete. Pipe-to-wall connections shall be mortared to produce smooth transitions and watertight joints or provided with ASTM C 923 resilient connectors. Bases shall have smooth inverts accurately shaped to a semicircular bottom conforming to the inside contour of the adjacent sewer sections. Changes in direction of the sewer and entering branches into the manhole shall have a circular curve in the manhole invert of as large a radius as the size of the manhole will permit.

2.3.1.1 Precast Concrete Structures

ASTM C 478, except as specified herein. Provide a minimum wall thickness of 5 inches. ASTM A 615/A 615Mreinforcing bars. ASTM A 497 welded wire fabric. ASTM C 443 or AASHTO M198, Type B gaskets for joint connections. Provide a 4 inch layer of clean gravel bedding with a maximum size of 2 inches.

2.3.2 Masonry Materials

Shall conform to the following specifications and other requirements specified hereunder.

2.3.2.1 Brick

ASTM C 32, Grade MS, or ASTM C 62, Grade SW, except that the absorption test will be waived.

2.3.2.2 Concrete Masonry Units

ASTM C 139.

2.3.2.3 Mortar

ASTM C 270, Type M.

2.3.2.4 Water

Water for masonry mortar shall be fresh, clean, potable.

2.3.2.5 Grout

ASTM C 476.

2.3.3 Metal Items

2.3.3.1 Frames, Covers, and Gratings

Shall be cast iron as indicated conforming to ASTM A 48, Class 35B or ductile iron, conforming to ASTM A 536.

2.3.3.2 Drainage Structure Steps

Zinc-coated steel as indicated conforming to 29 CFR 1910.27. As an option, plastic or rubber coating pressure-molded to the steel may be used. Plastic coating shall conform to ASTM D 4101, copolymer polypropylene. Rubber shall conform to ASTM C 443, except shore A durometer hardness shall be 70 plus or minus 5. For curb inlets, steel sump ladder rungs as indicated may be used in lieu of cast-iron steps; rungs shall be zinc-coated after fabrication. Aluminum steps or rungs will not be permitted. Steps are not required in manholes, curb inlets, or catch basins less than 4 feet deep.

2.4 FLARED ENDS

Flared end sections shall be same material as pipe material except that only reinforced concrete flared ends shall be provided for concrete pipe.

2.5 EROSION CONTROL RIPRAP

Provide nonerodible rock not exceeding 15 inches in its greatest dimension and choked with sufficient small rocks to provide a dense mass with a minimum thickness of 8 inches or as indicated. Minimum weight shall be 50 pounds per unit.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

3.1.1 General Requirements for Installation of Pipelines

These requirements shall apply to pipeline installation except where specific exception is made under paragraph entitled "Special Requirements."

3.1.1.1 Location

The work covered by this section shall terminate at a point approximately 5 feet from the building, unless otherwise indicated on the drawings.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 31 00 00, "Earthwork."

3.1.1.3 Pipe Laying and Jointing

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. Lay pipe with the bell ends in the upgrade direction. Adjust spigots in bells to produce a uniform space. Blocking or wedging between bells and spigots will not be permitted. Replace by one of the proper dimensions any pipe or fitting that does not allow sufficient space for proper calking or installation of joint material. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Provide batterboards not more than 25 feet apart in trenches for checking and ensuring that pipe invert elevations are as indicated. Laser beam method may be used in lieu of batterboards for the same purpose.

3.1.1.4 Connections to Existing Lines

Notify Contracting Officer in writing at least 10 days prior to date that connections are to be made. Obtain approval of the Contracting Officer before interrupting service. Conduct work so that there is minimum interruption of service on existing line.

3.1.2 Special Requirements

3.1.2.1 Installation of Concrete Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" of this section and with the provisions for rubber gasket jointing and jointing procedures of ACPA 01-103 or of ACPA 01-102, Chapter 9. Make joints with the gaskets previously specified for joints with this piping. Clean and dry surfaces receiving lubricants, cements, or adhesives. Affix gaskets to pipe not more than 24 hours prior to the installation of the pipe. Protect gaskets from sun, blowing dust, and other deleterious agents at all times. Before installation of the pipe, inspect gaskets and remove and replace loose or improperly affixed gaskets. Align each pipe section with the previously installed pipe section, and pull the joint together. If, while pulling the joint, the gasket becomes loose and can be seen through the exterior joint recess when the pipe is pulled up to within one inch of closure, remove the pipe and remake the joint.

3.1.2.2 Installation of PVC Plastic Piping

Install pipe and fittings in accordance with the "General Requirements for Installation of Pipelines" and with the requirements of ASTM D 2321 for laying and joining pipe and fittings. Make joints with the gaskets specified for joints with this piping; assemble in accordance with the requirements of ASTM D 2321 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

3.1.2.3 Installation of Corrugated Plastic Piping

Install pipe and fittings in accordance with the "General Requirement for Installation of Pipelines" and with the recommendations of the PVC or HDPE pipe manufacturer.

3.1.3 Concrete Work

Perform cast-in-place concrete work in accordance with Section 03 30 53, "Cast-In-Place Concrete."

3.1.4 Manhole, Curb Inlet, and Catch Basin Construction

Construct base slab of cast-in-place concrete or use precast concrete base sections. Make inverts in cast-in-place concrete and precast concrete bases with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent drainage sections. For changes in direction of drains and entering branches into the manhole, make a circular curve in the manhole invert of as large a radius as manhole size will permit. For cast-in-place concrete construction, either pour bottom slabs and walls integrally or key and bond walls to bottom slab. 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, curb inlets, and catch basins. Parging will not be required for precast concrete manholes. Cast-in-place concrete work shall be in accordance with the paragraph entitled, "Concrete Work." Make joints between concrete manholes and pipes entering manholes with the resilient connectors specified for this purpose or mortared to produce a watertight joint; install in accordance with the recommendations of the connector manufacturer. Where a new manhole is constructed on an existing line, remove existing pipe as required to construct the manhole. Cut existing pipe so that pipe ends are approximately flush with the interior face of manhole wall, but not protruding beyond into the manhole.

3.1.5 Metal Work

3.1.5.1 Workmanship and Finish

Perform metal work so that workmanship and finish will be equal to the best practice in modern structural shops and foundries. Form iron and steel to shape and size with sharp lines and angles. Do shearing and punching so that clean true lines and surfaces are produced. Make castings sound and free from warp, cold shuts, and blow holes that may impair their strength or appearance. Give exposed surfaces a smooth finish with sharp well-defined lines and arises. Provide rabbets, lugs, and brackets wherever necessary for fitting and support.

3.1.5.2 Field Painting

After installation, clean cast-iron frames, covers, gratings, and steps not buried in masonry or concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

The Owner/Engineer or designee, 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. Be able to produce evidence, when required, that each item of work has been constructed properly in accordance with the drawings and specifications.

3.2.2 Pipeline Testing

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.

END OF SECTION 02630

SECTION 02730 - BITUMINOUS PRIME COAT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The publications shall be the most current issue.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 140	Sampling Bituminous Materials
ASTM D 2028	Cutback Asphalt (Rapid-Curing Type)

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00, SUBMITTALS, PRODUCTS, AND SUBSTITUTIONS:

SD-03 Product Data

Cutback asphalt

Submit temperature viscosity relationship.

SD-06 Test Reports

Bituminous materials

1.3 DELIVERY, STORAGE, AND HANDLING

Inspect the materials for contamination and damage. Unload and store the materials with a minimum of handling.

1.4 ENVIRONMENTAL REQUIREMENTS

Apply the prime coat only when the surface is dry or contains moisture not in excess of the amount that will permit uniform distribution and the desired penetration. Apply the prime coat only when the ambient temperature is 50 degrees F or above and when the temperature has not been below 35 degrees F for 12 hours immediately prior to application, unless otherwise directed.

1.5 SAFETY REQUIREMENTS

Perform the work in a safe manner in accordance with all applicable regulations governing the use of specified product.

1.6 CONSTRUCTION EQUIPMENT

Provide equipment dependable and adequate for the purpose intended and properly maintained in satisfactory and safe operating condition at all times. Calibrated equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by an approved calibration laboratory within 12 months prior to commencing work.

1.6.1 Bituminous Distributor

Bituminous distributor shall have pneumatic tires of such width and number that the load produced on the base surface shall not exceed 650 pounds per inch of tire width. The bituminous distributor shall be designed and equipped to distribute the bituminous material uniformly at even heat on variable widths of surface at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard, with a pressure range of 25 to 75 pounds per square inch and an allowable variation not to exceed 5 percent from any specified rate. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating the materials to the proper application temperature, a thermometer for reading the temperature of the tank contents, and a hose and spray nozzle attachment for applying bituminous material to spots unavoidably missed by the distributor and to areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

1.6.2 Heating Equipment for Storage Tanks

The equipment for heating the bituminous material shall be steam, electric, or hot oil heaters. Steam heaters shall consist of steam coils and equipment for producing steam, so designed that the steam cannot get into the material. An armored thermometer with a temperature range from 40 to 400 degrees F shall be fixed to the tank so that the temperature of the bituminous material may be determined at all times.

1.6.3 Brooms and Blowers

Brooms and blowers shall be of the power type and suitable for cleaning prepared subgrades or bases.

PART 2 PRODUCTS

2.1 BITUMINOUS MATERIAL

2.1.1 Cutback Asphalt

ASTM D 2028, Grade RC-70.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Immediately before applying the prime coat, remove loose material, dirt, clay, and other objectionable material from the surface to be primed. After the cleaning operation and prior to the application of the prime coat, examine the area to be primed. Ensure that the area is fit to receive the bituminous priming material.

3.2 APPLICATION

Immediately following the surface preparation, apply the bituminous material by means of the bituminous distributor. Apply the bituminous material at a pressure range of 25 to 75 pounds per square inch within the temperature limits specified herein, and at the rate of not less than 0.20 gallon nor more than 0.30 gallon of bituminous material per square yard. Apply the bituminous material so that uniform distribution is obtained over the entire surface to be treated. Unless the distributor is equipped to obtain satisfactory results at the junction of previous and subsequent applications, spread building paper on the surface of the applied material for a sufficient distance back from the ends of each application, so that flow from the sprays may be started and stopped on the paper, and so that all sprayers will operate at full force on the surface to be treated. Immediately after the application, remove the building paper and apply bituminous material to spots missed by the distributor.

3.2.1 Curing

Following the application of bituminous material, allow the surface to cure without being disturbed for a period of not less than 48 hours or longer, as may be necessary to attain penetration into the foundation course and evaporation of the volatiles from the bituminous material. Furnish and spread enough sand to effectively blot up and cure excess bituminous material. Maintain the primed surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and repriming deficient areas.

3.2.2 Application Temperature for Cutback Asphalt

Between 100 and 150 degrees F and provide an application viscosity between 40 and 120 centistokes, kinematic, or 20 and 60 seconds, Saybolt Furol.

3.2.3 Application Temperature for Emulsified Asphalt

Between 75 and 130 degrees F.

3.3 FIELD QUALITY CONTROL

Furnish samples of bituminous materials for testing. Sample bituminous materials in accordance with ASTM D 140.

3.4 PROTECTION

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades to prevent traffic over freshly treated surfaces.

END OF SECTION 02730

SECTION 02740 - HOT – MIX ASPHALT (HMA) FOR ROADS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The publications shall be the most current issue.

FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT)
FDOT RBS Standard Specification for Road and Bridge Construction

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00, SUBMITTALS, PRODUCTS, AND SUBSTITUTIONS:

SD-05 Design Data

Job-mix formula

Submit a job-mix formula, prepared within one year of submittal, for approval by the Owner prior to preparing and placing the bituminous mixture.

1.3 QUALITY ASSURANCE

1.3.1 Required Data

Job-mix formula shall show the following:

a. Source and proportions, percent by weight, of each ingredient of the mixture;

b. Correct gradation, the percentages passing each size sieve listed in the specifications for the mixture to be used, for the aggregate and mineral filler from each separate source and from each different size to be used in the mixture and for the composite mixture;

c. Amount of material passing the No. 200 sieve determined by dry sieving;

d. Number of blows of hammer compaction per side of molded specimen;

e. Temperature viscosity relationship of the asphalt cement;

f. Stability, flow, percent voids in mineral aggregate, percent air voids, unit weight;

g. Asphalt absorption by the aggregate;

h. Effective asphalt content as percent by weight of total mix;

i. Temperature of the mixture immediately upon completion of mixing;

j. Asphalt viscosity grade; and

1.3.2 Charts

Plot and submit, on a grain size chart, the specified aggregate gradation band, the job-mix gradation and the job-mix tolerance band.

1.3.3 Selection of Optimum Asphalt Content

Base selection on percent of total mix and the average of values at the following points on the curves for each mix:

a. Stability: Peak

b. Unit Weight: Peak

c. Percent Air Voids: Median

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site for damage and store with a minimum of handling. Store aggregates in such a manner as to prevent segregation, contamination, or intermixing of the different aggregate sizes.

1.5 ENVIRONMENTAL CONDITIONS

Place bituminous mixture only during dry weather and on dry surfaces. Place courses only when the surface temperature of the underlying course is greater than 45 degrees F for course thicknesses greater than one inch and 55 degrees F for course thicknesses one inch or less.

1.6 CONSTRUCTION EQUIPMENT

Calibrated equipment, such as scales, batching equipment, spreaders and similar equipment, shall have been recalibrated within 12 months of commencing work.

1.6.1 Mixing Plant

Design, coordinate, and operate the mixing plant to produce a mixture within the job-mix formula tolerances and to meet the requirements of ASTM D 995, including additional plant requirements specified herein.

1.6.2 Paving Equipment

1.6.2.1 Spreading Equipment

Self-propelled electronically controlled type, unless other equipment is authorized by the Owner. Equip spreading equipment of the self-propelled electronically controlled type with hoppers, tamping or vibrating devices, distributing screws, electronically adjustable screeds, and equalizing devices. Capable of spreading hot bituminous mixtures without tearing, shoving, or gouging and to produce a finished surface of specified grade and smoothness. Operate spreaders, when laying mixture, at variable speeds between 5 and 45 feet per minute. Design spreader with a quick and efficient steering device; a forward and reverse traveling speed; and automatic devices to adjust to grade and confine the edges of the mixture to true lines. The use of a spreader that leaves indented areas or other objectionable irregularities in the fresh laid mix during operations is prohibited.

1.6.2.2 Rolling Equipment

Self-propelled pneumatic-tired rollers supplemented by three-wheel and tandem type steel wheel rollers. The number, type and weight of rollers shall be sufficient to compact the mixture to the required density without detrimentally affecting the compacted material. Rollers shall be suitable for rolling hot-mix bituminous pavements and capable of reversing without backlash. Pneumatic-tired rollers shall be capable of being operated both forward and backward without turning on the mat, and without loosening the surface being rolled. Equip rollers with suitable devices and apparatus to keep the rolling surfaces wet and prevent adherence of bituminous mixture. Vibratory rollers especially designed for bituminous concrete compaction may be used provided rollers do not impair stability of pavement structure and underlying layers. Repair depressions in pavement surfaces resulting from use of vibratory rollers. Rollers shall be self-propelled, single or dual vibrating drums, and steel drive wheels, as applicable; equipped with variable amplitude and separate controls for energy and propulsion.

1.6.2.3 Hand Tampers

Minimum weight of 25 pounds with a tamping face of not more than 50 square inches.

1.6.2.4 Mechanical Hand Tampers

Commercial type, operated by pneumatic pressure or by internal combustion.

PART 2 PRODUCTS

2.1 AGGREGATES

Asphalt concrete pavement shall conform to FDOT RBS, SP 12.5.

2.2 VARIATIONS FROM FORMULA

Variations from the approved job-mix formula shall not exceed the following, and in no case shall the job-mix formula, with tolerances applied, fall outside the general limits for aggregate gradation and bituminous material specified herein:

Aggregate	Tolerance (Plus or Minus)
1/2 inch and larger	8 percent
3/8 and No. 4	7 percent
Nos. 8 and 16	6 percent
Nos. 30 and 50	5 percent
No. 100	4 percent
No. 200	3 percent
Asphalt Cement	0.5 percent
Temperature of Mixture as discharged	20 degrees F

2.3 SOURCE QUALITY CONTROL

Use materials for testing that are identical to materials to be provided in this project. Employ a commercial laboratory approved by the Owner to perform testing.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Mixing

Produce and transport bituminous mixture in a plant as specified in FDOT Standard Specification for Road and Bridge Construction (Most Recent addition).

3.1.2 Surface Preparation of Underlying Course

Prior to the laying of the asphalt concrete, clean underlying course of foreign or objectionable matter with power blowers or power brooms, supplemented by hand brooms and other cleaning methods where necessary. During the placement of multiple lifts of bituminous concrete, each succeeding lift of bituminous concrete shall have its underlying lift cleaned and provided with a bituminous tack coat if the time period between the placement of each lift of bituminous concrete exceeds 14 days, or the underlying bituminous concrete has become dirty.

3.1.3 Spraying of Contact Surfaces

Spray contact surfaces of previously constructed pavement with a thin coat of bituminous materials to act as an anti-stripping agent, conforming to Section 32 12 16.2, "Bituminous Tack Coat." Paint contact surfaces of structures with a thin coat of emulsion or other approved bituminous material prior to placing the bituminous mixture. Tack coat the previously placed primed coats on base courses when surface has become excessively dirty and cannot be cleaned or when primed surface has cured to the extent that it has lost all bonding effect.

3.2 PLACEMENT

3.2.1 Machine Spreading

The range of temperatures of the mixtures at the time of spreading shall be between 250 degrees F and 300 degrees F. Bituminous concrete having temperatures less than minimum spreading temperature

when dumped into the spreader will be rejected. Adjust spreader and regulate speed so that the surface of the course is smooth and continuous without tears and pulling, and of such depth that, when compacted, the surface conforms with the cross section, grade, and contour indicated. Unless otherwise directed, begin the placing along the centerline of areas to be paved on a crowned section or on the high side of areas with a one-way slope. Place mixture in consecutive adjacent strips having a minimum width of 10 feet, except where the edge lanes require strips less than 10 feet to complete the area. Construct longitudinal joints and edges to true line markings. Establish lines parallel to the centerline of the area to be paved, and place string lines coinciding with the established lines for the spreading machine to follow. Provide the number and location of the lines needed to accomplish proper grade control. When specified grade and smoothness requirements can be met for initial lane construction by use of an approved long ski-type device of not less than 30 feet in length and for subsequent lane construction by use of a short ski or shoe, in-place string lines for grade control may be omitted. Place mixture as nearly continuous as possible and adjust the speed of placing as needed to permit proper rolling.

3.2.2 Shoveling, Raking, and Tamping After Machine-Spreading

Shovelers and rakers shall follow the spreading machine. Add or remove hot mixture and rake the mixture as required to obtain a course that when completed will conform to requirements specified herein. Broadcasting or fanning of mixture over areas being compacted is prohibited. When segregation occurs in the mixture during placing, suspend spreading operation until the cause is determined and corrected. Correct irregularities in alinement left by the spreader by trimming directly behind the machine. Immediately after trimming, compact edges of the course by tamping laterally with a metal lute or by other approved methods. Distortion of the course during tamping is prohibited.

3.2.3 Hand-Spreading in Lieu of Machine-Spreading

In areas where the use of machine spreading is impractical, spread mixture by hand. The range of temperatures of the mixtures when dumped onto the area to be paved shall be between 250 and 300 degrees F. Mixtures having temperatures less than minimum spreading temperature when dumped onto the area to be paved will be rejected. Spread hot mixture with rakes in a uniformly loose layer of a thickness that, when compacted, will conform to the required grade, thickness, and smoothness. During hand spreading, place each shovelful of mixture by turning the shovel over in a manner that will prevent segregation. Do not place mixture by throwing or broadcasting from a shovel. Do not dump loads any faster than can be properly handled by the shovelers and rakers.

3.3 COMPACTION OF MIXTURE

Compact mixture by rolling. Begin rolling as soon as placement of mixture will bear rollers. Delays in rolling freshly spread mixture shall not be permitted. Start rolling longitudinally at the extreme sides of the lanes and proceed toward center of pavement, or toward high side of pavement with a one-way slope. Operate rollers so that each trip overlaps the previous adjacent strip by at least one foot. Alternate trips of the roller shall be of slightly different lengths. Conduct tests for conformity with the specified crown, grade and smoothness immediately after initial rolling. Before continuing rolling, correct variations by removing or adding materials as necessary. If required, subject course to diagonal rolling with the steel wheeled roller crossing the lines of the previous rolling while mixture is hot and in a compactible condition. Speed of the rollers shall be slow enough to avoid displacement of hot mixture. Correct displacement of mixture immediately by use of rakes and fresh mixture, or

remove and replace mixture as directed. Continue rolling until roller marks are eliminated and course has a density of at least 98 percent but not more than 100 percent of that attained in a laboratory specimen of the same mixture prepared in accordance with ASTM D 1559. During rolling, moisten wheels of the rollers enough to prevent adhesion of mixture to wheels, but excessive water is prohibited. Operation of rollers shall be by competent and experienced operators. Provide sufficient rollers for each spreading machine in operation on the job and to handle plant output. In places not accessible to the rollers, compact mixture thoroughly with hot hand tampers. Skin patching of an area after compaction is prohibited. Remove mixture that becomes mixed with foreign materials or is defective and replace with fresh mixture compacted to the density specified herein. Roller shall pass over unprotected edge of the course only when laying of course is to be discontinued for such length of time as to permit mixture to become cold.

3.4 JOINTS

Joints shall present the same texture and smoothness as other portions of the course, except permissible density at the joint may be up to 2 percent less than the specified course density. Carefully make joints between old and new pavement or within new pavements in a manner to ensure a thorough and continuous bond between old and new sections of the course. Vertical contact surfaces of previously constructed sections that are coated with dust, sand, or other objectionable material shall be painted with a thin uniform coat of emulsion or other approved bituminous material just before placing fresh mixture.

3.4.1 Transverse

Roller shall pass over unprotected end of freshly laid mixture only when laying of course is to be discontinued. Except when an approved bulkhead is used, cut back the edge of previously laid course to expose an even, vertical surface for the full thickness of the course. When required, rake fresh mixture against joints, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll. Transverse joints in adjacent lanes shall be offset a minimum of 2 feet.

3.4.2 Longitudinal Joints

Space 6 inches apart. Do not allow joints to coincide with joints of existing pavement or previously placed courses. Spreader screed shall overlap previously placed lanes 2 to 3 inches and be of such height to permit compaction to produce a smooth dense joint. With a lute, push back mixture placed on the surface of previous lanes to the joint edge. Do not scatter mix. Remove and waste excess material. When edges of longitudinal joints are irregular, honeycombed, or poorly compacted, cut back unsatisfactory sections of joint and expose an even vertical surface for the full thickness of the course. When required, rake fresh mixture against joint, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll while hot.

3.5 FIELD QUALITY CONTROL

3.5.1 Pavement and Mixture

Take plant samples for the determination of mix properties and field samples for thickness and density of the completed pavements. Furnish tools, labor and material for samples, and satisfactory replacement of pavement. Take samples and tests at not less than frequency specified hereinafter and

at the beginning of plant operations; for each day's work as a minimum; each change in the mix or equipment; and as often as directed. Accomplish sampling in accordance with ASTM D 979.

3.5.2 Testing

3.5.2.1 Aggregates Tests

a. Gradation: ASTM C 136.

b. Mineral Filler Content: ASTM D 546.

c. Abrasion: ASTM C 131 for wear (Los Angeles test). Perform one test initially prior to incorporation into the work and each time the source is changed.

3.5.2.2 Bituminous Mix Tests

Test one sample for each 500 tons, or fraction thereof, of the uncompacted mix for extraction in accordance with ASTM D 2172; perform a sieve analysis on each extraction sample in accordance with ASTM C 136 and ASTM C 117. Test one sample for each 500 tons or fraction thereof for stability and flow in accordance with ASTM D 1559. Test one sample for each material blend for index of retained strength in accordance with ASTM D 1075.

3.5.2.3 Pavement Courses

Perform the following tests:

a. Density: One test for each 500 square yards of asphalt placed. Acceptance of in-place field density tests shall be based on the laboratory compacted density of the approved design mix as per FDOT FM 1-T166. In-place field densities shall not be less than 96% of the design mix laboratory compacted density. Engineer shall determine location of cores and tests.

b. Thickness: Determine thickness of wearing courses from samples taken for the field density test. The maximum allowable deficiency at any point shall not be more than 1/4 inch less than the thickness for the indicated course. Average thickness of course or of combined courses shall be not less than the indicated thickness. Where a deficiency exceeds the specified tolerances, correct each such representative area or areas by removing the deficient pavement and replacing with new pavement.

c. Smoothness: Straightedge test the compacted surface of wearing course as work progresses. Apply straightedge parallel with and at right angles to the centerline after final rolling. Unevenness of course shall not vary more 1/8 inch in 10 feet. Correct each portion of the pavement showing irregularities greater than that specified.

d. Finished Grades: Finish grades of each course placed shall not vary from the finish elevations, profiles, and cross sections indicated by more than 1/2 inch. Finished surface of the final wearing course will be tested by the Owner. Correct deficient paved areas by removing existing work and replacing with new materials that meet the specifications. Skin patching for correcting low areas is prohibited.

e. Finish Surface Texture of Wearing Course: Visually check final surface texture for uniformity and reasonable compactness and tightness. Final wearing course with a surface texture having undesirable irregularities such as segregation, cavities, pulls or tears, checking, excessive exposure of coarse aggregates, sand streaks, indentations, ripples, or lack of uniformity shall be removed and replaced with new materials.

3.6 PROTECTION

Do not permit vehicular traffic, including heavy equipment, on pavement until surface temperature has cooled to at least 120 degrees F. Measure surface temperature by approved surface thermometers or other satisfactory methods.

END OF SECTION 02740

SECTION 02750 - CONCRETE SIDEWALKS CURBS & GUTTERS

PART 1 – GENERAL

1.1 DESCRIPTION

A. The work specified in this Section consists of the construction of Portland cement concrete curb and gutter, concrete traffic separator, valley gutter, special concrete gutter, sidewalks and any other types of concrete curb not specified in other Sections. The various items shall be constructed in accordance with these specifications and in conformity with the lines, grades, dimensions and notes shown in the plans.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete: All work under this Section and any exterior concrete shall be of 4,000 PSI Concrete as specified in Section 347 of the Florida Department of Transportation Specifications for Road and Bridge Construction, latest edition, hereinafter referred to as F.D.O.T. Specifications. (Disregard mention of 2500 psi concrete in FDOT Specification).

B. Reinforcement: Any steel reinforcement required by the plans shall conform to the requirements of Section 415 of the F.D.O.T. Specifications.

C. Joint Materials: Joint materials for the various items shall be in accordance with Section 932 of the F.D.O.T. Specifications. Submit to Engineer for approval.

D. Concrete Mix, Design, and Testing:

Design Mix to produce normal-weight concrete consisting of Portland cement, aggregate, water-reducing or high-range water-reducing admixture (superplasticizer), air-entraining admixture, and water to produce the flowing properties:

Compressive Strength: 4000 psi, minimum at 28 days, unless otherwise indicated. W/C ratio 0.58 maximum (non air-entrained), 0.46 maximum (air-entrained).

Slump Range: Not more than 8" after addition of HRWR admixture (superplasticizer) to verified 2"-3" slump; not more than 3" for ramps, slabs and sloping surfaces; not more than 4" for other concrete.

Air Content: 5 to 8 percent.

All sampling and testing shall be conducted by a geotechnical engineer registered in the State of Florida. Submit test results directly to the Engineer. The following test shall be taken:

28 day compressive test of concrete, minimum of 3 test cylinders per 50 cubic yards of concrete poured. If less than 50 cubic yards is poured, then a minimum of three test cylinders per day.

Air content, minimum one test for each day's pour.

Slump test, minimum three tests per 50 cubic yards of concrete poured. If less than 50 cubic yards is poured, then a minimum of three tests per day.

Contractor shall replace materials removed for testing purposes.

Should any work or material fail to meet the requirements set forth in the plans and specification, Contractor shall pay for retesting of same.

Contractor shall notify the testing laboratory 24 hours prior to work being ready for testing. Contractor shall coordinate with and assist testing laboratory.

2.2 FORMS

A. Form Materials: Forms for this work shall be made of either wood or metal. They shall be straight, free from warp or bends and of sufficient strength, when staked, to resist the pressure of the concrete without deviation from line and grade. For all items constructed on a radius, the Contractor will be required to use flexible spring steel forms or laminated boards, unless otherwise permitted by the Engineer. Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

B. Depth of Forms: Forms shall have a depth equal to the plan dimensions for the depth of concrete being deposited against them.

C. Machine Placement: Placing of these items by machine methods may be allowed with the approval of the Engineer provided that an acceptable finished product, true to line, grade and cross section, is consistently produced.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Remove all loose material from compacted sub-grade surface immediately before placing concrete.

B. The sub-grade shall be uniformly graded, compacted and thoroughly dampened. There shall not be any soft or muddy spots, or free standing water on the sub-grade.

3.2 EXCAVATION

A. Excavation shall be to the required depth, and the foundation material upon which these items are to be placed shall be compacted as specified in Section 120-9 of the F.D.O.T. Specifications.

3.3 FORM CONSTRUCTION

A. Set forms to the required grades and lines, braced and secured. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check complete formwork for grade and alignment to following tolerances:

C. Top of forms not more than 1/8 inch in 10 feet.

D. Vertical face on longitudinal axis, not more than 1/4 inch in 10 feet.

E. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.4 REINFORCEMENT

A. Clean reinforcement of loose rust and mill, scale, earth, ice, and other materials that reduce or destroy bond with concrete.

B. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runner, bolsters, spacers and hangers, as required.

C. Place reinforcement to obtain at least the minimum coverage for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operation. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

3.5 CONCRETE PLACEMENT

A. Do not place concrete until subgrade and forms have been checked for line and grade. Moisten sub-grade if required 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.

B. Place concrete by methods that prevent segregation of mix. Consolidate concrete along face of form and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.

C. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

D. Deposit and spread concrete in a continuous operation between transverse joins or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If interrupted for more than 1/2-hour, place a construction joint. Deposit concrete as nearly as practical to its final location to avoid segregation.

E. When adjacent pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained sufficient strength to carry loads without injury.

F. Fabricated Bar Mats: Keep mats clean and free from excessive rust, and handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

G. Place concrete in 2 operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay fabricated bar mats immediately in final position. Place top layer of concrete, strike off and screed.

H. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to Engineer.

I. Curbs and Gutters: Automatic machines may be used for curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results that meet or exceed minimums specified. Machine placement must produce curbs and gutters to required cross sections, line, grades, finish and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

3.6 JOINTS

A. Expansion Joints: Provide pre-molded joint filler for expansion joints abutting concrete curbs, valve boxes, manholes, structures, walks and other fixed objects, unless otherwise indicated. Extend joint fillers full width and depth of joint, not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material Remove protection after concrete has been placed on both sides of joint. Locate expansion joints at a distance equal to the width of the walk/slab.

For curb, locate expansion joints every 20', at end of a run, at all inlets and radius points and at other locations indicated on plans.

B. Filler and Sealants: Sonolastic SL2 sealant or approved equal, submit specifications to Engineer for approval.

C. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for more than 1/2 hour, except where such placements terminate at expansion joints. Located and install construction joints so as not to impair strength and appearance of the structure, as acceptable to Engineer.

D. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs on ground and vertical surfaces.

E. Control Joints: At intervals not greater than half the width of the walk/slab (see plans), the concrete shall be scored or saw-cut to a depth equal to one-third (1/3) the total depth of the concrete.

3.7 CONCRETE FINISHING

A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 10-ft. straightedge. Distribute concrete as required to remove surface irregularities, and re-float repaired areas to provide a continuous smooth finish.

C. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2-inch radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

D. After completion of floating and when excess moisture or surface sheen has disappeared, complete troweling and finish surface as follows:

1. Broom finish by drawing a fine-hair broom across concrete surface perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Engineer. Wash broom clean of excess and dried concrete as necessary during finishing operations.

2. On inclined slab surfaces, provide a coarse, non-slip finish by scoring surface with a stiff-bristled broom, perpendicular to line of traffic. Wash broom clean of excess and dried concrete as necessary during finishing operations.

3. Burlap finish by dragging a seamless strip of damp burlap across concrete, perpendicular to line of traffic. Repeat operation to provide a gritty texture acceptable to Engineer.

D. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Engineer. Plastering will not be permitted on the face of the curb, and any rejected curb, curb and gutter or valley gutter shall be removed and replaced without additional compensation.

E. Curb Final Finish: All exposed surfaces shall be given a finish while the concrete is still green. In general, only a brush finish will be required. For any surface areas, however, which are too rough or where other surface defects make additional finishing necessary, the Engineer may require that the curb be rubbed to a smooth surface with a soft brick or wood block, with water used liberally, Also, if necessary, further to provide a suitable surface, the Engineer may require additional rubbing, using a thin grout or mortar.

3.8 CURING

A. General:

1. The concrete shall be continuously cured for a period of at least 7 days. Curing shall be commenced after finishing has been completed and as soon as the concrete has hardened sufficiently to permit application of the curing material without marring the surface. Any curing material removed or damaged during the 7 day period shall be replaced immediately.

2. After forms are removed, the surfaces exposed shall be cured by lacing a berm of moist earth against them or by any of the methods described below, for the remainder of the 7 day curing period.

B. Wet Burlap Method: Burlap, as specified in 925-1, of theF.D.0.T. specifications, shall be placed over the entire exposed surface of the concrete, with sufficient extension beyond each side to insure complete coverage. Adjacent strips shall be overlapped a minimum of 150 mm (6”). The burlap shall be held securely in place such that it will be in continuous contact with the concrete at all times and no earth shall be permitted between the burlap surface at laps or between the burlap and the concrete. The burlap shall be saturated with water before being placed and shall be kept thoroughly wet throughout the curing period.

C. Membrane Curing Compound Method: Clear membrane curing compound or white-pigmented curing compound, as specified in 925-2 of the F.D.0.T. Specifications, shall be applied by a hand sprayer meeting the requirements of 350-3.1 0 of the F.D.0.T. Specifications, in a single-coat continuous film at a uniform coverage of at least 0.2 L/m^2 (1 gallon/200 S.F.). Any cracks, checks or other defects appearing in the coating shall be recoated immediately. The curing compound shall be thoroughly agitated in the drum prior to application, and during application as necessary to prevent settlement of the pigment.

D. Polyethylene Sheeting Method: Polyethylene sheeting, as specified in 925-3 of the F.D.O.T. Specifications, shall be placed over the entire exposed surface of the concrete, with sufficient extension beyond each side to insure complete coverage. Adjacent strips shall be overlapped a minimum of 150 mm (6”). The sheeting shall be held securely in place such that it will be in continuous contact with the concrete at all times.

3.9 BACKFILLING AND COMPACTION

A. After the concrete has set sufficiently, but not later than 3 days after pouring, the spaces in front and back of the curb shall be refilled to the required elevation, with suitable material, which shall be placed and thoroughly compacted in layers not thicker than 150 mm (6”).

3.10 SURFACE REQUIREMENTS

A. The gutter section of curb and gutter shall be tested with a 3.048 m (10’) straightedge laid parallel to the center line of the roadway, and while the concrete is still plastic. Straight edging shall be done along the edge of the gutter adjacent to the pavement or along other lines on the gutter cross section, as directed by the Engineer. Irregularities in excess of 6 mm (1/4”) shall be immediately corrected.

3.11 REPAIRS AND PROTECTIONS

A. Repair or replace broken or defective concrete, as directed by Engineer.

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 bonded to pavement with epoxy adhesive.

C. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage as they occur.

D. Sweep concrete pavement and wash fee of stains, dirt, and other foreign material just before final inspection.

END OF SECTION 02750

SECTION 02760 - GRADED AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The publications shall be the most current issue.

FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT)
FDOT SPECIFICATION 204
AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 117	Materials Finer than 75-Micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	Sampling Aggregates
ASTM D 1556	Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft)

1.2 SUBMITTALS

Submit the following test reports: Materials sieve and particle size analysis

1.3 QUALITY ASSURANCE

A. Codes and Standards: Comply with FDOT Standard Specifications, latest edition, and with local governing regulations if more stringent than herein specified.

B. Testing and Inspection Service: Employ, at the Contractor's expense, a testing laboratory, acceptable to the Architect/Engineer, to perform testing and inspection service for quality control testing during base course placement operations. Contractor shall replace materials removed for testing purposes. Should any work of materials fail to meet the requirements set forth in the plans and specifications, Contractor shall pay for re-testing of same.

PART 2 PRODUCTS

2.1 GRADED AGGREGATE

A. Clean, sound durable particles of crushed stone conforming to FDOT SPEC 204.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Clean underlying surface of foreign substances. Provide adequate grade and line stakes for accurate placement and completion of the base course. Surface shall be of the specified line, grade, smoothness and compaction immediately before placement of base materials.

3.2 PLACEMENT AND PROCESSING

A. Place materials in layers of uniform thickness with an approved spreader. When the compacted thickness is specified as 6" or less, the material shall be placed in a single layer.

3.3 COMPACTING AND FINISHING

A. Compact each layer of base course through full depth to at least 100 percent of the maximum laboratory density obtained in accordance with The Modified Proctor Test (ASTM D 1557, Method B or D). Determine in-place density in accordance with ASTM D 1556. Surface shall be smooth, free from waves, and shall not deviate by more than 1/4 inch when tested with a 10 foot straightedge. Correct nonconforming areas before applying the next course. Place earth, or other approved materials, along the exposed edges of each course to the same height and for a width of at least one foot and compact with each course.

1. Layer Thickness: A. When the specified compacted thickness of the course is greater than 6 inches, construct the course in two or more layers. When the specified compacted thickness is 6 inches or less, one course construction may be used.

2. Maintenance: Perform additional reworking, mixing, shaping, and compacting necessitated by damage from atmospheric conditions, traffic, or other causes. Ensure that the true grade and cross section are maintained, with no rutting or other distortion, and that the base meets all requirements at the time the subsequent base course is applied. Base shall be properly drained at all times.

3.4 FIELD QUALITY CONTROL

A. Supply samples of coarse aggregate and binder material. Obtain approval for materials and select sources well in advance of the time when materials shall be required in the work.

1. Testing

a. Sieve Analysis: Make sieve and particle size analysis from each sample collected during the course of the project. Tests shall include an analysis of each grade of material and an analysis of the combined material representing the blend or mixture.

b. Smoothness Test: Perform smoothness test with a 10 foot straightedge applied parallel with and at right angles to the center line of the finished surface. Correct surface deviations in excess of 1/4 inch by loosening, adding or removing material, reshaping, watering, and compacting. When base course is constructed in more than one layer, smoothness requirements apply only to the top layer.

c. Field Density Tests: ASTM D 1556. Perform one field density test for each 500 square yards of each layer of base course.

d. Laboratory Density Tests: ASTM D 1557, Method B or D, for all material.

e. Thickness Tests: Take at least one depth measurement for each 500 square yards of completed base course. Make depth measurements by test holes, at least 3 inches in diameter, through the course. Where thickness deficiency exceeds 1/2 inch, correct by scarifying, adding mixture of proper gradation, reblading, and recompacting. Where measured thickness exceeds 1/2 inch thicker than shown, it shall be considered as the indicated or specified thickness plus 1/2 inch for determining the average. Average thickness shall be the average of the depth measurements and shall not underrun the thickness shown by more than 1/4 inch.

f. Contamination of Base Material: If at anytime, the subgrade material should become mixed with the base course materials, the Contractor shall, without additional compensation, dig out and remove the mixture, reshape and compact the subgrade and replace the materials removed with clean base material, which shall be shaped and compacted as specified.

g. Cracks and Checks: If cracks or checks appear in the base, either before or after priming, which, in the opinion of the Engineer, would impair the structural efficiency of the base, the Contractor shall remove the cracks or checks by rescarifying, reshaping, adding base material where necessary and recompacting.

END OF SECTION 02760

SECTION 02770 - BITUMINOUS TACK COAT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The publications shall be the most current issue.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T102	Spot Test of Asphaltic Materials

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 140	Sampling Bituminous Materials
ASTM D 977	Emulsified Asphalt
ASTM D 2397	Cationic Emulsified Asphalt

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

SD-06 Test Reports

Certified test reports: For emulsified asphalt

1.3 DELIVERY AND STORAGE

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling.

1.4 WEATHER LIMITATIONS

Apply the tack coat only when the surface is dry. Apply the tack coat only when the ambient temperature is 50 degrees F or above and when the temperature has not been below 35 degrees F for 12 hours immediately prior to application, unless otherwise directed.

PART 2 PRODUCTS

2.1 MATERIALS

Bituminous material for the tack coat shall be emulsified asphalt.

2.1.1 Emulsified Asphalt

ASTM D 977, Type SS-1 or ASTM D 2397, Type CSS-1. Dilute the emulsified asphalt with equal parts of water. The base asphalt used to manufacture the emulsion shall show a negative spot when tested in accordance with AASHTO T102 using standard naphtha.

2.2 CONSTRUCTION EQUIPMENT

Provide equipment dependable and adequate for the purpose intended and properly maintained in satisfactory and safe operating condition. Calibrated equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by a calibration laboratory within 12 months prior to commencing work.

2.2.1 Bituminous Distributor

The bituminous distributor shall be designed and equipped to distribute the bituminous material uniformly at even heat on variable widths of surface at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard, with a pressure range of 25 to 75 pounds per square inch and with an allowable variation not to exceed 5 percent from any specified rate. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gages, volume-measuring devices, adequate heaters for heating the materials to the proper application temperature, a thermometer for reading the temperature of the tank contents, and a hose and spray nozzle attachment suitable for applying bituminous material to spots unavoidably missed by the distributor and to areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

2.2.2 Heating Equipment for Storage Tanks

The equipment for heating the bituminous material shall be steam, electric, or hot oil heaters. Steam heaters shall consist of steam coils and equipment for producing steam, so designed that the steam cannot get into the material. An armored thermometer with a temperature range from 40 to 400 degrees F shall be fixed to the tank so that the temperature of the bituminous material may be determined at all times.

2.2.3 Brooms and Blowers

Brooms and blowers shall be of the power type suitable for cleaning the surfaces for application of the bituminous material.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the tack coat, remove loose material, dirt, clay, and other objectionable material from the surface to be treated by a power broom or blower supplemented with hand brooms. After the cleaning operation and prior to the application of the tack coat, inspect the area to be paved to determine the fitness of the area to receive the bituminous material.

3.2 APPLICATION OF BITUMINOUS MATERIAL

Apply the tack coat when the surface to be treated is dry. Immediately following the preparation of the surface for treatment, apply the bituminous material by means of the bituminous distributor, within the limits of temperature specified herein and at a rate of not less than 0.05 gallon nor more than 0.15 gallon of diluted emulsion per square yard. Apply the bituminous material so that uniform distribution is obtained over the entire surface to be treated. Treat lightly coated areas and spots missed by the distributor with the bituminous material. Following the application of bituminous material, allow the surface to cure without being disturbed for period of time necessary to permit setting of the tack coat. Apply the bituminous tack coat only as far in advance of the placing of the overlying layer as required for that day's operation. Maintain and protect the treated surface from damage until the succeeding course of pavement is placed.

3.2.1 Application Temperature for Emulsified Asphalt

Between 75 and 130 degrees F.

3.3 FIELD SAMPLING AND TESTING

3.3.1 Sampling Bituminous Materials

Furnish samples of bituminous materials for testing. Test in accordance with ASTM D 140.

3.3.2 Bituminous Material Tests

Perform spot test for asphalt in accordance with AASHTO T102 on each shipment.

3.4 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

END OF SECTION 02770

SECTION 02810 – UNDERGROUND IRRIGATION SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 DESCRIPTION OF WORK

A. Extent of underground irrigation system is shown on drawings.

1.3 QUALITY ASSURANCE

A. Irrigation work shall be accomplished by a single firm specializing in irrigation work.

B. Manufacturer Qualifications: Provide underground irrigation system as a complete unit produced by acceptable manufacturer, including heads, valves, controls, and accessories. Include all items necessary to create a complete, working system.

1.4 SUBMITTALS

A. Product Data: Submit manufacturers' technical data and installation instructions for underground sprinkler system.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of the following: Rain Bird Sprinkler Mfg. Corp. or equal.

2.2 MATERIALS

A. Pressure Pipe: Comply with following:

1. PVC plastic pipe, ASTM D 1785, Class 200

B. Circuit Pipe (downstream from circuit valves): Comply with following:

1. PVC plastic pipe, ASTM D 1785, Class 200

C. Pipe Fittings: Comply with the following:

1. For PVC plastic pipe, ASTM D 2466 socket fitting with ASTM D 2564 solvent cement.

D. Valves: Manufacturer's standard, of type and size indicated, and as follows:

1. Automatic Circuit Valves: Globe valves operated by low-power solenoid, normally closed, manual flow adjustment.

E. Sprinkler Heads: Manufacturer's standard unit as specified, designed to provide uniform coverage over entire area of spray shown on drawings at available water pressure, as follows:

1. Spray: Fixed pattern, with screw-type flow adjustment.
2. Pop-Up Spray: Fixed pattern, with screw-type flow adjustment and stainless steel retraction spring.
3. Pop-Up Rotary: Gear drive, full circle and adjustable part circle type.

F. Valve Box: Precast plastic as specified.

2.3 AUTOMATIC CONTROL SYSTEM

A. General: Furnish low voltage system manufactured expressly for control of automatic circuit valves of underground irrigation systems.

B. Exterior Control Enclosure: As specified, manufacturer's standard weatherproof enclosure with locking cover, complying with NFPA 70 (National Electric Code).

C. Circuit Control: Each circuit variable from approximately 5 to 60 minutes. Include switch for manual or automatic operation of each circuit.

D. Timing Device: Adjustable, 24-hour and 14 day clocks to operate any time of day and skip any day in a 14 day period.

1. Allow for manual or semi-automatic operation without disturbing preset automatic operation.

PART 3 – EXECUTION

3.1 SYSTEM DESIGN

A. Location of Heads: Design location is precise. Make minor adjustments as necessary to avoid obstructions.

B. Minimum Water Coverage

1. Turf areas, 100%
2. Other planting areas, 100%

C. Do not decrease number of heads indicated unless otherwise acceptable to Architect.

3.2 TRENCHING AND BACKFILLING

A. General: Excavate straight and true with bottom uniformly sloped.

B. Protect existing lawns and plantings. Remove and replant as necessary to complete installation. Replace damage lawn areas and plants with new to match existing.

C. Trench Depth: Excavate trenches to a depth of 3" below invert of pipe, unless otherwise indicated.

D. Minimum Cover: Provide following minimum cover over top of installed piping

1. Mainline pressure pipe, 18".
2. Lateral line pipe, 12".

E. Backfill: Backfill with clean material from excavation. Remove organic material as well as rocks and debris larger than 1" diameter. Place acceptable backfill material in 6" lifts, compacting each lift.

F. Existing Lawns: Where trenching is required across existing lawns, uniformly cut strips of sod 6" wider than trench. Remove sod in rolls of suitable size for handling and keep moistened until replanted.

G. Backfill trench to within 6" of finished grade. Continue fill with acceptable topsoil and compact to bring sod even with existing lawn.

H. Replant sod within 3 days after removal, roll and water generously.

I. Reseed and restore to original condition any sod areas not in healthy condition equal to adjoining lawns 30 days after replanting.

J. Pavements: All pipes under pavement will be installed in schedule 40 PVC sleeve with diameter at least 2 times diameter of ensleeved pipe.

3.3 INSTALLATION

A. General: Unless otherwise indicated, comply with requirements of Uniform Plumbing Code.

B. Connection to Main: Connect to water source as shown on Irrigation Plan.

1. Install new tee, valve, and union.

C. Circuit Valves: Install in valve box, arranged for easy adjustment and removal as specified.

1. Provide union on downstream side.
2. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.

D. Piping: Lay pipe on solid subbase, uniformly sloped without humps or depressions.

1. Install PVC pipe in dry weather when temperature is above 40 degrees Fahrenheit (4 degrees Celsius) before testing, unless otherwise recommended by manufacturer.
2. Sprinkler Heads: Flush circuit lines with full head of water and install heads after hydrostatic test is completed.
3. Install lawn heads at manufacturers' recommended height.
4. Install shrubbery heads at manufacturers' recommended heights.
5. Locate part-circle heads to maintain a minimum distance of 12" from walls and 6" from other boundaries, unless otherwise indicated. In parking areas, maintain a minimum distance of 30" from any curbs where parking spaces are located.

E. Dielectric Protection: Use dielectric fittings at connection where pipes of dissimilar metal are joined.

3.4 TESTING

A. General: Notify landscape architect in writing when testing will be conducted. Conduct tests in presence of landscape architect.

B. Hydrostatic Test: Test water piping and valves, before backfilling trenches, to a hydrostatic pressure of not less than 150 psi. Piping may be tested in sections to expedite work. Remove and repair piping, connections, valves which do not pass hydrostatic testing.

C. Operational Testing: Perform operational testing after hydrostatic testing is completed, backfill is in place, and sprinkler heads adjusted to final position.

1. Demonstrate to landscape architect that system meets coverage requirements and that automatic controls function properly.
2. Coverage requirements are based on operation of one circuit at a time.

D. After completion of grading, seeding or sodding, and rolling of grass areas, carefully adjust lawn sprinkler heads so they will be flush with or not more than one-half inches above finish grade.

3.5 MAINTENANCE

A. The contractor shall maintain, inspect, adjust, monitor, and repair the irrigation system until 60 days after substantial completion of the project in a manner which will ensure continued operation.

END OF SECTION 02810

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

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 general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for temporary site fencing.
2. Section 311000 "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape at a height 6 inches (150 mm) above the ground for trees up to and including 4-inch (100-mm) size at this height and as measured at a height of 12 inches (300 mm) above the ground for trees larger than 4-inch (100-mm) size.

B. DBH: Diameter breast height; diameter of a trunk as measured by a diameter tape at a height 54 inches (1372 mm) above the ground line.

C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

A. 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. Tree-service firm's personnel, and equipment needed to make progress and avoid delays.
b. Quality-control program.

c. Coordination of Work and equipment movement with the locations of protection zones.
d. Trenching by hand or with air spade within protection zones.
e. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.
2. Detail fabrication and assembly of protection-zone fencing and signage.
3. Indicate extent of trenching by hand or with air spade within protection zones.

C. Samples: For each type of the following:

1. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.

1.6 OWNER PROVIDED VENDOR

A. Owner shall provide certified arborist to trim, prop, feed and otherwise maintain protected trees during construction.

1.7 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or 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. Do not direct vehicle or equipment exhaust toward protection zones.

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Stockpiled soil mixed with planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

B. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:

1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch (50-mm) opening, 0.148-inch- (3.76-mm-) diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- (60-mm-) OD line posts, and 2-7/8-inch- (73-mm-) OD corner and pull posts with 1-5/8-inch- (42-mm-) OD top rails and 0.177-inch- (4.5-mm-) diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.

a. Height: 72 inches (1800 mm).

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. Prepare written report, endorsed by arborist or other qualified professional, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Tie a 1-inch (25-mm) blue vinyl tape around each tree trunk at 54 inches (1372 mm) 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 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zone before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected areas 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.

1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
3. Access Gates: Install at least one per protection area; adjust to operate smoothly, easily, and quietly; free of 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. Maintain protection zones free of weeds and trash.

C. Maintain protection-zone fencing in good condition as acceptable to Architect and Landscape Architect and remove when construction operations and signage 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.

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" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, 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. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

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 (75 mm) 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 tree 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: Do not paint cut root ends
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 tree roots 12 inches (300 mm) outside 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 or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches under direction of arborist.

1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees according to ANSI A300 (Part 1

B. Unless otherwise directed by arborist and acceptable to Architect, do not cut tree leaders.

C. Cut branches with sharp pruning instruments; do not break or chop.

D. Do not paint or apply sealants to wounds.

E. Provide subsequent maintenance pruning during Contract period as recommended by arborist.

F. Chip removed branches and dispose of off-site.

3.7 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

D. Minor Fill within Protection Zone: Where existing grade is 2 inches (50 mm) or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect and Landscape Architect.

B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect and Landscape Architect determines are incapable of restoring to normal growth pattern.

1. Small Trees: Provide new trees of same size and species as those being replaced for each tree that measures 10 inches (150 mm) or smaller in caliper size.
2. Large Trees: Provide as many new tree(s) of 10-12inch (150-mm) caliper size to total the caliper size for each tree being replaced that measures more than 10 inches (150 mm) in caliper size.

    a. Species: Live Oak-Quercus Virginiana.

3. Plant and maintain new trees as specified in Section 329300 "Plants."

3.10 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 015639

SECTION 129300 - SITE FURNISHINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fixed exterior benches, backed.

B. Fixed exterior tables and benches.

C. Fixed exterior trash receptacles.

D. Fixed exterior bike racks.

E. Fixed exterior drinking fountains.

F. Bollards.

D. Fixed exterior playground equipment.

1.02 RELATED REQUIREMENTS

A. Section 32 13 13 - Portland Cement Concrete Paving: Mounting surface for furnishings.

B. Section 03 30 00 - Cast-in-Place Concrete: Mounting material for foundations.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Indicate size, shape, and dimensions, including clearances from adjacent walls, doors, and obstructions.

D. Shop Drawings: Indicate foundation including materials and reinforcing, grade elevation, relationship to other built elements. Mounting methods to foundations. Playground equipment shall have engineered shop drawings.

E. Verification Samples: For each finish product specified, color chip verifying Architect's color selection.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Handle racks with sufficient care to prevent scratches and other damage to the finish.

PART 2 PRODUCTS

2.01 FIXED EXTERIOR BACKED BENCHES

A. Manufacturer: Sitescapes, Inc., sitescapesonline.com

B. Model: 6’ Cityview vertical Strap with Arched Back and Center Armrest.

C. Frame: Aluminum Color: Onyx Black Duracoat.

D. Mounting: Surface Mount on Reinforced cast-in-place concrete foundation.

E. Attachment Bolts: Provided with product to suit mounting condition. Finished to match frame.

F. Quantities: - Refer to the Landscape drawings for locations.

2.03 FIXED EXTERIOR TRASH RECEPTACLES

A. Manufacturer: Sitescapes, Inc., sitescapesonline.com

B. Model: 36 Gallon, Cityview Vertical Strap Receptacle with Side Door/Lock and Dome Top

C. Frame: Aluminum Color: Onyx Black Duracoat.

D. Mounting: Surface Mount on Reinforced cast-in-place concrete foundation.

E. Attachment Bolts: Provided with product to suit mounting condition. Finished to match frame.

F. Quantities: - Refer to the Landscape drawings for locations.

2.04 FIXED EXTERIOR BIKE RACKS

A. Manufacturer: Sitescapes, Inc., sitescapesonline.com

B. Model: 36 Gallon, Cityview Vertical Strap Receptacle with Side Door/Lock and Dome Top

C. Frame: Aluminum Color: Onyx Black Duracoat.

D. Mounting: Surface Mount on Reinforced cast-in-place concrete foundation.

E. Attachment Bolts: Provided with product to suit mounting condition. Finished to match frame.

F. Quantities: - Refer to the Landscape drawings for locations.

2.05 FIXED EXTERIOR DRINKING FOUNTAINS

A. Manufacturer: Elkay, 1-800-476-4106

B. Model: Outdoor EZH20 Bottle Filling Station, Non-Filtered and Non-Refridgerated Bi-Level Pedestal with Pet Station, LK4420BF1UDBFRKBLK

C. Color: Black

D. Mounting: Surface Mount on Reinforced cast-in-place concrete foundation.

E. Attachment Bolts: Provided with product to suit mounting condition. Finished to match frame.

F. Quantities: - Refer to the Landscape drawings for locations.

2.06 BOLLARDS

A. Manufacturer: Reliance Foundry, info@reliance-foundry.com

B. Model: Decorative Bollard, Flutted Post, Spherical Top, R-7530-AL

C. Frame: Aluminum Color: Powder Coat Black.

D. Mounting: Surface Mount on Reinforced cast-in-place concrete foundation.

E. Attachment Bolts: Provided with product to suit mounting condition. Finished to match frame.

F. Quantities: - Refer to the Landscape drawings for locations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive products.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Do not begin installation until unsatisfactory substrates have been properly repaired.

3.02 PREPARATION

A. Ensure surfaces to receive products are clean, flat, and level.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install products level, plumb, square, and correctly located as indicated on the drawings.

C. In-Ground Anchor Installation:

1. Prepare holes in size according to manufacturer’s instructions.
2. Place anchoring bolts through the holes in the pipe.
3. Lower product into holes, ensuring the bottom of posts are at least 1-1/2 inch from the ground.
4. Pour concrete and level product.
5. Support until dry.

D. Surface Flange Installation: Anchor product securely in place with anchor bolts provided by manufacturer. Avoid damage to bolt finish. Touch-up only as necessary.

3.04 CLEANING

A. Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 32 14 00

UNIT PAVING

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. Concrete pavers set in **aggregate** setting beds.

B. Related Requirements:
   1. Section 321313 "Concrete Paving" **for cast-in-place concrete curbs and gutters serving as edge restraints for unit pavers**.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**.

1.4 ACTION SUBMITTALS

A. Product Data: For materials other than water and aggregates.

B. Product Data: For the following:

   1. Pavers.

C. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C 136.

D. Samples for Initial Selection: For each type of unit paver indicated.

E. Samples for Verification: For full-size units of each type of unit paver indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Adhesion and Compatibility Test Reports: From latex-additive manufacturer for mortar and grout containing latex additives.

B. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.

1. For solid interlocking paving units, include test data for freezing and thawing according to ASTM C 67.

1.6 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Submit to latex-additive manufacturer, for testing as indicated below, Samples of flooring materials that will contact or affect mortar and grout that contain latex additives.

1. Use manufacturer's standard test methods to determine whether mortar and grout materials will obtain optimal adhesion with, and will be nonstaining to, installed brick and other materials constituting brick flooring installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store pavers 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.

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.

1.9 FIELD CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 CONCRETE PAVERS

A. Concrete Pavers:
   1. Unilock Pavers
      a. Thickness: As noted on plan documents
      b. Color: As noted on plan documents
      c. Shape: As noted on plan documents
   2. 4x8 Belgard Pavers
      a. Thickness: As noted on plan documents
      b. Color: As noted on plan documents
      c. Shape: As noted on plan documents
   3. 12x12 Belgard Pavers
      a. Thickness: As noted on plan documents
      b. Color: As noted on plan documents
      c. Shape: As noted on plan documents

2.3 CURBS AND EDGE RESTRAINTS

A. Job-Built Concrete Edge Restraints: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mixed concrete with minimum 28-day compressive strength of 3000 psi (20 MPa).

2.4 ACCESSORIES

A. Cork Joint Filler: Preformed strips complying with ASTM D 1752, Type II.

B. Compressible Foam Filler: Preformed strips complying with ASTM D 1056, Grade 2A1.

2.5 AGGREGATE SETTING-BED MATERIALS

A. Graded Aggregate for Subbase: Sound, crushed stone or gravel complying with **ASTM D 448 for Size No. 57.**

B. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33/C 33M for fine aggregate.

C. Sand for Joints: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 (1.18-mm) sieve and no more than 10 percent passing No. 200 (0.075-mm) sieve.

1. Provide sand of color needed to produce required joint color. White mason sand.

D. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2, AASHTO M 288.
2. Apparent Opening Size: No. 60 (0.250-mm) sieve, maximum; ASTM D 4751.
3. Permittivity: 0.02 per second, minimum; ASTM D 4491.
4. UV Stability: 50 percent after 500 hours' exposure, ASTM D 4355.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces indicated to receive unit paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Where unit paving is to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.

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

3.2 PREPARATION

A. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.

B. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.

C. Proof-roll prepared subgrade according to requirements in Section 312000 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive **subbase and base** course for unit pavers.

3.3 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

1. For concrete pavers, a block splitter may be used.

D. Joint Pattern: As indicated.

E. Tolerances: Do not exceed 1/32-inch (0.8-mm) unit-to-unit offset from flush (lippage) or 1/8 inch in 10 feet (3 mm in 3 m) from level, or indicated slope, for finished surface of paving.

F. Expansion and Control Joints: Provide cork joint filler at locations and of widths indicated. Install joint filler before setting pavers. Make top of joint filler flush with top of pavers.

G. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.
1. Install job-built concrete edge restraints to comply with requirements in Section 033000 "Cast-in-Place Concrete."

3.4 AGGREGATE SETTING-BED APPLICATIONS

A. Compact soil subgrade uniformly to at least **95** percent of **ASTM D 698** laboratory density.

B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

C. Place separation geotextile over prepared subgrade, overlapping ends and edges at least 12 inches (300 mm).

D. Place aggregate base, compact by tamping with plate vibrator, and screed to depth indicated.

E. Place leveling course and screed to a thickness of +/- 1 inch(25 to 38 mm), taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.

F. Set pavers with a minimum joint width of 1/16 inch (1.5 mm) and a maximum of 1/8 inch (3 mm), being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines.

1. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.

G. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf (16- to 22-kN) compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.

1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches (900 mm) of uncompacted pavers adjacent to temporary edges.

2. Before ending each day's work, compact installed concrete pavers except for 36-inch (900-mm) width of uncompacted pavers adjacent to temporary edges (laying faces).
3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches (90 mm) of laying face.
4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.

H. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

I. Do not allow traffic on installed pavers until sand has been vibrated into joints.

J. Repeat joint-filling process 30 days later.

3.5 REPAIRING, POINTING, AND CLEANING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.

C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.

1. Remove temporary protective coating as recommended by coating manufacturer and as acceptable to paver and grout manufacturers.
2. Do not allow protective coating to enter floor drains. Trap, collect, and remove coating material.

END OF SECTION 321400

SECTION 328400 - PLANTING IRRIGATION

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. Piping.
2. Encasement for piping.
3. Manual valves.
4. Pressure-reducing valves.
5. Automatic control valves.
6. Automatic drain valves.
7. Transition fittings.
8. Miscellaneous piping specialties.
9. Sprinklers.
10. Quick couplers.
11. Controllers.
12. Boxes for automatic control valves.

1.3 DEFINITIONS

A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.

C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be **automatic operation with controller and automatic control** valves.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.

C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:

1. Point of Connection: 90 psi

2. Head Pressure: **30 psi (1380 kPa)**.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories.

B. Wiring Diagrams: For power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For **sprinklers, isolation valves, and automatic control valves**, to include in operation and maintenance manuals.

B. Provide the following attic stock:
1. Sprinkler heads: 3 for each type
2. Electric control valves: 2
3. Solenoids: 3

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Company must have three years of experience installing systems of similar size and complexity. Company must have qualified superintended on-site at all times who has minimum three years' experience installing irrigation systems of similar size and complexity.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

B. Contractor is responsible for storage and security of all materials stored on site.

1.10 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify **Owner** no fewer than five days in advance of proposed interruption of water service.
2. Do not proceed with interruption of water service without **Owner's** written permission.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

B. PVC Pipe, Pressure Rated: ASTM D 2241, PVC 1120 compound, **SDR 21** class 200.

1. PVC Socket Fittings: ASTM D 2467, Schedule 80.
2. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.

2.2 PIPING JOINING MATERIALS

A. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.3 PRESSURE-REDUCING VALVES

A. Water Regulators:
1. As indicated on the drawings.

B. Water Control Valves:

1. As indicated on the drawings.

2.4 AUTOMATIC CONTROL VALVES

A. Plastic, Automatic Control Valves:

1. As indicated on the drawings.
2. Description: Molded-plastic body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

2.5 AUTOMATIC DRAIN VALVES

A. Description: Spring-loaded-ball type of corrosion-resistant construction and designed to open for drainage if line pressure drops below 2-1/2 to 3 psig (17 to 20 kPa).

2.6 TRANSITION FITTINGS

A. General Requirements: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

2.7 SPRINKLERS

A. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.

B. Plastic, Pop-up, Gear-Drive Rotary Sprinklers:

C. As indicated on the drawings. Plastic, Surface, Pop-up Spray Sprinklers:

1. As indicated on the drawings.

D. Plastic, Pop-up Spray Sprinklers:
1. As indicated on the drawings.

E. Plastic Flood Bubblers:

1. As indicated on the drawings.

2.8 CONTROLLERS

A. Connect wiring to existing.

2.9 BOXES FOR AUTOMATIC CONTROL VALVES

A. Plastic Boxes:
1. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.

a. Size: As required for valves and service.
b. Shape: As required for valves and service.
c. Sidewall Material: **PE**.
d. Cover Material: **PE**.

1) Lettering: "**VALVE BOX**"

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 31 2000 "Earth Moving."

B. Provide minimum cover over top of underground piping according to the following:

1. Irrigation Main Piping: Minimum depth of 30 **inches (900 mm)** below finished grade, or not less than **18 inches (450 mm)** below average local frost depth, whichever is deeper.
2. Circuit Piping: **12 inches (300 mm)**.
3. Drain Piping: **12 inches (300 mm)**.
4. Sleeves: **36 inches under roadways**.

3.2 PREPARATION

A. Set stakes to identify locations of proposed irrigation system. Obtain Landscape Architect's approval before excavation.

3.3 PIPING INSTALLATION

A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.

B. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.

C. Install piping free of sags and bends.

D. Install groups of pipes parallel to each other, spaced to permit valve servicing.

E. Install fittings for changes in direction and branch connections.

F. Install unions adjacent to valves and to final connections to other components with NPS 2 (DN 50) or smaller pipe connection.

G. Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 (DN 65) or larger pipe connection.

H. Lay piping on solid subbase, uniformly sloped without humps or depressions.

I. Install ductile-iron piping according to AWWA C600.

J. Install PVC piping in dry weather when temperature is above 40 deg F (5 deg C). Allow joints to cure at least 24 hours at temperatures above 40 deg F (5 deg C) before testing.

K. Install piping in sleeves under parking lots, roadways, and sidewalks.

L. Install sleeves made of **Schedule 40** PVC pipe and socket fittings, and solvent-cemented joints.

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
3. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.5 VALVE INSTALLATION

A. Underground Iron Gate Valves, Resilient Seat: Comply with AWWA C600 and AWWA M44. Install in valve casing with top flush with grade.

1. Install valves and PVC pipe with restrained, gasketed joints.

B. Pressure-Reducing Valves: Install in boxes for automatic control valves or aboveground between shutoff valves.

C. Drain Valves: Install in underground piping in boxes for automatic control valves.

3.6 SPRINKLER INSTALLATION

A. Install sprinklers after hydrostatic test is completed.

B. Install sprinklers at manufacturer's recommended heights.

C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches (100 mm) from walls and 4 inches (50 mm) from other boundaries unless otherwise indicated.

3.7 AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION

A. Equipment Mounting: Install exterior wall-mounted devices on exterior wall in specific location approved by Owner and Landscape Architect.

1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. All wiring extending above grade to controller shall be in conduit and securely neatly to wall.

B. Install control cable in same trench as irrigation piping **beside** piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

3.8 CONNECTIONS

A. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.

B. Connect wiring between controllers and automatic control valves.

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Any irrigation product will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.10 STARTUP SERVICE

A. **Perform** startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that controllers are installed and connected according to the Contract Documents.
3. Verify that electrical wiring installation complies with manufacturer's submittal.

3.11 ADJUSTING

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than **1/2 inch (13 mm)** above, finish grade.

3.12 CLEANING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.13 DEMONSTRATION

A. **Train** Owner's maintenance personnel to adjust, operate, and maintain **automatic control valves and controllers**.

3.14 PIPING SCHEDULE

A. Install components having pressure rating equal to or greater than system operating pressure.

B. Piping in control-valve boxes and aboveground may be joined with flanges or unions instead of joints indicated.

C. Underground irrigation main piping shall be following:

1. SDR 21, PVC, pressure-rated pipe class 200; PVC socket fittings; and solvent-cemented joints.

D. Circuit piping shall be the following:

1. SDR 21, PVC, pressure-rated pipe class 200; PVC socket fittings; and solvent-cemented joints.

3.15 VALVE SCHEDULE

A. Underground, Shutoff-Duty Valves: Use the following:

1. As indicated on the drawings.

B. Drain Valves:

1. As Indicated on the drawings.

END OF SECTION 328400

SECTION 329113 - SOIL PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fine grading and planting soils specified by composition of the mixes.

B. Related Requirements:

1. Section 311000 Site Clearing for topsoil stripping and stockpiling.

1.2 DEFINITIONS

A. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

B. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

C. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

D. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each bulk-supplied material in sealed containers labeled with content, source, and date obtained; providing an accurate representation of composition, color, and texture.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

A. Planting-Soil Type Existing, on-site surface soil; modified to produce viable planting soil. Blend existing, on-site surface soil with the soil amendments and fertilizers to produce planting soil as recommendation by testing laboratory for plant types specified.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

B.

1. Class: O, with a minimum of 95 percent passing through a No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through a No. 60 (0.25-mm) sieve.
2. Form: Provide lime in form of ground dolomitic limestone.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 (0.30-mm) sieve.

F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M

2.3 ORGANIC AMENDMENTS

A. Mushroom Compost: Locally produced compost.

2.4 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

B. 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 testing agency.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil or topsoil to a depth of six (6) inches in exterior planting areas after subgrading is complete. Planting beds in interior courtyards of Building 7 and 8 shall have planting soil placed to a depth of fourteen (14) inches minimum after subgrading is complete and subsurface and surface drainage is installed.

B. 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 planting soil.

3.2 BLENDING PLANTING SOIL IN PLACE

A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Preparation: Till unamended, existing soil in planting areas to a minimum depth of 6 inches (150 mm) Remove stones larger than 2 inches (50 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C. Mixing: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.

   1. Mix lime and sulfur, if recommended by soil tests,with dry soil before mixing fertilizer.
   2. Mix mushroom compost at one part compost to four parts unamended soil.
   3. Mix fertilizer with planting soil no more than seven days before planting.

D. Compaction: Compact blended planting soil to 75 to 85 percent of maximum Standard Proctor density according to ASTM D 698.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections:

1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D 698. Space tests at no less than one for each 20,000 sq. ft. (200 sq. m) of in-place soil or part thereof.

C. Soil will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.4 PROTECTION AND CLEANING

A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Erection of sheds or structures.
5. Excavation or other digging unless otherwise indicated.

C. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

3.5 CLEANING AND FINISH GRADING

A. The work includes, but is not necessarily limited to, furnishing all materials, labor, and equipment for the preparation of topsoil, the cleaning and fine grading of planting areas in order to produce a proper planting bed for seed, sprigs, sod or plants.

B. GENERAL

1. Cleaning and finish grading is intended to be the final preparation of the site for the planting operation. This line item includes any and all work not previously specified that is necessary to ensure a smooth, debris free, even surface on which to plant. This section also includes tilling or disking to improve soil conditions in preparation for planting.
2. This section is intended to include all work to complete stone picking, final picking of twigs, removal of clearing debris that is still present, and removal of wind-blown debris of any form. All garbage, material scraps, stockpiles, gravel, rocks, or any unwanted litter or foreign matter shall be removed from the planting beds, and disposed of in accordance with all state, federal, and local laws. This line item is all encompassing and is intended to ensure no construction debris is to be found on the property. This will

include removal of minor other construction spoil piles, and any other related construction debris or materials present on site.

3. Cleaning and fine grading will begin immediately following notification that the irrigation system is operative.
4. Cleaning and fine grading includes extensive grade checking with a surveyor's instrument and rod. All areas to be planted shall be checked by the Contractor for positive, continuous surface drainage. The Contractor shall demonstrate to the Landscape Architect and Owner that he has checked all grades and he is positive that no slow drainage areas, "bird baths" or puddles exist. This may require staking all swales or slow draining areas with wood stakes. Each stake shall indicate the percentage of slope from stake to stake. Stakes shall be placed at no greater than fifty foot intervals.

C. EQUIPMENT AND PERSONNEL

1. Equipment for rock removal shall be capable of picking rocks of three quarters (3/4") inch in diameter and larger. The equipment should be tractor-drawn and have a self-contained dumping box attached. Such equipment should be the type that is manufactured by Harley or Pixtone.
2. Tilling the soil is best accomplished with a tractor-drawn disc plow or disc harrow.
3. Finish grading equipment can best be performed by the use of a small D-4 or equivalent bulldozer, a ten to twelve-foot tractor-drawn box blade, an eight foot tractor-drawn box blade, and a sand pro with box attachment. Finish grading will also require hand labor to be performed with landscape rakes, shovels, axes, etc.

D. CLEANING

1. The Contractor shall have all areas to be planted thoroughly scarified and loosened by disking, harrowing, or other suitable means to a minimum depth of four inches prior to finish grading. These areas shall be machine or hand worked as necessary to eliminate all lump and soil clods. Tillage shall include the removal of all equipment ruts and tracks, areas of compaction or erosion, and any other undesirable soil conditions that would prevent the proper preparation of a finely pulverized planting bed.
2. Tillage shall be accomplished only under proper soil conditions. The Landscape Architect may, at his discretion, request the cessation of the tillage operation during periods of severe drought, excessive soil moisture, or other unsatisfactory soil conditions. All haul roads shall be loosened and returned to plantable conditions.
3. All rocks, stones, sticks, brush, roots, and other objectionable materials which might interfere with the formation of a finely pulverized planting bed, impair planting or create future problems of maintenance shall be removed from the soil. All stone larger than ¾" in diameter shall be removed from the top four inches of planting bed. Rock picking and debris removal shall continue after the application of fertilizer and/or lime until the particular area is acceptable to the Owner and Landscape Architect.

E. FINE GRADING

1. Areas to be planted shall be graded and floated to provide complete surface drainage of not less than three percent. All water-holding depressions and pockets shall be eliminated. Undulations and unsightly variations in grade that will not permit the use of normal mowing equipment without scalping or missing shall be removed so that proper use of such equipment may be had.
2. Areas to be planted shall also be finish graded to meet any walks, paths or other adjoining surfaces so that, after compaction, no water pockets or ridges remain. Ten feet around catch basins must have a minimum of three percent surface drainage.

3. Areas where sod will interface with pathways shall be fine graded so as to counter-sink the sod such that once sod is placed, it shall be at grade with the edge of pavement.
4. At any time during the fine grading process, the Landscape Architect reserves the right to make minor adjustments in the finish shaping at no extra cost to the Owner.

END OF SECTION 329113

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. Sodding.

B. Related Requirements:

   1. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Certification of Grass Sod:

1. Certification of sod from **turfgrass nursery upon delivery**. Include identification of source and name and telephone number of supplier prior to delivery.

C. Product Certificates: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
1. Experience: **Three** years' experience in turf installation.
2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

3. Pesticide Applicator: State licensed, commercial.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

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 materials with appropriate certificates.

1.9 SITE CONDITIONS

A. 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.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Sod: **Certified** complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.

B. Turfgrass Species: As noted on plan documents.

2.2 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.

2.3 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

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. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is 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 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. General: Prepare planting area for soil placement and mix planting soil.

B. Placing Planting Soil: **Blend planting soil in place**.

1. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Apply Pre-emergent herbicide and pre-plant fertilizer per manufacturer’s recommendations.

D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 SODDING

A. Lay sod within 24 hours of harvesting **unless a suitable preservation method is accepted by Architect prior to delivery time**. Do not lay sod if dormant or if ground is frozen or muddy. Remove sod netting from zoysia sod if using large rolls.

B. 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 soil or sod during installation. Tamp and roll lightly to ensure contact with soil, 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. If rolled sod is used, Contractor shall remove all netting prior to installation.

1. Lay sod across 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 two anchors per sod strip to prevent slippage.

C. 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 1-1/2 inches (38 mm) below sod.

D. Once sod has sufficiently rooted so as to prevent damage, roll sodded areas with small one-ton roller or similar to smooth any construction rutting and provide even and smooth maintainable surface.

3.5 TURF MAINTENANCE

A. General: 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 remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation. Upon final completion, the Owner shall take over maintenance of the turf grass.

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 2 inches (100 mm).

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 (25 mm) 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 one-third of grass height. Remove no more than one-third 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 **turf grass** to a height of 2 inches.

3.6 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.7 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.8 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. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. 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.

D. Remove nondegradable 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. Plants.
2. Tree stabilization.

B. Related Requirements:
1. Section 329200 "Turf and Grasses" for turf.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than **diameter and depth recommended by ANSI Z60.1 for type and size of plant required**; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a 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 plant required.

D. Finish Grade: Elevation of finished surface of planting soil.

E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

F. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

G. Planting Area: Areas to be planted.

H. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

I. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

J. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

K. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

L. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 COORDINATION

A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Plant Photographs: Include color photographs in **digital** format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than **20** plants are required, include a minimum of **three** photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

B. Samples for Verification: For each of the following:

1. Trees and Shrubs: **Three** Samples of each variety and size **delivered to site for review**. Maintain approved Samples on-site as a standard for comparison.
2. **Organic** Mulch: **1-quart (1-L)** volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

3. Root Barrier: Width of panel by 12 inches (300 mm).

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of 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.

C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
1. Experience: **Three** years' experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements."
2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

3. Pesticide Applicator: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

D. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety,

cultivar, size, and quality. Landscape Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials 30 (thirty) days in advance of delivery to site.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if 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 materials with appropriate certificates.

C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, 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 plants during shipping and delivery. Do not drop plants during delivery and handling.

D. Handle planting stock by root ball.

E. 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.

F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
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 plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.11 FIELD CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

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 and warranty requirements.

1.12 WARRANTY

A. Special Warranty: 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 health or growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
b. Structural failures including plantings falling or blowing over.
c. Faulty performance of **tree stabilization**, **edgings and tree grates**.

2. Warranty Periods: From date of Substantial Completion.

a. Trees, Shrubs, Vines, and Ornamental Grasses: **12** months.
b. Ground Covers, Biennials, Perennials, and Other Plants: **12** months.
c. Annuals: **Two** months.

3. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 25 percent dead or in an unhealthy condition at time of Substantial Completion and end of warranty period.
c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock,

densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots are unacceptable.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label **at least one** plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.2 FERTILIZERS

A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: **5-gram** tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 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: **Pine needles**.
2. **3 inches (76 mm) minimum.**
3. Color: Natural.

2.4 PESTICIDES

A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as

required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.5 TREE-STABILIZATION MATERIALS

A. Trunk-Stabilization Materials:
   1. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or **turnbuckles**, or **compression springs**.
   2. Proprietary Staking-and-Guying Devices: Proprietary stake or anchor and adjustable tie systems to secure each new planting by plant stem; sized as indicated and according to manufacturer's written recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.

   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. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
   3. Suspend planting 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 or which is dusty.

B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination and replace with new planting soil.

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

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

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.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Lay out plants at locations directed by Landscape Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.3 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil.

B. Placing Planting Soil: **Blend planting soil in place**.

C. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as ball diameter for **balled and burlapped** and **container-grown** stock.
3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
5. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
6. Maintain supervision of excavations during working hours.
7. Keep excavations covered or otherwise protected **when unattended by Installer's personnel**.

B. Backfill Soil: Subsoil and topsoil removed from excavations **may b**e used as backfill soil unless otherwise indicated.

C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.

D. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare **1 inch (50 mm) above** adjacent finish grades for shrubs and vines, and 3-4 inches above adjacent grade for trees.

1. Backfill: Planting soil per soil preparation specfications. **For trees, use excavated soil for backfill.**
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and 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.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.

    a. Quantity: **As indicated on Drawings**.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. **Container-Grown** Stock: Set each plant plumb and in center of planting pit or trench with root flare **1 inch above** adjacent finish grades and 3-4 inches above adjacent grades for trees..

1. Backfill: Planting soil. **For trees, use excavated soil for backfill.**
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.

    a. Quantity: **As indicated on Drawings**.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Do not apply pruning paint to wounds.

3.7 TREE STABILIZATION

A. Trunk Stabilization by Staking and Guying: Install trunk stabilization as follows unless otherwise indicated on Drawings. Stake and guy trees more than 14 feet (4.2 m) in height and more than 3 inches (75 mm) in caliper unless otherwise indicated.

1. Site-Fabricated, Staking-and-Guying Method: Install no fewer than three guys spaced equally around tree.

   a. Securely attach guys to stakes 30 inches (760 mm) long, driven to grade. Adjust spacing to avoid penetrating root balls or root masses. Provide **turnbuckle** or **compression spring** for each guy wire and tighten securely.
   b. Support trees with bands of flexible ties at contact points with tree trunk and reaching to **turnbuckle** or **compression spring**. Allow enough slack to avoid rigid restraint of tree.

2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.8 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines **as indicated on Drawings** in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees **and Treelike Shrubs** in Turf Areas: Apply **organic** mulch ring of **3-inch (75-mm)** average thickness, with **36-inch (900-mm)** radius around trunks or stems. Do not place mulch within **6 inches (150 mm)** of trunks or stems.
2. Organic Mulch in Planting Areas: Apply **3-inch (75-mm)** average thickness of organic mulch **over whole surface of planting area**, and finish level with adjacent finish grades. Do not place mulch within **3 inches (75 mm)** of trunks or stems.

3.10 EDGING INSTALLATION

A. Shovel-Cut Edging: Separate mulched areas from turf areas **curbs and paving** with a 45-degree, 4- to 6-inch- (100- to 150-mm-) deep, shovel-cut edge**.**

3.11 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings until Substantial Completion.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease until Substantial Completion. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.12 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations as necessary until Substantial Completion. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.13 REPAIR AND REPLACEMENT

A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.

B. Remove and replace trees that are more than **25** percent dead or in an unhealthy condition at time of Substantial Completion or **before the end of the corrections period** or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.

1. Provide new trees of same size as those being replaced for each tree.
2. Species of Replacement Trees: **Same species being replaced**

3.14 CLEANING AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

D. After installation and before **Substantial Completion**, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

E. At time of Substantial Completion, verify that irrigation is in good working order. Replace improperly functioning irrigation components.

END OF SECTION 329300

SITE LANDSCAPE MAINTENANCE

PART 1 - Scope of Work

The maintenance contractor shall furnish all labor, materials, tools, equipment, and transportation required to maintain the site and landscaping at St. Andrews in an attractive and healthy condition throughout all the seasons of the year for a period of one year from the date of final acceptance of the entire project. It is the intent of the Owner to achieve the highest quality of landscape for the residents and guests of the site. The maintenance shall include all landscaping, irrigation, and hardscape elements as shown on the landscape, irrigation, hardscape plan documents. The maintenance work described in these specifications shall be performed as a continuous and constant program throughout the term of the contract.

Responsibility

The Contractor shall ensure that all work under this agreement is supervised by contractor-employed supervisory personnel who are technically qualified and possess management skill required to implement modern methods and newly developed horticulture procedures. Supervisory personnel must be able to demonstrate prior experience managing jobs of an equal size and nature.

The contractor shall ensure that all work under this agreement is performed by fully qualified, experienced personnel directly employed by the Contractor. Additionally, the Contractor shall ensure that the Contractor's employees are personally presentable at all times, and that such employees wear an appropriate uniform shirt, acceptable to the Owner's Representative or designee, containing Contractor's identification, when such employees are performing services under this agreement.

The Contractor shall be responsible for the skills, methods, appearance, and action of contractor's employees and for all work done.

The contractor shall perform the work provided for in this agreement under the direction of the Owner or Facility Manager. The Owner or Facility Manager may make inspections at any time and may request that the contractor perform additional work or services to bring the contractor's performance to the level required by this agreement. The contractor shall cooperate with any representative designated by the Owner or Facility Manager to determine the Contractor's conformity with the provisions of this agreement and the adequacy of the work being performed.

The contractor's vehicles shall be identified with the company name, logo and phone number.

The contractor must be able to demonstrate that all requirements for safety of employees and property occupants are in place at time of bid. This includes proper traffic delineation and pesticide use information.

Emergency Numbers

The Contractor shall be readily available by telephone during work hours. In addition, the Contractor shall provide the Owner and Facility Manager with a list of local emergency telephone numbers where he/she can be contacted after normal working hours, on weekends and holidays. This cannot be an an-

swering machine. Emergency calls shall be considered as part of maintenance, and shall not be considered as extra work. Response time, to any site, shall not be more than 60 minutes.

Vandalism or Other Damage

Contractor shall be responsible to report all vandalism or other damage on the site immediately upon recognition of the condition to the Owner.

Contractor's Monthly Maintenance Report

A monthly maintenance report shall be submitted with the monthly billing. The contractor shall provide, as a condition for payment, the following information on their monthly maintenance report:

Any work as addressed by the following schedule of services of this contract.
Current irrigation schedule
Fertilizer applied and information on such
Completed pruning and dates thereof
All spray reports and records that are required for compliance with all laws regulating such chemicals
Report/estimate on debris removal broken down by routine trash and recyclable material
Water usage
Status of additional services requests that have been authorized by the Owner

PART 2 - LANDSCAPE MAINTENANCE PERFORMANCE REQUIREMENTS

The Contractor shall maintain the landscape to the following conditions at all times.

Irrigation System

General—It is the Owner's objective to actively pursue water conservation within the maintenance program. The Contractor can expect the administration of this irrigation specification to be closely monitored. The Contractor will ensure proper irrigation maintenance and timing to provide a healthy growing lawn and plant material. Irrigation systems shall be closely monitored to provide a safe usable site. Watering shall be performed at late night or early morning times to not interrupt the high use times of the site. Watering schedules will need to be coordinated with the Owner for special event schedules.

Water Requirements—The Contractor shall have full responsibility to ensure watering requirements of the landscape are met. Contractor's forces shall be capable of performing repairs, installations and modifications of existing irrigation system to adequately irrigate all landscaped areas on a full-time basis. Adjustments to the irrigation schedule shall be changed as needed during drought or high rainfall conditions or special events.

The Contractor shall ensure that:

1. Sprinkler heads are in good operational order, filters are cleaned regularly, and nozzles are replaced when worn or inadequate coverage occurs. Any minor changes such as riser extensions filter replacements, solenoid replacements, etc. shall be considered included in the contract price and no additional compensation will be allowed. The cost to the repair damage caused to satellite or central controllers or water supply systems due to lighting or other acts of God shall not be covered under the contract price.

2. Drip irrigation lines shall be maintained secured to grade and below pines straw so that the system will not be compromised by residents walking in the beds and the lines will not present as a trip hazard.
3. All electrically operated valves shall close completely at the conclusion of the station watering program. Valves shall be cleaned regularly to ensure proper operation. Valve boxes shall be kept clean of rocks, soil, debris, and silt to a depth of 1" below the bottom of the valve. All valve box lids shall be in place, intact, and secure at all times.
4. Main irrigation lines shall not demonstrate leakage when all control valves are in the closed position. Main line repairs shall be considered included in the contract price and no additional compensation shall be allowed unless damage is obviously caused by external forces such as other utility repair.
5. Automatic controllers and electrical conductors shall be kept operational year round.
6. It shall be the responsibility of the Contractor to make any and all irrigation system repairs within three business days of knowledge of the problem. If repairs cannot be made within the designated time period, the Contractor shall notify the Owner or Facility Manager of the conditions and supply estimated time of when the repairs are to be made. It shall be the responsibility of the contractor to make arrangements to water the area of irrigation system failure by other means until the repairs are accomplished.
7. Seasonal programming of controllers shall be performed by the Contractor according to the watering rate and the clock settings for irrigation scheduling necessary to maintain healthy growing plant material. All controller stations shall be labeled in an easy to read manner inside each controller box.
8. Flushing of systems and cleaning or replacement of all filters within the irrigation system is routine maintenance and will not be considered extra work.
9. Time and length of watering shall be adjusted to the prevailing weather as well as the time of day that has the least amount of wind.
10. All sprinklers shall be adjusted properly to avoid spraying on parked cars, streets, walkways, buildings, signs, pool decking, and other property that may be damaged by water.
11. Plant material exhibiting signs of wilting or rot due to poor water management shall result in withholding of monthly payment until the problem is corrected.
12. All replacement components shall be of the same brand and model as that component being replaced.

Nutrient Care Standards

General—All of the grounds within the site require the addition of complete nutrients to promote good growth, healthy lawns and plant materials. Homogenized fertilizers containing nitrogen, phosphate, potassium and sulfur are usually sufficient. The following minimum Specifications have been prepared to identify what type of plant feeding will occur. Periodic nutrient and pH testing is considered a part of this contract. Results of those tests may dictate varying the schedule of fertilization and nutrient applications. The contractor shall be responsible for effective nutrient applications and proper nutrient conditions regardless of frequency of prior applications. Contractor shall be responsible to correct all plant issues resulting from poor nutrient management.

A-Ground cover areas – three applications per year

1. March-Application of complete fertilizer at a rate appropriate for optimum plant health

2. May and September—Application of slow or controlled release nitrogen at a rate appropriate for optimum plant health

B-Trees and shrubs-two application per year minimum

1. March-Planting tablets of a slow release formulation. The Contractor shall apply Agriform planting tablets or approved equal at a rate appropriate for optimum plant health.

C-After fertilizer is applied, the ground should be watered thoroughly to soak the fertilizer in the ground. For trees and shrubs, the fertilizer should be applied as close as possible to the feeder roots, but away from the trunk to avoid plant injury. Plant material which demonstrates leaf burning or other forms of chemical harm will be given 120 days from notice of damage to recover and demonstrate healthy foliage condition. After the 120 day recovery period, the contractor shall replace any damaged plants at his expense.

D-Lawns-six applications per year minimum at a rate appropriate for optimum plant health for the time of year of application.

E-The contractor shall supply the Owner or Facility Manager with the manufacturer's analysis from the fertilizer container for each formulation of fertilizer used. Owner and Facility Manager shall be notified when fertilizer will be applied for verification of application and notification of residents and guests.

F-Fertilizers shall be complete, furnishing the required percentage of nitrogen, phosphorous, and potash to keep lawns, trees, and shrubs and other plants in a healthy and vigorous growing condition.

Lawn Care Standards

General-Lawns require a regular schedule of care. A consistent green appearance and healthy growing conditions free of weeds, pests, and disease must be maintained. Turf will not exhibit bare spots. Contractor shall be responsible to maintain healthy conditions stated above even if efforts beyond the minimum expectations below are required. Routine maintenance and service shall include as a minimum;

A-Aerification

1. Performed once per year in early July.
2. All sprinklers, quick couplers, valve boxes, etc. shall be flagged prior to aeration. Any damage to such elements due to aeration shall be repaired at contractor's expense.
3. A hollow tine shall be used
4. Holes shall be no more than six inches apart.
5. Tines shall penetrate at least 4" deep.
6. Plugs shall be drug back into the soil profile with a drag mat.

B-Mowing

1. Only sharp, well-balanced blades shall be used.
2. Grass height shall be 1.25"-1.5"
3. Tufts of grass in corners or other hard to reach areas shall be mowed with monofilament line trimmer or hand clipped. Damage to hardscape elements such as light poles or sidewalks will not be tolerated…contractor shall be responsible for the repair of such damage.
4. All excessive mowed clippings shall be removed from the job site the same day.

5. All litter, rocks, and other debris shall be removed from the lawns prior to mowing
6. Contractor shall bee conscious of site users and perform mowing tasks in a safe manner.
7. No more than 1/3 of the leaf blade shall be removed in one mowing so as to prevent scalping.
8. Mowing shall be performed in differing directions at each mow to prevent compaction, undue wear, and windrowing.
9. Mowing shall be even, no scalping or bouncing due to excessive speed of the mower will be tolerated.

C-Edging

1. To be performed every other mowing.
2. Edge lawns against all paved areas, valve boxes, sprinkler heads, and other utilities
3. Special consideration should be given to safety of pedestrians in area while edging

D-Blowing

1. All hardscape surfaces shall be blown free of clippings after every mowing and edging. Surfaces shall be blown free of leaf litter and other debris on an as-needed basis. Any debris shall not be blown into the streets and storm water system. Excess debris shall be removed from the jobsite. Vacuuming or sweeping may be employed instead of blowing.

E-Raking

1. To be performed on an as-needed basis to remove leaves from lawns, artificial lawns, or hardscapes.

F-Tree Wells

1. Tree wells in lawns shall be maintained free of turf and weeds at all times
2. A 4' diameter round well shall be maintained around maturing trees.

G-Spraying and Weeding

1. As needed to present weed-free appearance.
2. Failed spray applications must be followed by reapplication or hand removal of weeds.
3. Lawn diseases and infestations must be identified and controlled in a timely manner. Reapplication of control methods may be required to correct failed or insufficient applications or further control infestations.

H-Irrigation

1. Proper watering of all turf areas is required to ensure a constant healthy growing condition. Over-watering or under-watering, for whatever reason, must be corrected immediately upon notification. In the event of droughts or special events the contractor and Owner and Facility Manager will discuss what will be acceptable levels of irrigation. Heavy, deep, infrequent watering is preferable to light, frequent watering.

I-Pet Damage

1. Pet damage such as urine burn and digging shall be addressed. Urine damage shall be treated to limit turf burn and encourage turf recovery. Holes or bare spots shall be repaired immediately to

preserve an even and uniform lawn. Replacement lawn sod shall be true to type of sod being replaced and free of weeds, and off-types.

J-Artificial Lawns

1. The contractor shall maintain the artificial lawn in accordance to the manufacturer's published maintenance standards for the lawn type at the site.

Ground Cover Standards

General—as with other types of plantings, ground covers respond noticeably to regular maintenance. The Contractor shall ensure that ground cover areas receive weeding, fertilization, trimming behind curbs, and watering. All ground covers shall be kept trimmed or removed away from walkways or interior clusters of shrubs.

A. Contractor shall establish an irrigation schedule to provide an appropriate watering rate.
B. Fertilize as scheduled. Additional fertilization may be needed.
C. Utilize herbicides or mechanical weeding in order to maintain a neat and attractive appearance year round. Pre-emergent herbicides can be used in tree and shrub-basins, planter areas, mulched areas, as well as ground cover areas.
D. Mow or weed-eat Asiatic jasmine areas to maintain uniform, but natural, appearance. This shall occur at least two times per year.
E. Ground cover shall not be allowed to grow into trees, walls, sidewalks, or other park amenities.
F. Mulch beds with pine straw at least twice per year as needed to keep a neat and weed and litter free bed.
G. Damaged plant material exhibiting poor health, due to the contractor's maintenance practices, work performance or non-performance of services shall be replaced at Contractor's expense. Replacement standards shall be new container plants and shall be equal in size to the remaining growth in the ground or the surrounding existing mature size in the adjacent landscape area.

Tree and Shrub Standards

General—Contractor shall maintain grounds in a healthy, well-shaped growing environment. Listed are additional maintenance services that the contractor shall be required to perform and shall be included in the base bid.

A. Shrubs and Annuals
    1. Prune any growth that is abnormal above the shrub.
    2. All pruning and trimming cuts must be made clean.
    3. Remove all trimmings from the job site the same day.
    4. All pruning shall be done to maintain the shrub in its natural form. No geometrical shaping of plants will be tolerated.
    5. Mulch beds with pine straw at least twice per year as needed to keep a neat and weed and litter free bed. Mulch shall be maintained at approximately 3" depth and be located so as to not cause rotting around tree and shrub crowns.
    6. Damaged plant material exhibiting poor health, due to the contractor's maintenance practices, work performance or non-performance of services shall be replaced at Contractor's expense.

Replacement standards shall be new container plants and shall be equal in size to the remaining growth in the ground or the surrounding existing mature size in the adjacent landscape area.

B. Trees

1. ISA pruning standards shall be used. Trees shall be pruned by properly selecting and developing permanent scaffold branches that are smaller in diameter than the trunk or branch on which they are growing. Branches shall be properly spaced to illustrate the true, natural form of the tree. Eliminate branches that are overlaying other branches, diseased or damaged growth, narrow V-shaped branches that are weak and may eventually be sources for disease to collect water, break, or rot. Thin out crowns of trees that become too heavy, which are susceptible to wind and storm damage. Prune to maintain natural appearance and proper space limitation. Avoid over-pruning that will stimulate sucker growth. Thinning cuts are preferred. Heading of crepe myrtles is not allowed.

   Broad leaf evergreen trees may be pruned and thinned throughout the year while deciduous trees shall be pruned only during months of November through February, unless for vandalism, wind damage, breakage, or disease. Prune and shape all trees to avoid future problems of height, spread, proximity to buildings, or wind damage and so that the natural appearance will be retained.

   All cuts shall be made with a clean, even cut near the nearest bud or other branch. Any and all improper cuts will be redone to the satisfaction of the Owner. On large limbs, initial cuts shall be made outwards from the final cut to avoid excessive weight and bark tearing. All final cuts must have a clean, even finish.

   All trees shall be inspected by the contractor periodically (especially after every hard wind and or rains storm) to determine if any damage has been done to trunks by mowing machines, wind, etc. Repair all damaged areas immediately to minimize damage to the bark, trunk, and scaffold. All broken branches shall be properly pruned immediately. All trees leaning due to wind, rain, etc. shall be straightened and guyed as approved, if necessary. Repair of excessive damage due to severe storms such as hurricanes will not be considered part of the base bid scope of work.

   Trim any suckers and water shoots. Remove all trimmings from the job site the same day.

   Street trees shall have their canopies maintained at a height no less than seven feet above the pathways or sidwalks. As trees mature, Contractor shall limb up trees so that they mature to the condition noted above.

   Damaged plant material exhibiting poor health, due to the contractor's maintenance practices, work performance or non-performance of services shall be replaced at Contractor's expense. Replacement standards shall be new tree and shall be equal in size to the remaining growth on site of similar species or the surrounding existing mature size in the adjacent landscape area.

C. Staking

All tree stakes and additional supports shall be inspected and maintained, and especially after wind and/or rainstorms to prevent girdling of trunks or branches, and to prevent rubbing that causes bark wounds. Stakes shall be maintained in-line, vertically and in good repair. All ties shall be checked on a routine basis, and all worn and broken ties shall be replaced. The replacement of ties and stakes for trees or large shrubs shall be considered as part of the required maintenance to be performed by the Contractor and will not be considered extra work.

The Contractor may remove staking that is no longer needed by the trees with sufficient trunk taper, upon the Owner or Facility Manager's approval.

Disease, Noxious Weeds, and Pest infestations

General—The Contractor shall act as, or coordinate with, a license specialist to identify pest management problems which may arise in the district. There must be licensed pest control advisor on staff and all required pest control recommendations shall be provided by this advisor. All pesticide applications shall be performed by a State Certified Applicator.

The Contractor shall be familiar with various Integrated Pest Management programs. The Contractor will be required to develop an IPM plan to effectively eradicate any diseases or pests that develop during the duration of this contract. The development and execution of the IPM program shall be the responsibility of the Contractor and will not be considered extra work. It is the contractor's responsibility to monitor all pest/disease problems and perform corrective measures as required to maintain a pest-free, weed-free , and disease-free landscape.

The Owner or Facility Manager will require all labels, licenses, and certificates, categories, permits and recommendations before chemicals are applied. An IPM plan developed by the contractor shall be approved by the Owner and Facility Manager before implementation.

A. Some approved noxious weed, disease, and pest control methods may include:
    a. Pre-emergent herbicide applications
    b. Post-emergent herbicide applications
    c. Mechanical cultivation and disposal
    d. Weed-eating or mowing
    e. Chemical growth regulator
    f. Debris or food source removal
    g. Water Jetting
    h. Insecticide, fungicide, or other pesticide applications
    i. Repeated control methods as necessary
B. The Contractor shall provide the Owner a monthly record of all pesticides used on the site. A copy of the same report shall be included with the Contractor's monthly billing to the city.
C. Pest Control Advisor recommendations will be required. A copy of these recommendations shall be made available to the Owner for approval prior to any work.
D. The Contractor shall comply with all Federal, State, and local laws and regulations governing the use of chemicals for control of weeds, diseases, and pests. The Contractor shall permit spraying for insect, disease, rodent or weed control to be done only by qualified, trained personnel under the supervision of a State licensed pest control operator, using recognized and approved materials and methods in compliance with all Federal, State, and local laws and regulations. All spraying

shall be done with extreme care so as to avoid any hazard to any person or pet in the immediate areas or any property damage.

E. Proper notification of all applications shall be posted on site so residents and guest are aware of the chemical application.
F. Insecticides, fungicides, herbicides, rodenticides, etc. shall be of the best quality obtainable, properly labeled with the guarantee analysis, and brought to each job site in the manufacturer's original container.

General Facilities Maintenance

Policing

A. All areas shall be kept free of litter. This will require a thorough policing of the site. Any rubbish or debris shall be disposed of by the Contractor.
B. Sidewalks, pathways, and hard surfaces, including railings, shall be policed often. They shall be cleaned thoroughly once a week, by sweeping, backpack blowing, or hosing off. All plant growth shall be prevented in any cracks, in curbs, gutters, in pavers, or along paved areas. Grass clippings shall be removed after each mowing operation. The Contractor shall clean all areas thoroughly as to prevent the accumulation of avian droppings.
C. Drainage-Contractor shall inspect regularly for proper operation. All debris such as dirt, pine straw, leaves, etc. shall be cleaned regularly from inlets to allow water to enter inlets freely. Any blockage of drain lines shall be cleared immediately.
D. Fence Lines-Fence lines shall be kept free of trash, weeds, grass and prunings. Contractor shall properly dispose of all debris. Chemicals for weed control may be used of required.
E. Graffitii/Vandalism/Damage-The contractor shall report graffiti, vandalism, and damage immediately to the Owner and Facility Manager.

SCHEDULE OF SITE MAINTENANCE SERVICES

The following represents a typical monthly Schedule of site maintenance services. The following schedule is only a guide. The contractor may need to adjust the schedule and services as necessary as conditions dictate to maintain the highest quality landscape in the healthiest condition as described above. The Owner or Facility Manager may change requirements as based upon seasonal or other considerations.

January
Check drains for debris blockage and clear as needed.
Remove silt and mulch that has washed across sidewalks and other hardscape features.
Continue dormant pruning of shrubs and trees.
Continue maintenance care per Specifications.
Perform pH and nutrient adjustments/supplements in all areas.
Continue to check and treat for fungus problems in turfgrass.
Mulch landscape beds.

February
Continue maintenance care per Specifications.
Finish dormant pruning of shrubs and trees.
Continue to check and treat for fungus problems in turfgrass.
Perform spring pre-emergent weed control in all turf and beds.

Perform spring fertilizer application in turfgrass.

March
Begin irrigation coverage checks.
Continue maintenance care per Specifications.
Check drains for debris blockage and clear as needed.
Step up frequency of lawn mowing and edging (edge over other mowing).
Continue grass and weed control.
Complete replanting of damaged plant material.
Fertilize all trees.
Continue to check and treat for fungus problems in turfgrass.
Apply insect control for mole crickets, fire ants, etc.

April
Finish application of fertilizer in shrub and groundcover areas
Rebuild basins around young trees
Prune vegetation for line of site obstruction at street intersections
Check for infestations of pests and treat as needed.
Continue grass and weed control in non-turf areas
Continue maintenance care per Specifications
Remove stakes and ties from maturing trees where they are no longer needed. At no time can ties be left to restrict tree growth
Establish spring watering schedule
Finish irrigation coverage checks and repairs.
Continue to check and treat for fungus problems in turfgrass.

May
Fertilize lawns.
Fertilize shrubs and groundcover areas.
Trim and replant ground cover as needed.
Spray for post-emergent weeds.
Continue maintenance care per Specifications.
Clear grass away from sprinkler heads in lawn areas where obstructed.

June
Clean and adjust and repair as needed all irrigation on regular basis throughout growing season.
Establish summer watering program.
Continue Maintenance care per Specifications.
Fertilize turf areas.
Perform nutrient and pH testing.

July
Continue fertilization of lawn areas as specified.
Continue maintenance care per Specifications.
Trim ground covers away from fences, trees, buildings, etc.
Adjust irrigation as needed.
Check young trees for proper deep watering, adjust irrigation as needed.
Perform nutrient adjustments as necessary.
Mulch landscape beds.

August

Continue maintenance care per Specifications.
Cut out all spent blossoms on shrubs.
Evaluate and adjust nutrient and pest control programs.
Edge/prune vegetation along street frontages, sidewalks, etc.
Adjust irrigation as needed.
Prune vegetation for line of sight obstruction at street intersections.

September
Adjust tree staking as needed.
Prune vegetation for line of sight obstruction at street intersections.
Continue maintenance care per Specifications.
Begin fall pre-emergent weed control.
Trim suckers off trees.
Fertilize shrubs and groundcover areas.

October
Complete fall pre-emergent weed control.
Begin fall watering schedule.
Apply post emergent control of broadleaf weeds.
Apply fall application of fertilizer to lawns.
Ensure all shrubs and groundcovers are trimmed to maintain desired shape throughout winter.
Check drains etc. to be sure they are clear of all debris.
Edge vegetation along street frontage, sidewalks, etc.

November
Start pruning deciduous trees, shrubs, etc.
Establish winter watering program
Check all job sites for damages after storms
Continue maintenance care per Specifications

December
Continue dormant spraying and pruning as needed
Continue maintenance care per Specifications
Check lawns for fungus, apply fungicide as needed.
Perform nutrient and pH testing in all areas.

INSPECTIONS

A. Inspections
    1. Owner will conduct quarterly inspections with the landscape architect and contractor to review the maintenance of the landscape.
    2. Contractor shall immediately address any deficiencies identified during the inspections.
    3. The purpose of the inspections shall be to evaluate the effectiveness, adequacy and acceptability of the contractor's performance in maintaining the site in accordance with the provisions of this specification. The landscape architect and owner may, during his inspections, identify and communicate to the contractor, areas of unsatisfactory work or of inadequate performance by the contractor. The contractor shall correct such identified unsatisfactory work or inadequate performance within seventy-two hours and shall submit a written report reflecting such correction. Re-inspection at completion of rework is mandatory. The Owner

has the exclusive right to make the decision as to whether or not the contractor's maintenance meets the standards of the Owner.

END OF SECTION 329400

SECTION 03200 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Bar supports.

B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of the Architect.

1.3 INFORMATIONAL SUBMITTALS

A. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:

a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420) [**Grade 100** **(Grade 690)**], deformed.

B. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

2.2 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

B. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch (1.2908 mm) in diameter.

2.3 FABRICATING REINFORCEMENT

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch (25 mm), not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318 (ACI 318M).

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 48 bar diameters at splices, or 24 inches (610 mm), whichever is greater.
2. Stagger splices in accordance with ACI 318 (ACI 318M).

G. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches (305 mm).

2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches (50 mm) for plain wire and 8 inches (200 mm) for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement.
2. Continue reinforcement across construction joints unless otherwise indicated.
3. Do not continue reinforcement through sides of strip placements of floors and slabs.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117 (ACI 117M).

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel-reinforcement placement.
2. Steel-reinforcement mechanical splice couplers.
3. Steel-reinforcement welding.

END OF SECTION 03200

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:
1. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Aggregates.
6. Admixtures:

a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

7. Vapor retarders.
8. Liquid floor treatments.
9. Curing materials.
10. Joint fillers.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.

5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

    a. Location of construction joints is subject to approval of the Architect.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Vapor retarders.
5. Joint-filler strips.

B. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Aggregates.
6. Admixtures:

C. Research Reports: For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.

D. Preconstruction Test Reports: For each mix design.

E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.

1. Include the following information in each test report:

a. Admixture dosage rates.
b. Slump.
c. Air content.
d. Seven-day compressive strength.
e. 28-day compressive strength.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 306.1.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M).

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I or Type II
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C33/C33M, Class 1N Insert class coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

    a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
    b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
    c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. (2.37 kg/cu. m) for moderately reactive aggregate or 3 lb./cu. yd. (1.78 kg/cu. m) for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301 (ACI 301M).

2. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C260/C260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

E. Water and Water Used to Make Ice: ASTM C94/C94M, potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 10 mils (0.25 mm) thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.4 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

    a. Ambient Temperature Below 50 deg F (10 deg C): Black.
    b. Ambient Temperature between 50 deg F (10 deg C) and 85 deg F (29 deg C): Any color.
    c. Ambient Temperature Above 85 deg F (29 deg C): White.

C. Curing Paper: Eight-feet- (2438-mm-) wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.

D. Water: Potable or complying with ASTM C1602/C1602M.

E. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

F. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Floor Slab Protective Covering: Eight-feet- (2438-mm-) wide cellulose fabric.

2.7 CONCRETE MIXTURES, GENERAL

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, in accordance with ACI 301 (ACI 301M).

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Total of Fly Ash or Other Pozzolans, Slag Cement: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass.

C. Admixtures: Use admixtures in accordance with 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 with a w/cm below 0.50.

2.8 CONCRETE MIXTURES

A. Normal-weight concrete used for footings, slabs, and tie beams.

1. Exposure Class: ACI 318 (ACI 318M) F1 W1 C1.
2. Minimum Compressive Strength: As indicated at 28 days.
3. Air Content:

    a. Exposure Class F1: 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch (38-mm) nominal maximum aggregate size.

4. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 Insert number percent by weight of cement.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M[**and ASTM C1116/C1116M**], and furnish batch ticket information.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 INSTALLATION OF 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.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.2 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.

3. Lap vapor retarder over footings and grade beams not less than 6 inches (150 mm), sealing vapor retarder to concrete.
4. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.

    a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches (150 mm) on all sides, and sealing to vapor retarder.

3.3 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.

    a. Continue reinforcement across construction joints unless otherwise indicated.
    b. Do not continue reinforcement through sides of strip placements of floors and slabs.

3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: 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.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.

2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M), but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301 (ACI 301M).

a. Do not use vibrators to transport concrete inside forms.
b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer.
c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.5 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 (ACI 301M) Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

    a. Patch voids larger than 1-1/2 inches (38 mm) wide or 1/2 inch (13 mm) deep.
    b. Remove projections larger than 1 inch (25 mm).
    c. Tie holes do not require patching.
    d. Surface Tolerance: ACI 117 (ACI 117M) Class D.
    e. Apply to concrete surfaces not exposed to public view.

B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.6 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 (ACI A117M) tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish

C. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.

3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view.
7. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch (3 mm) and also no more than 1/16 inch (1.6 mm) in 2 feet (610 mm).

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish to concrete stair treads, platforms, ramps as indicated on Drawings

1. Apply in accordance with manufacturer's written instructions and as follows:

a. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate over surface in one or two applications.
b. Tamp aggregate flush with surface, but do not force below surface.
c. After broadcasting and tamping, apply float finish.
d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.7 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 6 inches (150 mm) high unless otherwise indicated on Drawings, and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.

4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.

    a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    b. Cast anchor-bolt insert into bases.
    c. Install anchor bolts to elevations required for proper attachment to supported equipment.

C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Screed, tamp, and trowel finish concrete surfaces.

3.8 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 (ACI 301M) and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h (1 kg/sq. m x h), calculated in accordance with ACI 305.1, before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:

    a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
    d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
    e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

        1) Recoat areas subject to heavy rainfall within three hours after initial application.
        2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:

a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12-inches (300-mm).
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

c. Floors to Receive Polished Finish: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

d. Floors to Receive Chemical Stain:

1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
3) Butt sides of curing paper tight; do not overlap sides of curing paper.
4) Leave curing paper in place for duration of curing period, but not less than 28 days.

e. Floors to Receive Urethane Flooring:

1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
2) Rewet absorptive cover, and cover immediately with polyethylene moisture-retaining cover with edges lapped 6 inches (150 mm) and sealed in place.
3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.

f. Floors to Receive Curing Compound:

1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Maintain continuity of coating, and repair damage during curing period.
4) 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 does not interfere with bonding of floor covering used on Project.

g. Floors to Receive Curing and Sealing Compound:

1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.9 TOLERANCES

A. Conform to ACI 117 (ACI 117M).

3.10 APPLICATION OF LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 28 days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
4. Rinse with water; remove excess material until surface is dry.
5. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

3.11 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

1) Project name.
2) Name of testing agency.
3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
4) Name of concrete manufacturer.
5) Date and time of inspection, sampling, and field testing.
6) Date and time of concrete placement.
7) Location in Work of concrete represented by samples.
8) Date and time sample was obtained.
9) Truck and batch ticket numbers.
10) Design compressive strength at 28 days.
11) Concrete mixture designation, proportions, and materials.
12) Field test results.
13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:

    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.

3. Slump Flow: ASTM C1611/C1611M:

    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete;.

    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M:

    a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.

6. Compression Test Specimens: ASTM C31/C31M:

    a. Cast and laboratory cure two sets of three 6-inch (150 mm) by 12-inch (300 mm) or 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C39/C39M.

    a. Test one set of three laboratory-cured specimens at seven days and one set of two specimens at 28 days.
    b. Test one set of three field-cured specimens at seven days and one set of two specimens at 28 days.
    c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa) if specified compressive strength is 5000 psi (34.5 MPa), or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi (34.5 MPa).
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests:

    a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

        1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 (ACI 301M), section 1.6.6.3.

12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.12 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 03300

SECTION 04200 – UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

A. Provide unit masonry for walls and partitions:
   1. Exterior face brick at concrete masonry cavity walls.
   2. Re-use of salvaged brick from selective demolition.
   3. Exterior concrete masonry bearing walls.
   4. Interior concrete masonry bearing and non-bearing partitions.
   5. Glass block units

1.02 SUBMITTALS

A. Submit for approval samples, product data, and test reports.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Field Constructed Mock-Ups: Prior to installation of masonry work, erect sample wall panels to further verify selections made for color and textural characteristics, under sample submittals of masonry units and mortar, and to represent completed masonry work for qualities of appearance, materials and construction. Two sample panels are to be built, approximately 4' x 4' showing full range of brick for consideration.

1.04 PROJECT CONDITIONS:

A. Protection of Work: During erection, cover top of walls with waterproof sheeting at end of each day's work.

B. Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry.

C. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

D. Protect sills, ledges and projections from droppings of mortar.

E. Cold Weather Protection:

   1. Do not lay masonry units which are wet or frozen.
   2. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.
   3. Remove masonry damaged by freezing conditions.
   4. For clay masonry units with initial rates of absorption (suction) which require them to be wetted before laying, comply with the BIA recommendations for laying masonry.

F. Perform the following construction procedures while masonry work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout.
For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and

grout materials, maintain mixing temperature selected within 10 deg.F (6 deg.C).

1. 40 deg.F (4 deg.C) to 32 deg.F (0 deg.C):
   Mortar: Heat mixing water to produce mortar temperature between 40 deg.F (4 deg.C) and 120 deg.F (49 deg.C).
   Grout: Follow normal masonry procedures.
2. Do not lay brick or masonry when temperatures drop below 32 deg. F.

G. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry, temperature ranges apply to anticipated minimum night temperatures.

1. 40 deg.F (4 deg.C) to 32 deg.F (0 deg.C):
   Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Brick: Standard modular, 2-1/4" by 3-5/8" by 7-5/8". Comply with ASTM C 216, Grade SW, Type FBS. Special shapes as indicated or as required by building configuration. Brick shall match existing where applicable.

Standard modular, nominal **2-1/4" by 3-5/8" by 7-5/8**".
Acceptable manufacturers:
To be determined.

B. Concrete masonry units: Lightweight, ASTM C 140 and C 90 Type II, Grade N; 7-5/8" by 15-5/8" face size. Special shapes as indicated or as required. Provide units with minimum average net-area compressive strength of 2000 psi. Provide bullnose units at jambs and sills of all openings, and at all outside corners and end wall terminations, unless otherwise indicated.

C. Glass Block units: Provide solid glass block units as manufactured by Owens Corning: **Vistabrik**, Solid Glass Block: 3" thick; 4" x 8" size, solid glass block units, clear visibility. Install per written instructions with white mortar.

D. Wall flashing: **40 mil** minimum; self-sealing, self-healing, fully adhering composite flexible flashing consisting of **32** mil thick pliable and highly adhesive rubberized asphalt compound bonded completely to **8** mil thick, high density, four ply, cross laminated polyethylene film. Manufacturer producing a product that conforms to this specification is W.R. Grace 'Perm-A-Barrier'.

E. Matching Mortar: Testing of existing mortar to provide formula and color for matching mortar for the existing historic building.

F. Mortar: ASTM C 270, masonry cement mortar, Type M or S. Inorganic oxide mortar pigments.
Mortar at brick shall be
Mortar Color: **Argos: "Beige" or approved equal.**
Grout for unit masonry: Comply with ASTM C 476.

F. Reinforcing:
1. Ties and reinforcing: Hot-dipped galvanized, ASTM A 153.
2. Horizontal reinforcing: Welded ladder type, 9 gage wire with deformed side rods.
3. Brick to block ties: 3/16" diameter adjustable double hook & eye; Hohmann & Barnard Lox-All Adjustable Eye-Wire (eye and pintle) or approved equal.

4. Brick to steel stud ties: 3/16" diameter vee ties with drip, 12 gage wall slot; Hohmann & Barnard DW-10HS or approved equal.
5. Reinforcing bars: Deformed bars, ASTM A 615, Grade 60; in accordance with drawings.

H. Miscellaneous Materials:
1. Cavity Drainage Material: 2-inch thick, high density polyethylene, 90% open mesh, dovetail shaped to maintain unobstructed drainage at weep holes; Mortar Net Green or approved equal.
2. Weep Holes: “Weeps Vents” by Mortar Net USA Ltd. Install 4” to 6” above finish grade.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with PCA "Recommended Practices for Laying Concrete Block" and BIA Tech Notes 11, 11A, 11B, 11C, 11D, and 11E.

B. Weather Protection: Cold weather; heat mortar water and sand, enclose walls and provide temporary heat as recommended by BIA Tech Notes 1, 1A, 1B, and 1C. Hot weather; use mortar within 1-1/2" hours after mixing for ambient 80 degrees F or above.

C. Tolerances: From dimensions and locations in Contract Documents for plumb, level and alignment, plus or minus 1/8 in 20'.

D. Fire-Rating: Where indicated, provide assemblies identical to tested assemblies and accepted by authorities having jurisdiction.

E. Bond: Lay exposed face brick in running bond except in areas of special coursing as indicated on Drawings.

F. Joints: Maintain uniform 3/8" width; tool concave. Provide full bed, head and collar joints except at weep holes; keep cavity clean at cavity walls.

G. Weep holes: Provide weeps at 16” o.c. above all ledges, flashings and lintels. Fill cavity 10" high with cavity drainage material.

H. Install steel lintels and provide reinforced masonry lintels where indicated.

I. Coordinate installation of flashings; prepare masonry surfaces smooth and bed flashings in mortar. Comply with manufacturer's instructions for asphaltic membrane flashings.

J. Coordinate installation of embedded brick ties with insulated concrete forms supplied under Section 03130.

K. Ties and Horizontal Reinforcing: Comply with codes; space ties not more than 16" o.c. vertically and horizontally.

L. Provide L and T sections of reinforcing at corners and intersections. Lap reinforcing a minimum of 6". Reinforce masonry openings greater than 1'-0" wide with horizontal reinforcements place in 2 horizontal joints approximately 8" apart immediately above the lintel and below the sill. Extend the reinforcement a minimum of 2'-0" beyond jambs of the openings.

M. Remove and replace damaged units. Enlarge holes in mortar and re-point. Prepare joints to receive sealants. Clean brick using bucket and brush method; comply with BIA Tech Note 20. Clean Concrete masonry by dry brushing; comply with NCMA TEK No. 28.

3.02 CONSTRUCTION TOLERANCES:

A. Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/2" in 40' or more. For vertical alignment of head joints do not exceed plus or minus 1/4" in 10', 1/2" maximum.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.

C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.

D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".

E. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

3.03 LAYING MASONRY WALLS:

A. **Appearance:** Lay brick so that not less than a ½ brick (3 1/2") is laid at all areas including end walls, window openings, lintels and headers. Do not cut header bricks so the height is less than a full brick (2 1/4").

B. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and wherever possible at other locations.

C. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.

D. Pattern Bond: Lay exposed masonry in running bond with vertical joint in each course centered on units in courses above and below. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2". Bond and interlock each course of each wythe at corners. Do not use units with less that nominal 4" horizontal face dimensions at corners or jambs.

E. Stopping and Resuming Work: Rack back 1/2-unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.

F. Fill cores in hollow concrete masonry units with grout 3 courses (24") under bearing plates, beams, lintels, posts and similar items, unless otherwise indicated.

3.04 MORTAR BEDDING AND JOINTING:

A. Lay solid brick size masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

B. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters,

and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

C. Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.

D. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.

E. Tool exposed joints slightly concave using a jointer larger than joint thickness.

F. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

3.05 FLASHING OF MASONRY WORK:

A. General: Provide concealed flashing in masonry work at, or above, angles, ledges and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar.

3.06 REINFORCED UNIT MASONRY

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 that of other loads that may be placed on them during construction.

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

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

3.07 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: Special inspections according to Level **C** in TMS 402/ACI 530/ASCE 5. Level 1 Special Inspections according to IBC Table 1704.5.1

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. (464 sq. m) of wall area or portion thereof.

E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C67 for compressive strength.

F. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.

G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

H. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for **mortar air content and compressive strength**.

I. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

3.08 REPAIR, POINTING AND CLEANING:

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings and adjacent work to provide a neat, uniform appearance, and prepare for application of sealants.

C. Final Cleaning: After mortar is thoroughly set and cured, clean masonry as follows:

Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.

Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

Use bucket and brush hand cleaning method described in BIA"Technical Note No. 20 Revised" to clean brick masonry made from clay or shale, except use detergent masonry cleaner
Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins.

D. Protection: Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion.

END OF SECTION 04200

SECTION 05120 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Shrinkage-resistant grout.

B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
2. Section 053100 "Steel Decking" for field installation of shear stud connectors through deck.

1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Shear stud connectors.
4. Anchor rods.
5. Threaded rods.
6. Forged-steel hardware.
7. Shop primer.
8. Galvanized-steel primer.
9. Etching cleaner.
10. Galvanized repair paint.
11. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Mill test reports for structural-steel materials, including chemical and physical properties.

C. Source quality-control reports.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).

B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE or Category CSE.

C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A992/A992M.

B. Plate and Bar: ASTM A36/A36M.

C. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade B ASTM A500/A500M, Grade C structural tubing.

D. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS AND CONNECTORS

A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325 (Grade A325M), Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH (ASTM A563M, Class 10S), heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

2.3 RODS

A. Headed Anchor Rods: ASTM F1554, Grade 36, straight.

1. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.

2.4 PRIMER

A. Steel Primer:

1. Comply with Section 099600 "High-Performance Coatings."

2.5 SHRINKAGE-RESISTANT GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength 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.

2.8 GALVANIZING

2.9 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 (50 mm).
2. Surfaces to be field welded.

B. Surface Preparation of Steel: in accordance with 09660, High Performance Coatings

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.

1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
2. Bolted Connections: Inspect shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M. Shop splices of members and full penetration welds shall be 100% inspected using the following inspection procedures, at testing agency's option:

    a. Liquid Penetrant Inspection: ASTM E165/E165M.
    b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
    c. Ultrasonic Inspection: ASTM E164.
    d. Radiographic Inspection: ASTM E94/E94M.

4. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments 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 in accordance with ANSI/AISC 303 and ANSI/AISC 360.

B. Baseplates Bearing 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 shrinkage-resistant 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 grouting.

C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

3.3 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type 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 ANSI/AISC 303 and ANSI/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. Special Inspections: Owner will engage a special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Bolted Connections: Inspect bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.

END OF SECTION 05120

SECTION 05213 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

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. Architecturally exposed structural steel (AESS).
2. Section 051200 "Structural Steel Framing" requirements that also apply to AESS.

1.3 DEFINITIONS

A. AESS: Architecturally exposed structural steel.

1.4 PREINSTALLATION MEETINGS

1.5 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS.

1. Identify AESS category for each steel member and connection, including transitions between AESS categories and between AESS and non-AESS.

B. Samples: Submit Samples to set quality standards for AESS.

1. Two steel plates, 3/8 by 8 by 4 inches (9.5 by 200 by 100 mm), with long edges joined by a groove weld and with weld ground smooth.
2. Steel plate, 3/8 by 8 by 8 inches (9.5 by 200 by 200 mm), with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches (100 by 150 by 9.5 mm), welded to plate with a continuous fillet weld and with weld ground smooth and blended.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172) and is experienced in fabricating AESS similar to that indicated on this Project.

B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program, is designated an AISC-Certified Erector, Category ACSE or Category CSE, and is experienced in erecting AESS similar to that indicated on this Project.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P3 or SSPC-QP 3.
   1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Use special care in handling AESS to prevent twisting, warping, nicking, and other damage during fabrication, delivery, and erection. Store materials to permit easy access for inspection and identification. Keep AESS members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect AESS members and packaged materials from corrosion and deterioration.

   1. Do not store AESS materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8 FIELD CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with requirements of ANSI/AISC 303, Sections 1 through 9 and as modified in Section 10, "Architecturally Exposed Structural Steel."

2.2 FILLER

A. Polyester filler intended for use in repairing dents in automobile bodies.

2.3 PRIMER

A. Steel Primer:

   1. Comply with Section 09960 "High-Performance Coatings."

2.4 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

1. Use special care handling and fabricating AESS before and after shop painting to minimize damage to shop finish.

B. Category AESS 1:

1. Comply with overall profile dimensions of AWS D1.1/D1.1M for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
4. Make intermittent welds appear continuous, using filler or additional welding.
5. Seal weld open ends of hollow structural sections with 3/8-inch (9.5-mm) closure plates.
6. Limit butt and plug weld projections to 1/16 inch (1.6 mm).
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.
11. Remove backing and runoff tabs, and grind welds smooth.

C. Category AESS 2: In addition to requirements for Category AESS 1, comply with the following:

1. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
2. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
3. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1/D1.1M.
4. Conceal fabrication and erection markings from view in the completed structure.
5. Make welds uniform and smooth.

D. Category AESS 3: In addition to requirements for Category AESS 1 and AESS 2, comply with the following:

1. Cut out mill marks from mill material or hide these markings from view in the completed structure. Where neither method is possible, remove mill marks by grinding and filling surfaces as approved by Architect.
2. Grind butt and plug welds smooth or fill, removing weld splatter exposed to view.
3. Orient HSS seams as indicated or away from view.
4. Align and match abutting member cross sections.

5. At visible open joints of copes, miters, and cuts, maintain uniform clear gaps of 1/8 inch (3.2 mm). At closed joints, maintain uniform contact within 1/16 inch (1.6 mm).
6. Fabricate with exposed surfaces smooth, square, and of surface quality approved by Architect.

E. Category AESS 4: In addition to requirements for Category AESS 1, AESS 2, and AESS 3, comply with the following:

1. Treat HSS seams to appear seamless.
2. Contour and blend welds and weld transitions between members, removing splatter exposed to view.
3. Fill surface imperfections with filler and sand smooth to achieve surface quality approved by Architect.
4. Minimize weld show-through and distortion on the opposite side of exposed connections by grinding to a smooth profile aligned with adjacent material.

F. All exposed steel shall be considered AESS 4.

G. Shop prime steel surfaces, according to 09960 HIGH PERFORANCE COATINGS

H. Surface Preparation: Prepare surfaces according to 09960 HIGH PERFORMANCE COATINGS

I. EXECUTION

2.5 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.

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

2.6 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

2.7 ERECTION

A. Take special care during erection to avoid marking or distorting the AESS and to minimize damage to shop painting. Set AESS accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.

1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Take care to avoid any blemishes, holes, or unsightly surfaces resulting from the use or removal of temporary elements.
2. Grind tack welds smooth.
3. Remove backing and runoff tabs, and grind welds smooth.
4. Orient bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
5. Remove erection bolts in AESS, fill holes with weld metal or filler, and grind or sand smooth to achieve surface quality approved by Architect.
6. Fill weld access holes in AESS with weld metal or filler and grind, or sand smooth to achieve surface quality as approved by Architect.
7. Conceal fabrication and erection markings from view in the completed structure.

2.8 REPAIR

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and touchup galvanizing to comply with ASTM A780/A780M.

2.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to inspect AESS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.

B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

END OF SECTION 05213

SECTION 05310 - STEEL DECK

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish all materials, equipment and labor for installation of metal decking, accessories and miscellaneous items that may be required, as specified herein or indicated on drawings. This Section includes the following:
   1. Acoustical roof deck.

1.02 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.
B. Shop Drawings: Include layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.
C. Product certificates.
D. Welding certificates.
E. Research/evaluation reports.

1.03 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
B. AISI Specifications: Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members.
C. All installation of steel decking shall be checked by Architect's representative.
D. Conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
E. Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a location and manner to keep mud, oil, and rust from contaminating product.
B. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Decking shall be galvanized to comply with ASTM A525.

B. 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:
   1. **New Millennium,** 1992 NW Bascom Norris Dr., Lake City FL 334-224-2051
   2. **Epic Metals,** 11 Talbot Ave, Rankin, PA 15104, 877-696-3742
   3. **Vulcraft/Nucor,** 7205 Gault Ave, North, Ft. Payne, AL, 256-845-2460

2.02 ROOF DECK

A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 29.

B. Materials:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 40 or 50, G90 zinc coating.

C. Deck:

1. New Millenium - Versa-Dek® 3.5LS
2. EPIC Toris 4
3. Nucor-Vulcraft Verco 3.5D-24 Roof Deck

D. Profile Depth: Dovetail
E. Span Conditions: Provide double span minimum
F. Finish: Manufacturer’s highest rated corrosion protection system

2.03 ACCESSORIES

A. Accessories: Steel deck manufacturer's standard accessory materials, including mechanical fasteners, closure strips, pour stops, and closures for deck.

B. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

C. Galvanizing Repair Paint: ASTM A 780.

D. Repair Paint: Manufacturer’s standard

PART 3 - EXECUTION

3.01 EXAMINATION

A. Visually determine that Project is ready to begin the work of this Section; beginning of work indicates acceptance of conditions. Notify Architect in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Architect.

3.02 INSTALLATION

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 29, manufacturer's written instructions, and requirements in this Section.
B. The steel deck shall be placed in accordance with erection drawings. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks. The unit shall be brought to proper bearing on the supporting members.

C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to decking.
E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.
F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
    1. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
G. Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.
H. Repairs and Protection:
    1. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

I. Fasten deck to all supports and edge angles with fasteners and pattern indicated on structural drawings. Verify pattern with metal building drawings. Where different, use the more-strict requirement.

3.03 ADJUSTING

A. Adjust members as necessary to be compatible with final product. Notify Architect before substantially altering any member.

3.04 FIELD QUALITY CONTROL

A. Field welds will be subject to inspection.
B. Fastener size and spacing shall be inspected by qualified professional.
C. Remove and replace work that does not comply with specified requirements.
D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.05 CLEANING

A. Clean underside of deck to remove any dirt, dust, oil, or other material

END OF SECTION 05310

SECTION 05500 - METAL FABRICATIONS

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 SUMMARY

A. This section includes the following metal fabrications:

1. Miscellaneous metal fabrication, including steel beams.
2. Loose shelf and relieving angles.

1.3 SUBMITTALS

A. Product data for products used in miscellaneous metal fabrications, including paint products and grout.

B. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections. Submit shop drawings in pdf format. Do not reproduce contract documents for inclusion as part of shop drawings.

1.4 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

2.0 PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher leveled sheet.

Steel Plates, Shapes, and Bars: ASTM A 36.

Steel Tubing: Product type (manufacturing method) and as follows:

Cold-Formed Steel Tubing: ASTM A 500, grade as indicated below:

Grade A, unless otherwise indicated or required for design loading.

Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported

rails, unless otherwise indicated.

B. FASTENERS

General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.
Lag Bolts: Square head type, FS FF-B-561.
Machine Screws: Cadmium plated steel, FS FF-S-92.
Wood Screws: Flat head carbon steel, FS FF-S-111.
Plain Washers: Round, carbon steel, FS FF-W-92.

Drilled-In Expansion Anchors: Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [nondrilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade 5.

Toggle Bolts: Tumble wing type, FS FF-B-588, type, class, and style as required.

Lock Washers: Helical spring type carbon steel, FS FF-W-84.

C. PAINT

Shop Primer for Ferrous Metal: Manufacturer's or fabricator's standard, fast curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-645.

Galvanizing Repair Paint: High zinc dust content paint for re-galvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.

Bituminous Paint: Cold applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

Zinc Chromate Primer: FS TT-P-645.

2.2 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

2.3 LOOSE SHELF ANGLES

A. Provide shelf angles for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

B. Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

3.0 PART 3-EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. 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 the surfaces of exterior units which have been hot dip galvanized after fabrication, and are intended for bolted or screwed field connections.

3.2 SETTING

A. Set loose angles on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

C. Use metallic non-shrink grout in concealed locations where not exposed to moisture; use nonmetallic non-shrink grout in exposed locations, unless otherwise indicated.

D. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

END OF SECTION 05500

Waterfront Amphitheater
Panama City
sales@repservices.com

Product Guide Specification

DIVISION 107300

SPECIALTIES MANUFACTURERS OF PROTECTIVE COVERS

PART 1 - GENERAL

[reference CSI 2020 MasterFormat™ Division 10
(Specialties Manufacturers) category 7300 (Protective Covers)]

1.01 DESCRIPTION OF PRODUCT

A. MSL 45x56 (Waterfront Amphitheater) with MR over STG.

B. ROOF SLOPE: **1.75**.

C. Minimum Clearance Height (MCH): **18 in ft**. Minimum clearance height under the structure indicates the lowest height of a member from finish grade for clearance under the structure. This is generally the clearance under roof eave or frame, whichever is lower.

1.02 REFERENCES

A. REFERENCE STANDARDS:
1. AISC - American Institute of Steel Construction Manual of Steel Construction.
2. ASTM - American Society for Testing and Materials.
3. AWS - American Welding Society.
4. LEED - Leadership in Energy and Environmental Design.
5. OSHA – Occupational Safety and Health Administration Steel Erection Standard 29 CFR 1926 Subpart R-Steel Erection.
6. PCI - Powder Coating Institute.
7. SSPC – The Society for Protective Coatings.
8. Architecturally Exposed Structural Steel (AESS) - as defined by AISC

1.03 SUBMITTALS

A. GENERAL SUBMITTAL:
Submit [_____] sets of engineered drawings and [_____] sets of engineered calculations, both signed and sealed by a Professional Engineer licensed in the State of [_____].

B. PRODUCT DESIGN REQUIREMENTS:
The building shall meet the following design requirements as shown on the drawings:
1. Building Code: See drawings.
2. Ground Snow Load (Pg): See drawings.
3. Basic Wind Speed (V): See drawings.

4. Seismic Design: See drawings.

D. FOUNDATION DESIGN:
1. The shelter shall be set on foundations designed by others (architect).
2. Foundation materials shall be provided by contractor.

DI. ANCHOR BOLTS:
Anchor bolts shall be provided by Poligon.
Hooked anchors are not permitted par AISC requirements.

1.04 QUALITY ASSURANCE

A. MANUFACTURER QUALIFICATIONS:

1. Minimum of (10) years in the shelter construction industry.
2. Full time on-staff Licensed Engineer.
3. Full time on-staff Quality Assurance Manager.
4. Full time on-staff LEED AP.
5. All welders AWS Certified.
6. Manufacturer owned and controlled finishing system to include shot blast, pretreatment, primer, and top coat.
7. Published Quality Management System.
8. Annual audit of Quality System and Plant Processes by Third Party Agency.
9. Annual audit of powder coat finish system by Third Party Agency (PCI).

B. MANUFACTURER'S CERTIFICATONS:

1. AISC Certified Building Fabricator, (American Institute of Steel Construction) Certified Building Fabricator is an AISC Quality Management Systems (QMS) Certification which sets the quality standard for the structural steel industry.
2. PCI 4000 S Certified, Certification thru Powder Coating Institute for original equipment manufacturers (OEMs) to evaluate process on entire finish system to add powder coat over steel.
3. City of Los Angeles, CA Approved Fabricator Type I Steel.
4. Clark County, NV Approved Fabricator steel.
5. City of Houston, TX Approved Fabricator for Structural Steel.
6. Miami Dade County Certificate of Competency for Structural Steel.
7. State of Utah Approved Fabricator for Medium and High Strength Steel.
8. City of Riverside, CA Approved Fabricator Type I Steel.
9. City of Phoenix, AZ Approved Steel Fabricator.

C. INSTALLER QUALIFICATIONS:
Installer shall be classified as a Certified Installer as defined and certified by the shelter manufacturer.

1.05 FIELD OR SITE CONDITIONS

A. Foundations shall be at the same elevation unless specifically noted otherwise on the drawings.

1.06 MANUFACTURER WARRANTY

A. Shelter must have a (10) year limited warranty on steel frame members.
B. Shelter must have a (10) year limited warranty on paint system.

PART 2 - PRODUCTS

2.01 SHELTER SYSTEM AND MATERIALS

A. MANUFACTURERS:
1. Acceptable Manufacturer: Poligon, a Product of PorterCorp,
4240 N 136th Ave., Holland, MI 49424; 616.399.1963;
E-mail: info@poligon.com; www.poligon.com.
2. Talk to a local rep agency.
Receive pricing from Rep Services at 407-831-9658.
3. The product shall be designed, produced, and finished at a facility operated and directly supervised by the supplier who has a minimum of (10) years in the business of making pre-manufactured shelters.
4. Manufacturer must be an AISC Certified Building Fabricator.

B. SUBSTITUTION LIMITATIONS:

i. Substitutions for cause: Will only be considered when circumstances, outside of the contractor’s control, will create a substantial delay in the completion of the project. Approval of substitution requests is at the discretion of the architect, owner, and/or their designated consultants. Architect will only consider contractor's request for substitution when the following conditions are satisfied:
1. Requested substitution meets or exceeds requirements as per the Contract Documents and will produce indicated results
2. Requested substitution provides equal design characteristics that specified product provides
3. Substitution request is fully documented and properly submitted.

ii. If those conditions are not satisfied, Architect may return requests without action, except to record non compliance with these requirements. It is required that the contractor provide the following:
1. Documentation that the proposed substitution complies with all requirements as stated or shown in the contract documents and/or drawings
2. Proof of meeting or exceeding specified warranty and/or certifications. Example: Fabricator Qualifications, such as AISC or PCI4000
3. Detailed comparison of significant qualities of proposed substitutions with those of the specified product. Include annotated copy of applicable Specification Section. Product data, including drawings and descriptions of products and fabrication
4. Documentation of any deviations from the specified material/product
5. Architect may request additional information and documentation prior to rendering a decision
6. If substitution approval happens during bidding, Architect will approve substitution requests by issuing an Addendum. Substitutions not approved by addendum are rejected. This information will be provided in an expeditious manner.
7. Substitutions for convenience: Will not be considered

C. PRODUCT REQUIREMENTS AND MATERIALS:

1. GENERAL:
The pre-engineered package shall be pre-cut unless otherwise noted and pre-fabricated which will include all parts necessary to field construct the shelter. The shelter shall be shipped knocked down to minimize shipping expenses. Field labor will be kept to a minimum by pre-manufactured parts. Onsite welding is not necessary.

2. REINFORCED CONCRETE:
   a. Concrete shall have minimum 28-day compressive strength of 3,000 psi and slump of 4” (+/- 1”), unless otherwise noted on the drawings.
   b. Reinforcing shall be ASTM A615, grade 60.

3. STEEL COLUMNS:
   a. Hollow structural steel tube minimum ASTM A500 grade B with a minimum wall thickness of 3/16”.
   b. Unless columns are direct buried, columns shall be anchored directly to concrete foundation with a minimum of four anchor rods to meet OSHA requirement 1926.755(a)(1).

4. STRUCTURAL FRAMING:
Hollow Structural Steel tube minimum ASTM500 grade B. “I” beams, tapered columns, or open channels shall not be accepted for primary beams.
Frame will have a **STANDARD POLI-5000** finish.
Color chosen from manufacturer's standard color chart; textured colors not available:

TBD.

5. COMPRESSION MEMBERS:
   Compression rings of structural channel or welded plate minimum ASTM A36 or compression tubes or structural steel tube minimum ASTM A500 grade B shall only be used.

6. CONNECTION REQUIREMENTS:
   a. Anchor bolts shall be ASTM F1554 (Grade 36) unless otherwise noted.
   b. Structural fasteners shall be zinc plated ASTM A325 high strength bolts and A563 high strength nuts.
   c. Structural fasteners shall be hidden within framing members wherever possible.
   d. Structural fasteners shall be manufactured in the U.S
   e. No field welding shall be required to construct the shelter.
   f. All welds shall be free of burrs and inconsistencies.
   g. Exposed fasteners shall be powder coated by manufacturer prior to shipment to match frame or roof colors as applicable.
   h. Manufacturer shall provide extra structural and roofing fasteners.

7. ROOFING MATERIALS:

   a. PRIMARY ROOF DECK: FACTORY PRE-STAINED TONGUE AND GROOVE (TG):
      1. T&G shall be of 2x6 tongue and groove, Hem Fir, Select Structural KD 15. Factory stained **TBD**.
      2. Manufacturer shall supply 30 pound felt and drip edge if both primary and secondary roofs are being supplied by the manufacturer.
      3. Contractor shall cut T&G down to required lengths.

   b. SECONDARY ROOF SYSTEM: “R” PANEL METAL ROOFING (MR):
      1. Roofing shall be 24 gauge ribbed galvalume steel sheets, with ribs 1 3/16” high and 12” on center.
      2. Roof surface shall be painted with Kynar 500 to the manufacturer’s standard color: **TBD**.
      3. Roof panels shall be factory precut to size and angled to provide ease of one-step installation.
      4. Metal roofing trim shall match the color of the roof and shall be factory made of 26 gauge Kynar 500 painted steel.
      5. Trim shall include panel ridge caps, hip caps, eave trim, splice channels, rake trim, roof peak cap, and corner trim as applicable for model selected. Trim may need to be cut to length and notched. Installation drawings shall have detailed information on how to cut and affix roof trim.
      6. Ridge, hip, and valley caps shall be pre-formed with a single central bend to match the roof pitch and shall be hemmed on the sides.
      7. Roof peak cap shall be pre-manufactured.
      8. Manufacturer shall supply painted screws and butyl tape.

8. FINISHES:

a. STANDARD POLI-5000 FINISH:
1) Steel shall be cleaned, pretreated, and finished at a facility owned and directly supervised by the manufacturer.
2) Steel shall be shot blasted to SSPC-SP10 near-white blast cleaning. SSPC-SP2 hand tool cleaning will not be an acceptable alternative.
3) Parts shall be pretreated in a (3) stage iron phosphate or equal washer.
4) Epoxy primer powder coat shall be applied to parts for superior corrosion protection.
5) Top coat of Super Durable TGIC powder coat shall be applied over the epoxy primer.
6) Finish shall not have any VOC emissions.
7) Sample production parts shall have been tested and meet the following criteria:
a) Salt spray resistance per ASTM B 117/ ASTM D 1654 to 10,000 hours with no creep from scribe line and rating of 10.
b) Humidity resistance per ASTM D2247-02 to 5,000 hours with no loss of adhesion or blistering.
c) Color/UV resistance per ASTM G154-04 to 2,000 hours exposure, alternate cycles with results of no chalking, 75% color retention, color variation maximum 3.0 E variation CIE formula (before and after 2,000 hours exposure).
8) The manufacturer shall be PCI 4000 S Certified
9) Exposed fasteners for frame and ornamentation shall be powder coated to match structure.

9. ACCESSORIES
b. ELECTRICAL ACCESS & CUTOUTS:

1) Electrical access to be provided through a 1 1/8” diameter hole in the column base plate and ¾” diameter holes are provided through connection plates for wire access through columns, trusses, and into the compression ring/tube.
2) Electrical cutouts shall be provided in 15 places for fixtures or wires.

PART 3 - EXECUTION

3.01 INSTALLERS STORAGE AND HANDLING

A. Protect building products after arrival at destination from weather, sunlight, and damage.

B. Installer shall store product elevated to allow air circulation and to not introduce mold, fungi decay or insects to the product.

C. Product must be handled with protective straps or padded forks if lifting with mechanical equipment. Use of chain or cable to lift product into place will not be accepted and may void manufacturer's warranty.

E. The secondary roof shall be installed immediately after the primary roof to prevent moisture damage to wood.

3.02 ERECTION

A. INSTALLATION:

The shelter shall be erected by a Certified Installer who has a demonstrated ability to construct the shelter in the manner recommended by the shelter manufacturer.

B. GENERAL CONTRACTOR:

Interface with other work is to be coordinated by the customer or the customer's agent. Certain designs have electrical or other plumbing requirements that are not supplied by Poligon.

C. TOLERANCES:

Tolerances on steel structural members are set according to AISC construction practices, abided in the factory, and cannot be increased. No field slotting or opening of holes will be allowed. It is therefore essential that contractors conform to the tolerances specified on the installation drawings for anchor bolt or column layout details.

D. OSHA COMPLIANCE:

OSHA Compliance to Steel Erection Standard 29CRF 1926 Subpart R-Steel Erection.

3.03 REPAIR

A. Do not attempt any field changes without first contacting Poligon.

3.04 FIELD OR SITE QUALITY CONTROL

A. Field or Site Tests and Inspections are not required by Poligon but may be required by the customer or by the local building inspector.

END OF SECTION

SECTION 05600 – HANDRAILS

1.01 GENERAL

This section is to cover the fabrication and installation of aluminum hand and guardrails. This section does not pertain to grab bars used in restrooms.

1.02 QUALITY ASSURANCE

A. The design of the rails shall be in accordance with the current revisions of SREF and Florida Accessibility Code for Building Construction.
B. Fabrication: Work shall be performed by experienced and qualified fabricators who have experience in aluminum rail fabrication.
C. Pipe cuts shall square and without burrs. All Welds shall be ground smooth to the surface of the pipe. Curved sections shall be bent with no crimping or flattening of the inside radius. All welded joints in rail to rail connections shall be internally reinforced.
D. The rails shall be anchored in such a manor as to meet the guidelines on the Florida Accessibility Code For Building Construction.

1.03 MATERIALS

A. All pipe shall be 1-1/2" O.D., Schedule 40 extruded aluminum pipe, alloy 6063-T-6, unless otherwise indicated on plans.
B. Handrail pickets are to be solid aluminum bars.
C. Finish: **All exposed aluminum shall receive powder coated finish**.
D. All fasteners shall be type 300 stainless steel.
E. Provide cast cover flanges for all railing installed against wall surfaces.

1.04 INSTALLATION

A. Railings shall be installed as shown on approved shop drawings by mechanics experienced in the installation of aluminum railing.
B. Railings shall be firmly mounted and aligned both vertically and horizontal to the structure installed on.
C. After installation, railings shall be cleaned and protected from damage until final acceptance of the project.
D. Damage to adjacent structures during installation of railing will be required like new at no cost to the owner.

END OF SECTION 05600

SECTION 06100 - ROUGH CARPENTRY

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY:

A. Types of work in this section include rough carpentry for:

1. Wood nailers, blocking and furring.

B. Finish carpentry is specified in another section within Division 6.

1.3 DEFINITIONS:

A. Rough carpentry includes carpentry work not specified as part of other sections and which is generally not exposed, except as otherwise indicated.

B. Standards: In addition to complying with all pertinent codes and regulations, all materials of this section shall comply with pertinent provisions of:

Southern Pine	Southern Pine Inspection Bureau
Plywood	"Softwood Plywood - Construction and Industrial" (Amended June l969), Product Standard PD 1-66 of U.S. Department of Commerce, Bureau of Standards, and A.P.A.
Rough Hardware	"Specification for the Design, Fabrication and Erection of Structural Steel for Buildings of the American Institute of Steel Construction"
Building Paper	Federal Specification UU-B-790a, dated February 5, l968
Wood Preservative	Standard P-5 of the American Wood Preservers Institute

Other similar and pertinent reference standards for the products needed.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's specifications and installation instructions for:

1. Sheathing.

B. Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation and finishing of treated material.

C. Preservative Treatment: For each type specified, include certification by treating plant stating compliance: Spruce-Pine-Fir graded under NLGA rules.

D. Any species and grade which meets or exceeds the following values:

Fb (minimum extreme fiber stress is bending); 1500 psi.
E (minimum modulus of elasticity); 1,500,000 psi.

2.0 PART 2 - PRODUCTS

A. All materials of this Section, unless specifically otherwise approved in advance by the Architect, shall meet or exceed the following:

ITEM:	DESCRIPTION:
Plates, Grounds or Furring in contact w/ concrete masonry or plaster	Pressure treated #2 KD Southern Yellow Pine
All Framing Members	Exposed – Southern Yellow Pine No. 1 Not Exposed – Southern Yellow Pine No. 2 or better
Plywood Roof Decking	5/8" - 4' x 8' Structural 1 - CDX Grade with exterior glue, installed with plyclips, nailed to trusses as per drawings.
Wood Truss	#2 KD Southern Yellow Pine Gang nail or equal (except exposed trusses to be built using SP No. 1. Designed and fabricated in accordance with "National Design Specifications for Stress Grade Lumber and its Fastening" by National Lumber Manufacturers Association. "Timber Construction Standards" by American Institute of Timber Construction and Design specifications for light metal plate connected wood trusses. (Truss Plate Institute). Trusses shall be for wind loads indicated on the structural drawings Ice and Water Shield - One layer of 40 mil. Self-adhering ice and water shield membrane equal to Carlisle: "Dri-Start A", or as manufactured by GAF, Tamko, ELK or CertainTeed.
Wood Preservative	Ammonical copper arsenite or 5% solution of pentachlorophenol
Steel Hardware	ASTM A-7 or A-36 (Use galvanized at exterior locations)
Machine Bolts	ASTM A-307
Lag Bolts	Federal Specifications FF-B-561
Nails	Common (Except as noted) Federal Specifications FF-N-1-1 (Use galvanized at exterior locations)
Flashing	Nervastral Seal Prof HD-20 except where metal is indicated

2.1 BOARDS:

A. Concealed Boards: Where boards will be concealed by other work, provide lumber of 15 percent maximum moisture content (KD) and of following species and grade:

Southern Pine No. 2 Boards per SPIB rules, or any species graded Construction Boards per WCLIB or WWPA rules.

2.2 MISCELLANEOUS LUMBER:

A. Provide wood for support or attachment of other work including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping and similar members.

B. Moisture content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

C. Grade: Standard Grade light framing size lumber of any species or board size lumber as required. No. 3 Common or Standard grade boards per WCLIB or WWPA rules or No. 3 boards per SPIB rules.

2.3 CONSTRUCTION PANELS:

A. Trademark: Factory-mark each construction panel with APA trademark evidencing compliance with grade requirements.

B. Concealed APA Performance-Rated Panels: Where construction panels will be used for the following concealed types of applications, provide APA Performance-Rated Panels complying with requirements indicated for grade designations, span rating, exposure durability classification, edge detail (where applicable) and thickness.

1. Roof and wall sheathing: APA RATED SHEATHING.
Exposure Durability Classification: EXTERIOR.
Span Rating: As required to suit rafter and stud spacing indicated.

C. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant treated plywood panels with grade designation, APA C-D PLUGGED INT with exterior glue, in thickness indicated, or, if not otherwise indicated, not less than 15/32".

2.4 MISCELLANEOUS MATERIALS:

A. Fasteners and Anchorages: Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.

2.5 WOOD TREATMENT BY PRESSURE PROCESS:

A. LUMBER: Pressure-treat above-ground items with water-borne preservatives to comply with AWPB LP-2. After treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:

Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers and waterproofing.

Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.

Wood framing members less than 18" above grade.

Wood floor plates installed over concrete slabs directly in contact with earth.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL:

A. Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.

B. Set carpentry work to required levels and lines, with members plumb and true and cut and fitted.

C. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards.

D. Countersink nail heads on exposed carpentry work and fill holes.

E. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

3.2 WOOD GROUNDS, NAILERS, BLOCKING AND SLEEPERS:

A. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

C. Provide permanent grounds of dressed, preservative treated, key- bevelled lumber not less than 1-1/2" wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

3.3 WOOD FURRING:

A. Install plumb and level with closure strips at edges and openings. Shim with wood as required tolerance of finished work.

B. Furring to Receive Plywood Paneling: Unless otherwise indicated, provide 1" x 3" furring at 2' o.c., horizontally and vertically. Select furring for freedom from knots capable of producing bent- over nails and resulting damage to paneling.

3.4 WOOD FRAMING, GENERAL:

A. Provide framing members of sizes and on spacings shown, and frame openings as shown, or if not shown, comply with recommendations of "Manual for House Framing" of National Forest Products Association (N.F.P.A). Do not splice structural members between supports.

B. Provide special framing as shown for eaves, overhangs, and similar conditions, if any.

3.5 BOARD SHEATHING:

A. Install boards with end joints staggered over supports, and with each piece extending over at least 2 spaces between supports. Nail with 8d common nails, spaced 2 per support for board widths of 6" and less, 3 per support for widths of 8" and more.

3.6 INSTALLATION OF CONSTRUCTION PANELS:

A. General: Comply with applicable recommendations contained in Form No. E 30F, "APA Design/Construction Guide - Residential & Commercial", for types of construction panels and applications indicated. Fasten panels as recommended by manufacturer.

END OF SECTION 06100

SECTION 06160 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Roof sheathing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

   1. Wood-preservative-treated plywood.
   2. Fire-retardant-treated plywood.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of air-barrier and water-resistant roof sheathing. Testing Agency Qualifications:

B. 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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

   1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS

A. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; **Use Category UC3b for exterior construction not in contact with ground.**

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: **Treat all plywood unless otherwise indicated**

2.4 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Application: Treat all plywood unless otherwise indicated.

2.5 ROOF SHEATHING

A. Plywood Sheathing: **Exterior, Structural I** sheathing.
1. Span Rating and Nominal Thickness as indicated on the Structural Drawings.

2.6 FASTENERS

A. General: See Structural Drawings for Fastener size, type and spacing. Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For **roof** sheathing, provide fasteners **with hot-dip zinc coating complying with ASTM A153/A153M** or **f Type 304 stainless steel**.

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. Arrange joints so that pieces do not span between fewer than three support members.

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, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

D. Coordinate **roof** 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.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 FIELD QUALITY CONTROL

A. Testing and Inspecting Agency: The Contractor will engage a qualified testing agency to perform inspections.

B. Prepare inspection reports.

END OF SECTION 06160

SECTION 06192 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood roof trusses.
2. Wood floor trusses.
3. Wood girder trusses.

1.2 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 of permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
6. Show splice details and bearing details.

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

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss-fabricating firm.

B. Evaluation Reports: For the following, from ICC-ES:

1. Metal-plate connectors.
2. Metal truss accessories.

1.4 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.

B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.

B. Structural Performance: Metal-plate-connected wood trusses shall be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1.

C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.

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 any rules-writing agency certified by the American Lumber Standard Committee (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. Provide dry lumber with **19** percent maximum moisture content at time of dressing.

B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry" or Section 061053 "Miscellaneous Rough Carpentry."

2.3 METAL CONNECTOR PLATES

A. Fabricate connector plates to comply with TPI 1.

B. Hot-Dip Galvanized-Steel Sheet: ASTM A653/A653M; 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 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.

2.4 FASTENERS

A. 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, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

A. Allowable design loads, as published by manufacturer, shall comply with or exceed those of basis-of-design products. 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. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 (Z180) coating designation.

2.6 FABRICATION

A. 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.

B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

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. 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.

F. Securely connect each truss ply required for forming built-up girder trusses.

G. 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 **Section 061000 "Rough Carpentry" or Section 061053 "Miscellaneous Rough Carpentry."**
2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.

H. Install wood trusses within installation tolerances in TPI 1.

I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

J. Replace wood trusses that are damaged or do not comply with requirements.

END OF SECTION 06192

SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Wood trim for transparent finish.
2. Stained wood cabinets.
3. Solid surface countertops and window sills.

1.3 SUBMITTALS

A. Shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

B. Samples for initial selection purposes of the following in form of manufacturer's color charts consisting of actual units or sections of units showing full range of colors, textures, and patterns available for each type of material indicated.

1. Shop applied wood finishes.
3. Exposed cabinet hardware, one unit of each type and finish.
4. Solid surfacing.

1.4 QUALITY ASSURANCE

A. AWI Quality Standard: Comply with applicable requirements of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI) except as otherwise indicated.

B. WIC Quality Standard: Comply with applicable requirements of "Manual of Millwork" published by Woodwork Institute of California (WIC) unless otherwise indicated.

C. Installer Qualifications: Installation of all surfaces shall be by a firm that is authorized by the manufacturer to fabricate and install these surfaces and that can demonstrate successful experience in installing finished carpentry items similar in type and quality to those required for this project.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.

B. Do not deliver woodwork until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas.

C. Transport and handle sheets and fabricated items by methods that will prevent damage and defacing.

D. Storage: If units are not installed immediately upon delivery to site, store in covered location, off the ground or floor, and cover with moisture and stain-resistant paper or plastic.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Obtain and comply with Woodwork Manufacturer's and Installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation, whether stored on site or off site. Do not install woodwork until these conditions have been attained and stabilized so that woodwork is within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

Obtain and comply with manufacturer=s advice for optimum temperature and humidity conditions for the product during its storage and installation

B. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.

1.7 WARRANTY

A. Furnish manufacturer’s warranty against defective materials and workmanship.

2.0 PART 2 - PRODUCTS

2.1 SOLID SURFACE:

A. Surfaces sheets in 1/2" thickness, Class I or Class III rated
Finish: Matte.
Color: From manufacturer’s standard colors.

B. Manufacturers:
1. Avonite - Studio, or approved equal by:
2. Wilsonart
3. Formica solid surfacing
4. Corian

C. Solid Surfaces shall be non-porous, homogenous blend of polyester or acrylic alloys and fillers to create a material that cuts like wood. The color and pattern shall extend throughout the material. The material shall be in 1/4@ (6mm) or 1/2@ (12mm) thickness as indicated, in one piece wherever possible.

Joint Adhesive: Type recommended by manufacturer, in color to match surfaces

Silicone sealant: Type recommended by manufacturer

2.4 WOOD MATERIALS

A. General: Provide materials that comply with requirements of the AWI woodworking standard for each type of woodwork and quality grade indicated and, where the following products are part of woodwork, with requirements of the referenced product standards, that apply to product characteristics indicated:

Hardboard: ANSI/AHA A135.4

High Pressure Laminate: NEMA LD 3.
Softwood Plywood: PS 1.

B. Wood cabinets or trim for transparent finish: **Premium grade Red Oak.**
C. Wood trim for painted finish: **Paint grade fir, pine or poplar** (no knots).

2.5 FABRICATION, GENERAL

A. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber in relation to relative humidity conditions existing during time of fabrication and in installation areas.

B. Fabricate woodwork to dimensions, profiles, and details indicated.

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

D. Solid surface:
1. Color selected from manufacturer's standard colors
2. Ease top and front edges and corners.
3. Surfaces shall be fabricated to field measurements. Seams shall be located where shown on approved shop drawings. Provide seam blocks under all seams where necessary in accordance with manufacturer's recommendations.

2.6 WOOD CABINETS

A. Quality Standard: Comply with AWI Section 400".
B. Quality Standard: Comply with WIC Section 15 "Plastic-Covered Casework."
C. WIC Section 16: "Laminated Plastic Countertops, Splashes and Wall Paneling."

2.7 HARDWARE

A. Hinges: shall be Blum Module 170 concealed, European style, 170 degree opening (90 degree opening where adjacent to wall), self-closing.

B. Pulls shall be cast brass, accurately positioned on door and drawer front with machine screws. Pulls shall be Stanley #4484. Finish shall be brushed aluminum.

C. Drawers and glide out shelves shall be suspended on nylon roller steel slides to insure quiet, smooth operation. Slides shall have 100 pound load rating (minimum) with built in drawer stop and self close feature in the last one inch of travel. Glides shall be full extension Knape & Vogt (K&V) 8400 typical.

D. File drawers shall be suspended on full extension steel slides with ball bearings and a 100 pound minimum load rating, equal to K&V 8400.

E. Locks will be provided where shown on drawings or cabinet description. Locks shall be cylinder type, dye cast, with five disc tumbler mechanism. Each lock shall be provided with 3 milled brass keys. Provide option of selecting keyed alike, keyed different, and master keyed locks. K&V 986, Corbin 02067, Yale 9730.

F. Adjustable shelf standards and supports shall be Stanley 798/799, K&V 255 or Grant 120/121. Line Boring is acceptable with metal shelf supports (note: plastic is not acceptable).

G. Grommets may be solid plastic or metal with cord slot cover equal to Mockett with at least 8 colors to choose from.

3.0 PART 3 - EXECUTION

3.1 PREPARATION

A. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 8'-0" for plumb and level (including tops) and with no variations in flushness of adjoining surfaces.

B. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

C. 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 as required for a complete installation. Except where pre-finished matching fastener heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.

E. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.

F. Tops: Anchor securely to base units and other support systems as indicated.

3.2 ADJUSTMENT AND CLEANING

A. Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

3.3 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensures that woodwork is being without damage or deterioration at time of Substantial Completion.

END OF SECTION 06402

SECTION 07200 - INSULATION

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Applications of insulation specified in this section include the following:

1. Cavity Insulation
2. Spray-applied insulation
3. Batt-type insulation for wall noise reduction.
4. Vapor barriers under slabs-on-grade

1.3 QUALITY ASSURANCE:

A. Thermal Resistivity: Where thermal resistivity properties of insulation materials are designated by r-values they represent the rate of heat flow through a homogenous material exactly 1" thick, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one square foot per hour at mean temperatures indicated.

B. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

1. Surface Burning Characteristics: ASTM E 84.
2. Fire Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's product literature and installation instructions for each type of insulation and vapor retarder material required.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. General Protection: Protect insulations from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS:

1. Cavity Wall Insulation: Provide rigid closed-cell extruded board with integral high density skin; comply with ASTM C 578 for
   Type IV and the following:
   a. Meet the typical 5 year aged thermal conductivity, K factor of .20 BTU in/hr square feet degree F. when tested at 75 degrees F mean temperature per ASTM C-518-75e.
   b. Compressive strength of 40 psi per ASTM D-1621-73.
   c. Maximum water absorption of 0.3% by volume when tested per ASTM 272-72
   d. Water vapor permeance for one inch product of 1.0 perm max. per ASTM E96-80.
   e. Manufacturer's standard length and width:
   f. Square Edge
   g. 2"
   h. R = 10
   i. Acceptable Manufacturer: **Styrofoam SM** by Dow Chemical Co., or approved equal.

2. Batt-type Insulation and acoustical insulation: Provide Unfaced glass fiber units:

   a. Flame spread and smoke developed as per ASTM E84.
   b. Manufacturer's standard length and width as, per drawings.
   c. Size: 4" or 6" nom.; R = 19 at exterior walls.
   d. Acceptable manufacturer's: Certainteed Corp., Manville Corp., or Owens-Corning Fiberglas Corp.

3. Spray-applied insulation (**Icynene**):
   a. Water-blown foam insulation, applied by spraying and adhering to substrates.
      Mfr: Icynene, Inc. or approved equal.
   b. ASTM D6866, for renewable content, ASTM C518 for thermal performance: Developed thermal resistance is as shown on the drawings.: R/in = R3.7 hr. ft2 ºF/BTU
   c. Fire resistance: Class A; Surface burning characteristics per ASTM E84:
      Flame Spread less than 25
      Smoke Development less than 450
   d. R value at floor: R=20
   e. Installation by licensed Icynene installer with 3years minimum experience.

4. Vapor barriers under slabs-on-grade: **15 mil** polyethylene film with laboratory tested vapor)transmission rating of 0.2 perms.

5. Miscellaneous Materials:

   Adhesive for bonding insulation to be as recommended by insulation manufacturer, and complying with the requirements for fire performance characteristics.

   Mechanical Anchors to be the type and size recommended by the insulation manufacturer for type of application and condition of substrate.

   Mastic Sealer to be type recommended by insulation manufacturer for bonding edge joints between units and filling voids in work.

3.0 PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION:

A. Require Installer to examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in

which substrate and related work is specified. Obtain installer's written report listing conditions detrimental to performance of work in this section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

B. Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections which might puncture vapor retarders.

3.2 INSTALLATION, GENERAL:

A. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.

B. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

3.3 INSTALLATION OF CAVITY INSULATION:

A. Install small pads of adhesive spaced approximately 1'-0" o.c. both ways on inside face, as recommended by manufacturer. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

Certify that adhesive is compatible with Liquid Applied Dampproofing specified in Section 07160

3.4 INSTALLATION OF BATT INSULATION:

A. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations.

3.5 INSTALATION OF SPRAY-APPLIED INSULATION:

A. Installation per manufacturer’s written instructions by licensed Icynene installer with 3years minimum experience.

3.6 INSTALLATION OF VAPOR RETARDERS:

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those which have been stuffed with loose fiber-type insulation.

B. Seal overlapping joints in vapor retarders with adhesives per vapor retarder manufacturer's printed directions. Seal butt joints and fastener penetrations with tape of type recommended by vapor retarder manufacturer.

C. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with tape or another layer of vapor retarder.

3.7 PROTECTION:

A. General: Protect installed insulation and vapor retarders from harmful weather exposures and from possible physical abuses, where possible by no delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure.

END OF SECTION 07200

SECTION 07241- EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1-GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY:

A. Extent of exterior insulation and finish systems is indicated on drawings.

B. Types of exterior insulation and finish system applications in this section include the following:

Applications over concrete masonry units.

C. Sealing joints for this system is specified in this section.

1.3 DEFINITIONS:

A. Exterior insulation and finish system refers to an exterior assembly composed of an inner layer of thermal insulation board and an outer layer forming the protective finish coating. The assembly is applied to a supporting substrate of construction indicated. Designations below for the class and type of exterior insulation and finish system specified in this section are based on those developed by the Exterior Insulation Manufacturers Association (EIMA).

B. Class PB Type A designates a polymer-based protective finish coating (Class PB), externally reinforced (Type A).

C. System in this section refers to Class PB Type A exterior insulation and finish systems.

D. System manufacturer refers to the manufacturer of the exterior insulation and finish system.

1.4 SYSTEM DESCRIPTION:

A. Provide system complying with the following performance requirements:

B. Bond Integrity: Free from bond failure within system components for between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.

C. Weather tightness: Resistant to water penetration from exterior into system and assemblies behind it or through them into interior of building which results in deterioration of thermal insulating effectiveness or other degradation of system and assemblies behind system including substrates, supporting wall construction, and interior finish.

1.5 SUBMITTALS:

A. Product Data: Manufacturer's technical data for each component of exterior insulation and finish system.

B. Samples for Initial Selection Purposes: Manufacturer's standard color charts and small scale samples indicating textural choices available.

C. Submit sealant manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available.

D. Samples for Verification Purposes: Samples, 2' square, for each finish, color, and texture indicated; prepare samples using same tools and techniques intended for actual work.

E. Incorporate within each sample a typical control joint filled with sealant of color indicated or selected.

F. Installer certificates signed by manufacturer certifying that Installers comply with specified requirements.

G. Sealant compatibility and test report from sealant manufacturer certifying that materials forming joint substrates of system have been tested for compatibility and adhesion with joint sealants; include sealant manufacturer's interpretation of results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

1.6 QUALITYASSURANCE:

A. Manufacturer Qualifications: Firm regularly engaged in manufacturing products for system indicated and with at least 3 years successful experience in applications similar to that required for this Project.

B. Installer Qualifications: Engage an Installer that is certified in writing by system manufacturer as qualified for installation of systems indicated.

C. Single Source Responsibility: Obtain materials for system from either a single manufacturer or from manufacturers approved by the system manufacturer as compatible with other system components.

1.7 PROJECT CONDITIONS:

A. Environmental Conditions: Do not install system when ambient outdoor temperatures are 40 deg F (4 deg C) and falling unless temporary protection and heat is provided to maintain ambient temperatures above 40 deg F (4 deg C) during installation of wet materials and for 24 hours after installation or longer to allow them to become thoroughly dry and weather resistant.

1.8 SEQUENCING AND SCHEDULING:

A. Sequence installation of system with related work specified in other sections to ensure that wall assemblies, including flashing, trim, and joint sealers, are protected against damage from weather, aging, corrosion, or other causes.

PART 2-PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturers: Provide System from one of the following:

Dryvit System, Inc.
ISPO, Inc.
Finestone, Inc.
Parex System
Sto Industries, Inc.
Senergy Inc.

2.2 MATERIALS:

A. Compatibility: Provide adhesive, board insulation, reinforcing fabrics, base and finish coat materials, sealants, and accessories which are compatible with one another and approved for use by system manufacturer.

B. Provide colors and texture of protective coating to comply with following requirements:

C. Provide selection made by Architect from manufacturer's full range of standard colors and textures available for type of finish coat indicated.

D. Surface Sealer: System manufacturer's standard adhesion intermediary designed to improve bond between substrate of type indicated and adhesive for application of insulation.

E. Plastic Tracks for Application of Insulation: System manufacturer's standard plastic track system consisting of horizontal starter tracks, horizontal holding tracks, and vertical tee-shaped members designed for mechanical attachment to substrates indicated and for attaching insulation by engaging grooves in edges of insulation.

F. Adhesive for Application of Insulation: System manufacturer's standard formulation designed for indicated use, compatible with substrate and complying with the following requirements:

Factory-mixed formulation designed for adhesive attachment of insulation to substrates of type indicated, as approved by system manufacturer.

G. Molded Polystyrene Board Insulation: Rigid, cellular thermal insulation formed by the expansion of polystyrene resin beads or granules in a closed mold to comply with ASTM C 578 for Type I; aged in block form prior to cutting and shipping by air drying for not less than 6 weeks or by another method approved by system manufacturer and producing equivalent results; 2' x 4' x thickness indicated but not less than the minimum thickness allowed by system manufacturer; and complying with requirements of system manufacturer for corner squareness and other dimensional tolerances.

Manufacture insulation with edges grooved for track installation method.

H. Reinforcing Fabric: Balanced, alkali-resistant open weave glass fiber fabric treated for compatibility with other system materials; made from continuous multi-end strands with tensile strength of not less than 120 lbs. and 140 lbs. in warp and fill directions, respectively, per ASTM D 1682 and complying with ASTM D 578 and the following requirements:

Weight of Heavy Weight Resistant Reinforcing Fabric: Not less than 21 oz. per sq. yd.
Weight of Strip Reinforcing Fabric: Not less than 3.75 oz. per sq. yd.

I. Base Coat Materials: System manufacturer's standard, job mixed formulation of Portland cement complying with ASTM C 150, Type I, white or natural color; and system manufacturer's standard polymer based adhesive designed for use indicated.

J. Finish Coat Materials: System manufacturer's standard mixture complying with the following requirements for material composition and method of combining materials:

Factory-mixed formulation of polymer emulsion admixture, color- fast mineral pigments, sound stone particles, and fillers.

Water: Clean and potable.

K. Mechanical Fasteners: System manufacturer's standard corrosion- resistant fastener assemblies, complete with system manufacturer's standard washer and shaft attachments, selected for properties of pull-out, tensile, and shear strength required to resist design loads of application indicated, capable of pulling fastener head below surface of insulation board, and of the following description:

For attachment to wood framing members provide steel drill screws complying with ASTM C 1002.

2.3 ELASTOMERIC SEALANTS:

A. Sealant Products: Provide manufacturer's standard chemically curing, elastomeric sealant which is compatible with joint fillers, joint substrates, and other related materials.

Multi-Part Nonsag Urethane Sealant.

B. Sealant Color: Provide color of exposed sealants to comply with the following requirement:

Match finish coat color of system.

2.4 MIXING:

A. General: Comply with system manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as approved by system manufacturer. Mix materials in clean containers. Use materials within time period specified by system manufacturer or discard.

PART 3-EXECUTION

3.1 EXAMINATION:

A. Examine substrates, with Installer present, to determine if they are in satisfactory condition for installation of system. Do not proceed with installation of system until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

A. Protect contiguous work from moisture deterioration and soiling resulting from application of systems. Provide temporary covering and other protection needed to prevent spattering of exterior finish coatings on other work.

B. Protect system, substrates, and wall construction behind them from inclement weather during installation. Prevent infiltration of moisture behind system and deterioration of substrates.

C. Substrate Preparation: Prepare and clean substrates to comply with system manufacturer's requirements to obtain optimum bond between substrate and adhesive for insulation.

Apply surface sealer over substrates where required by system manufacturer for improving adhesion.

3.3 INSTALLATION:

A. General: Comply with system manufacturer's current published instructions for installation of system as applicable to each type of substrate indicated.

B. Mechanically attach insulation by track method to comply with the following requirements:

Apply boards over dry substrates in courses with long edges oriented horizontally; begin first course from a level base line and work upwards.

3.4 CLEANING AND PROTECTION:

A. Remove temporary covering and protection of other work. Promptly remove protective coatings from window and door frames, and any other surfaces outside areas indicated to receive protective coating.

B. Provide final protection and maintain conditions, in a manner acceptable to Installer and system manufacturer, which ensures system being without damage or deterioration at time of Substantial Completion.

END OF SECTION 07241

SECTION 07272 – FLUID-APPLIED AIR BARRIER

PART 1 - GENERAL

1.01 SUMMARY

A. Provide **fluid-applied vapor permeable air barrier membrane** (or dampproofing or waterproofing as noted on the drawings) over exterior face of concrete masonry units as indicated or required.
B. Supply labor, materials and equipment to complete the Work as shown on the Drawings and as specified herein to bridge and seal the following air leakage pathways and gaps:
   1. Openings and penetrations of window, door, and louver frames.
   2. Piping, conduit, duct, and similar penetrations.
   3. Embedded brick ties, screws, bolts, and similar penetrations.
   4. All other air leakage pathways in the building envelope.
C. Supply materials and installation methods of the primary vapor permeable air barrier membrane system and accessories.
D. Materials and installation methods of through-wall flashing membranes.

1.02 RELATED SECTIONS

A. 03300 – Cast-In-Place Concrete
B. 04200 – Unit Masonry
C. 08110 – Steel Doors and Frames
D. 08520 – Aluminum Windows
E. 10200 – Louvers and Vents

1.03 REFERENCES

A. The following standards are applicable to this section:
   1. ASTM E 2357: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
   2. ASTM E 2178: Standard Test Method for Air Permeance of Building Materials.
   3. ASTM E 283: Standard Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen.
   4. ASTM E 1677 Specification for Air Retarder (AR) Material or System for Low-Rise Framed Building Walls.
   5. ASTM E 330: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
   6. ASTM E 331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
   7. ASTM E 96: Water Vapor Transmission of Materials.
   8. CGSB 37-GP-56M: Membrane, Modified, Bituminous, Prefabricated, and Reinforced.
   9. AMMA 2400: Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction.
   10. ASTM E 2112: Standard Practice for Installation of Exterior Windows, Doors and Skylights.

1.04 PERFORMANCE REQUIREMENTS

A. Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier membrane assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration.

B. Air barrier shall be fully compatible with concrete masonry units.

1.05 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier membrane.

B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
   1. Include details of interfaces with other materials that form part of air barrier.

C. Submit documentation from an approved independent testing laboratory certifying the air leakage rates of the air barrier membrane assembly, including primary membrane, primer and sealants have been tested to meet ASTM E 2357.
   1. Test report submittals shall include test results on porous substrate and include sustained wind load and gust load air leakage results.

D. Submit copies of manufacturers' current ISO certification.

1.06 QUALITY ASSURANCE

A. Submit document stating the applicator of the primary air barrier membrane specified in this section is qualified by the manufacturer as suitable for the execution of the Work.

B. Perform the Work in accordance with manufacturer's written instructions and this specification.

C. Maintain one copy of manufacturer's written instructions on site.

D. Allow access to the Work site by the air barrier membrane manufacturer's representative.

E. Components used shall be sourced from one manufacturer, including primary membrane, transition and flashing membranes, air barrier sealants, primers, mastics, and adhesives.

F. Single-Source Responsibility:
   1. Obtain air barrier materials from a single manufacturer regularly engaged in manufacturing the product.
   2. Provide products which comply with all federal, state and local regulations controlling use of volatile organic compounds (VOCs).

1.07 PRE-INSTALLATION CONFERENCE

A. Schedule pre-installation conference a minimum of one (1) week prior to commencing work of t this section.

B. Include installers of other construction connecting to air barrier, including masonry, sealants, windows, door frames, and louvers.

C. Review air barrier requirements including surface preparation, substrate condition and pre-treatment, forecasted weather conditions, special details and sheet flashings, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.08 DELIVERY, STORAGE AND HANDLING

A. Refer to current Product MSDS for proper storage and handling.
B. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
C. Store roll materials on end in original packaging. Protect rolls from direct sunlight until ready for use.
D. Store air barrier membranes, adhesives and primers at temperatures of 40 degrees F and rising.
E. Keep solvent away from open flame or excessive heat.

1.09 COORDINATION

A. Ensure continuity of the air barrier throughout the scope of this section.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.11 WARRANTY

A. Provide manufacturer's standard 10-year material warranty.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Basis-of-Design Product: The design for the air barrier system is based on the following manufacturer. Subject to compliance with requirements, provide the named products or an equivalent product by one of the manufacturers listed in paragraph 2.1.B below. Air barrier membrane components and accessories shall be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.
   1. Basis-of-Design Manufacturer: Henry Company.
      909 N Sepulveda Blvd, Suite 650
      El Segundo, CA 90245
      800-598-7663
      Web Site: www.henry.com
B. 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:
   1. Grace Construction Products.
   2. Marflex Building Solutions.
   3. Prosoco, Inc.
   4. Sto Corp.
   5. Tremco, Inc.
   6. W.R. Meadows, Inc.
   7. Tyvek Brand, Dupont Corp.

2.02 MEMBRANES (Basis-of-Design). Contractor is to verify compatibility of fluid applied air barrier products with adjacent materials, in particular, with the **wall cavity insulation and mastic** used to install the insulation.

A. Primary air and rain barrier membrane for temperatures above 40 degrees F and rising shall be Air-Bloc 31 manufactured by Henry; a single component water based elastomeric emulsion membrane, trowel or spray applied. Membrane shall have the following physical properties:
   1. Air permeability: 0.0002 CFM/ft^2 @ 1.6 lbs/ft^2 to ASTM E2178 and ASTM E283 and have no increased air leakage when subjected to a sustained wind load of 10.5 lbs/ft^2 for 1 hour and gust wind load pressure of 62.8 lbs/ft^2 for 10 seconds when tested at 1.6 lbs/ft^2 to ASTM E331.
   2. Tested to ASTM E2357 for Air Leakage of Air Barrier Assemblies.
   3. Water vapor permeance (43 mil dry thickness): 21 perms to ASTM E96 Method B.
   4. Nominal wet film thickness: 90 mils.
   5. Elongation (ASTM D412): 1000% (Typical).
   6. Low temperature flexibility and crack bridging: Pass -4 degrees F to ASTM C836.
   7. Long term flexibility: Pass to CGSB 71-GP-24M.
   8. Watertightness (CGSB 37-GP-56M): Pass.

B. Self-adhering vapor permeable air barrier membrane for transition and joint treatment shall be Blueskin® Breather manufactured by Henry; a self-adhering membrane consisting of a microporous film laminate, backed with a specially applied adhesive, which allows water vapor to permeate through while acting as a barrier to air and rain water. Membrane shall have the following physical properties:
   1. Air leakage: <0.002 CFM/ft^2 @ 1.6 lbs/ft^2 to ASTM E283-91.
   2. Water vapor permeance: 37 perms to ASTM E96.
   3. Membrane Thickness: 17 mils.
   4. Low temperature flexibility -40 degrees F: Pass to ASTM D3111.
   5. Hydrostatic Water Resistance: 18 psi ASTM D751 Procedure A.

C. Self-adhering membrane for all window and window sill flashings, louver and louver sill flashings, door openings, inside and outside corners and other transitions shall be Blueskin® SA manufactured by Henry; an SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film. For application temperatures down to 10 degrees F use Blueskin® SA LT. Membrane shall have the following physical:
   1. Air leakage: <0.0001 CFM/ft^2 @1.6 lbs/ft^2 to ASTM E 2178 and ASTM E 283 and have no increased air leakage when subjected to a sustained wind load of 10.5 lbs/ft^2 for 1 hour and gust wind load pressure of 62.8 lbs/ft^2 for 10 seconds when tested at 1.6 lbs/ft^2 to ASTM E331.
   2. Tested to ASTM E 2357 for the air barrier assembly.
   3. Vapor permeance: 0.05 perms to ASTM E96.
   4. Membrane Thickness: 0.0394" (40 mils).
   5. Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M.
   6. Elongation: 200% to ASTM D412-modifed.
   7. Meets CAN/CGSB-51-33 Type I Water Vapor Permeance requirements.

D. Self-adhering through-wall flashing membrane shall be Blueskin® TWF manufactured by Henry; an SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film. Membrane shall have the following physical properties:
   1. Membrane Thickness: 0.0394 inches (40 mils).
   2. Film Thickness: 4.0 mils.
   3. Flow (ASTM D5147): Pass @ 212 degrees F.
   4. Puncture Resistance: 134 lbf to ASTM E 154.
   5. Tensile Strength (film): 5723 psi ASTM D882.
   6. Tear Resistance: 13lbs. MD to ASTM D1004.
   7. Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M.

2.03 PRIMERS

A. Primer for self-adhering membranes at temperatures above 25 degrees F shall be Aquatac™ Primer manufactured by Henry; a polymer emulsion based adhesive, quick setting. Primer shall have the following physical properties:
   1. Color: Aqua.
   2. Weight: 8.7 lbs/gal.
   3. Solids by weight: 53%.
   4. Water based, no solvent odors, low VOC.
   5. Drying time (initial set): 30 minutes at 50% RH and 70 degrees F.

B. Primer for self-adhering membranes at all temperatures shall be Blueskin® Adhesive manufactured by Henry, a synthetic rubber based adhesive, quick setting, having the following physical properties:
   1. Color: Blue.
   2. Weight: 6 lbs/gal.
   3. Solids by weight: 35%.
   4. Drying time (initial set): 30 minutes.

2.04 PENETRATION & TERMINATION SEALANT

A. Termination Sealant shall be HE925 BES Sealant manufactured by Henry; a moisture cure, medium modulus polymer modified sealing compound having the following physical properties:

   1. Compatible with sheet air barrier, roofing and waterproofing membranes and substrate.
   2. Complies with Fed. Spec. TT-S-00230C, Type II, Class A.
   3. Complies with ASTM C 920, Type S, Grade NS, Class 25.
   4. Elongation: 450 – 550%.
   5. Remains flexible with aging.
   6. Seals construction joints up to 1 inch wide.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Verify that surfaces and conditions are ready to accept the Work of this section. Notify Architect in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.

C. All surfaces shall be sound, dry, clean and free of oil, grease, dirt, or other contaminants. Fill voids and gaps in substrate to provide an even plane.

D. Do not proceed with application of air barrier membrane when rain is expected within 24 hours.

E. Condition materials to room temperature prior to application to facilitate handling.

3.02 SURFACE PREPARATION

A. Ensure all preparatory work is complete prior to applying primary air barrier membrane.
B. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
C. Apply primer at rate recommended by manufacturer to all areas to receive self-adhering sheet air/vapor barrier membrane and or through-wall flashing membrane as indicated on drawings by roller or spray and allow minimum 30 minute open time. Primed surfaces not covered by self-adhering membrane or self-adhering through-wall flashing membrane during the same working day shall be re-primed.

3.03 INSTALLATION OF AIR BARRIER SYSTEM

A. JOINT TREATMENT

1. Seal joints ¼ inch and less between concrete masonry units and steel with joint treatment sealant.
   a) Fill joint with approved joint treatment sealant ensuring contact with all edges of panel. Strike flush any excess sealant over joint layer to form a continuous layer over the joint.

2. Seal gaps and voids or irregular joints greater than ¼ inch with a strip of self-adhering air/vapor barrier transition membrane lapped a minimum of 1 1/2 inches on both sides of the joint.
   a) Prime surfaces as per manufacturers' instructions and allow to dry.
   b) Align and position self-adhering air/vapor barrier transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.
   c) Roll all laps and membrane with a counter top roller to ensure seal.

3. Alternately, joints not exceeding 1/8 inch can be sealed with yellow open weave glass fabric.
   a) Apply yellow open weave glass fabric centered over joint followed by a 1/8 inch (120mils) thick trowel application of air/vapor barrier membrane.
   b) Allow to dry prior to application of primary vapor permeable air barrier membrane.

B. INSIDE AND OUTSIDE CORNERS

1. Seal inside and outside corners with a strip of self-adhering transition membrane extending a minimum of 3 inches on either side of the corner detail.
   a) Prime surfaces as per manufacturers' instructions and allow to dry.
   b) Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.
   c) Roll all laps and membrane with a counter top roller to ensure seal.

C. CRACK TREATMENT – Concrete Masonry Units

1. Seal cracks over 1/16 inches with a strip of self-adhering transition membrane lapped a minimum of 1 ½ inches on both sides of the crack.
   a) Prime surfaces as per manufacturer's instructions and allow to dry.
   b) Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.
   c) Roll all laps and membrane with a counter top roller to ensure seal.
2. Alternately, static cracks 1/16 inch to 1/8 inch can be sealed with primary air barrier

membrane.

a) Fill crack with primary air barrier membrane.
b) Allow to dry prior to application of primary vapor permeable air barrier membrane.

D. TRANSITON AREAS

1. Tie-in to structural beams, columns, floor slabs, foundation walls, roofing systems and at the interface of dissimilar materials as indicated in drawings with self-adhering air barrier transition membrane.
   a) Prime surfaces as per manufacturers' instructions and allow to dry.
   b) Align and position self-adhering transition membrane, remove protective film and press firmly into place. Provide minimum 3 inch lap to all substrates.
   c) Ensure minimum 2 inch overlap at all end and side laps of membrane.
   d) Roll all laps and membrane with a counter top roller to ensure seal.

E. WINDOWS, DOORS, LOUVERS AND ROUGH OPENINGS

1. Wrap head and jamb of rough openings with specified self-adhering transition membrane as detailed. Place specified sill flashing membrane across sills and end dam terminations.
   a) Prime surfaces as per manufacturers' instructions and allow to dry.
   b) Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inch overlap at all end and side laps of membrane.
   c) Roll all laps and membrane with a counter top roller to ensure seal.

F. THROUGH-WALL FLASHING MEMBRANE

1. Apply through-wall flashing membrane along the base of brick veneer walls and over window, louver, and door openings as detailed.
   a) Prime surfaces and allow to dry, press membrane firmly into place, over lap minimum 2 inches at all end and side laps. Promptly roll all laps and membrane to ensure the seal.
   b) Applications shall form a continuous flashing membrane and shall extend up a minimum of 8 inches up the insulated concrete form wall.
   c) Seal the top edge of the membrane where it meets the substrate using termination sealant. Trowel-apply a feathered edge to seal termination to shed water.
   d) Install through-wall flashing membrane and extend 1/2 inch from outside edge of veneer. Provide "end dam" flashing as detailed.

G. PRIMARY AIR BARRIER

1. Apply by spray or flat trowel a complete and continuous unbroken film of liquid air and rain barrier membrane.
   a) For temperatures above 40 degrees F and rising, apply single component water based elastomeric emulsion air barrier membrane at a rate of18.6 sq.ft/gallon to a uniform wet film thickness of 90 mils.

2. Spray apply or trowel around all projections and penetrations ensuring a complete and continuous air barrier membrane. Lap liquid applied membrane 1 inch over self-

adhering membranes to seal leading edge.

3. Allow air barrier membrane to dry as per manufacturers recommendations prior to placement of insulating materials.

3.04 APPLICATION OF TERMINATION SEALANT

A. Seal membrane terminations, heads of mechanical fasteners, embedded brick ties, around penetrations, duct work, electrical and other apparatus extending through the primary water resistive air barrier membrane and around the perimeter edge of membrane terminations at window, louver, and door frames with specified termination sealant.

3.05 FIELD QUALITY CONTROL

A. Make notification when sections of the Work are complete to allow review prior to covering air barrier system.

3.06 PROTECTION

A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
B. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer.
C. Damp substrates shall not be inhibited from drying out. Do not expose the backside of the substrate to moisture or rain.
D. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane. Drying time varies depending on temperature and relative humidity. Protect the air barrier Work against wet weather conditions for a minimum of 24 hours.

END OF SECTION 07272

SECTION 07320 - CLAY TILE ROOFING

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of work is indicated on drawings.
B. Types of roof tile to be used: **Spanish mission-style clay tiles**.

1.3 SPECIAL PROJECT WARRANTY:

A. Provide written warranty, signed by Manufacturer of primary roofing materials and his authorized Installer, agreeing to replace/ repair defective materials and workmanship as required to maintain roofing system in watertight condition.

Warranty period is 10 years after date of substantial completion.

2.0 PART 2 - PRODUCTS

2.1 CONCRETE TILES:

A. Profile Tiles: Manufacturer's standard cement and sand mix, molded, interlocking tiles.
B. Spanish Mission style - barrel
C. Class A, water resistant tiles
D. Nom. Size: 10 1/2" x 14" long, for 3" min head-lap, two pre-drilled nailholes.
E. Manufacturer: Original manufacturer is Altusa for Almar Tile Co. Reclaimed tile brokers or approved equal will be required to provide the needed tile for completion.
F. Color: matching existing:
Trim tiles: Roof ridges, hip and gable end tiles and closure tiles at eaves.

2.2 UNDERLAYMENT AND ACCESSORY MATERIALS:

A. Underlayment Membrane: Self-adhering rubberized asphalt bonded to flexible polyethylene sheet not less than 56 mils thick:

Acceptable manufacturers:
a. Ice and Water Shield: Peel and Stick **Grace** Ultra by W. R. Grace & Co. (30 mil, 300 °F)
b. Water and Ice Protection WIP 300 HT by **Carlisle** (40 mil, 250 °F)
c. Titanium PSU30 Synthetic Roofing Underlayment by **InterWrap** (45 mil, 240 °F)

B. Nails: Copper, min. 11 gage, of sufficient length to penetrate roof sheathing as per manufacturer's recommendations.

C. Flashing: See Metal Flashing Section 07600.

3.0 PART 3 - EXECUTION

3.1 INSPECTION:

A. Examine substrate and conditions under which shingling work is to be performed and notify Contractor in writing of unsatisfactory conditions. Do not proceed with shingling work until unsatisfactory conditions have been corrected.

3.2 PREPARATION OF SUBSTRATE:

A. Clean substrate of any projections and substances detrimental to shingling work. Cover knotholes or other minor voids in substrate with sheet metal flashing secured with roofing nails.

B. Coordinate installation of shingles with flashing and other adjoining work to ensure proper sequencing. Do not install shingle roofing until all vent stacks and other penetrations through roofing have been installed and are securely fastened against movement.

3.3 INSTALLATION:

A. Install roofing material per written manufacturer's recommendations. Care shall be taken to ensure both horizontal and vertical alignment on the roof. Foreign matter shall be cleaned from all areas. Cracked or broken tiles shall not be acceptable and shall not remain on the roof.

B. Underlayment: Apply one layer of membrane horizontally over entire surface to be shingled, lapping succeeding courses as per manufacturer's recommendation.

C. Install metal flashing and vent flashing as indicated and in accordance with details and recommendations of concrete roof tile section of "The NRCA Roofing and Waterproofing Manual".

D. Comply with installation details and recommendations of NRCA Steep Roofing Manual.

3.4 CLEANING: Clean roofing tiles using commercial washing equipment and detergents recommended for this type of application.

END OF SECTION 07320.

SECTION 07410 – PRE-FORMED METAL ROOFING – ALTERNATE #2

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

1. **Pre-painted galvanized** formed sheet panels for standing seam installation.

1.3 QUALITY ASSURANCE:

A. Performance Test Standards: Provide preformed panel systems which have been pretested and certified by manufacturer to provide specified resistance to air and water infiltration and structural deflection and failure when installed as indicated and when tested in accordance with AAMA 501, "Methods of Test for Metal Curtain Walls".

B. Manufacturer: Obtain products from a single manufacturer.

C. Installer: A firm with not less than 5 years of successful experience in installation of roofing systems similar to those required for this project and which is acceptable to or licensed by manufacturer of primary roofing materials.

Work associated with metal roofing, including (but not limited to) vapor retarders, flashing and counterflashing, expansion joints, and flexible sheet joint sealers, is to be performed by Installer of metal roofing.

D. Wind resistance of roofs: Roof decks and coverings shall be designed for wind loads in accordance with the Florida Building Code and tested in accordance with UL580 or ASTM E1592 or TAS 125. Margin of safety of 2:1 shall be applied to all wind uplift resistance test results except when a margin of safety is specified in the test standard.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's product specifications and standard details. Submit 12" sample of actual panel showing configuration, gage and finish.

B. Shop Drawings: Show roof panel system with associated flashings and accessories in plan view; sections and details. Include metal thicknesses and finishes, panel lengths, joining details, anchorage details, flashings and any special fabrication provisions for termination and penetrations. Shop drawings to be prepared by metal roof panel manufacturer and sealed by a professional engineer registered in the state of the project location.

Submit shop drawings showing special conditions and recommendations that are inconsistent with the contract drawings. Contractor to submit a roof plan showing the **single seam roof panels for the roof. The contractor may at their option ship factory panels or field fabricate panels from coils to achieve the single length seam.**

1.5 SPECIAL PROJECT WARRANTY:

A. Provide written warranty, signed by Manufacturer of primary roofing materials and his authorized Installer, agreeing to replace/ repair defective materials and workmanship as required to maintain roofing system in watertight condition. Warranty period is **20 years** after date of substantial completion.

2.0 PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide preformed roofing and siding products by one of the following:

1. Galvanized Roofing:
   AEP-Span
   Berridge Company
   Bemo USA
   Fabral Roofing
   Imetco
   H.H. Robertson Company.
   Peterson Roofing
   Zip-Rib

2.2 SHEET MATERIALS:

A. Steel for Painting/Coating: Hot-dip aluminum coated steel sheet, ASTM A 446, Grade A except where higher strength required for performance, G90 zinc coating, surface treated for maximum coating performance. Steel roofing and wall panels; Aluminum-Zinc alloy-coated steel sheet ASTM A 792/A 792M, Class AZ50 or AZ55 coating designation, Grade 40; AEP-Span SR-1224 Galvalume or approved equal:
   1. Surface: Smooth.
   2. Thickness: 24 gage, unless indicated otherwise on drawings.

B. Metal bearing clips: Provide 6" x 6" min. bearing plates to keep the clip from sinking into the rigid insulation.

2.3 METAL FINISHES:

A. Flouropolymer Coating: Factory finish: Full-strength 70% "Kynar 500" coating baked-on for 15 minutes at 450 deg.F (232 deg.C), in a dry film thickness of 1.0 mils, 30% reflective gloss (ASTM D 523), over min. 0.2 mil baked-on modified epoxy primer.
   Color: matching Pac-Clad "**Sierra Tan**"

B. Durability: Provide coating which has been field tested under normal range of weathering conditions for minimum of 20 years without significant peel, blister, flake, chip, crack or check in finish, and without chalking in excess of 8 (ASTM D 659), and without fading in excess of 5 NBS units.

2.4 UNDERLAYMENT

A. Underlayment Membrane: Self adhering rubberized asphalt bonded to flexible polyethylene sheet not less than **30 mils** thick; **high temperature (240 °F minimum)** underlayment:

1. Ice and Water Shield:
    a. **Peel and Stick Grace Ultra** by W. R. Grace & Co. (30 mil, 300 °F)
    b. **Water and Ice Protection WIP 300 HT** by Carlisle (40 mil, 250 °F)
    c. **Titanium PSU30 Synthetic Roofing Underlayment** by InterWrap (45 mil, 240 °F)

    Membrane to meet ASTM D1970 for high temperature underlayment requirements

2.5 MISCELLANEOUS MATERIALS:

A. Fasteners: Manufacturer's standard non-corrosive types, with exterior heads gasketed.

B. Accessories: Except as indicated as work of another specification section, provide components required for a complete roofing/siding system, including trim, copings, fascias, gravel stops, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, louvers, sealants, gaskets, fillers, closure strips and similar items. Match materials/finishes of preformed panels.

2.6 PANEL FABRICATION; PERFORMANCES:

A. Required Performances: Fabricate panels and other components of roof/wall system for the following installed-as-indicated performances:

Roof Loading: See structural drawings for wind loading and live load criteria.
Design Criteria: **160** mph lateral wind forces;
Water Penetration: No significant, uncontrolled leakage at 4 lbs. per sq. ft. pressure with spray test. Water penetration to meet TAS 100 and AAMA 501.1. Test for static head water infiltration to meet ASTM E 2140 and TAS 114. Air infiltration test to meet ASTM E 1680.
Air Infiltration: 0.02 cfm per sq. ft. for gross roof/wall areas, with 4 lbs. per sq. ft. differential pressure.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Comply with panel fabricator's and material manufacturers' instructions and recommendations for installation.

B. Installation Tolerances: Shim and align panel units within installed tolerance of 1/4" in 20'-0" on level/plumb/slope and location/line as indicated, and within 1/8" offset of adjoining faces and of alignment of matching profiles.

C. Seaming: Complete seaming of panel joints by operation of portable power-driven equipment of type recommended by panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers and sealants where indicated and where required for weatherproof performance of panel systems. Provide types of gaskets and sealants/fillers indicated or, if not otherwise indicated, types recommended by manufacturer.

END OF SECTION 07410

SECTION 07530 – FLEXIBLE SHEET ROOFING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Membrane roofing system: **Fully-adhered** membrane roofing system.
2. Flashings and other accessories as indicated on drawings.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by flexible sheet roof (FSR) membrane manufacturer based on testing and field experience.

C. Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7-98.

1. Design wind velocity shall be **160** mph with a wind load; Risk Category II.
2. Design pressures are indicated on structural drawings.

D. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

1.3 SUBMITTALS

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

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.

1. Base flashings and membrane terminations.

C. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

D. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of meeting performance requirements.

E. Maintenance Data: For roofing system to include in maintenance manuals.

F. Warranties: Special warranties specified in this Section.

G. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

B. Manufacturer Qualifications: A qualified manufacturer that has FMG approval for membrane roofing system identical to that used for this Project.

C. Source Limitations: Obtain components for membrane roofing system from roofing membrane manufacturer.

D. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. WARRANTY: Special Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, and other components of membrane roofing system.
2. Warranty Period: **15 years** from date of Substantial Completion.

3. Warranty shall be provided in writing prior to final payment.
4. No freshwater or saltwater exclusions are acceptable.
5. Warranty to meet the standard NDL warranty; 70 mph wind speed.

PART 2 - PRODUCTS

2.1 GENERAL:

A. Performance: Provide roofing materials recognized to be of generic type indicated and tested to show compliance with indicated performances, or provide other similar materials certified in writing by manufacturer to be equal or better than specified in every significant respect, and acceptable to Architect.

B. Compatibility: Provide products which are recommended by manufacturers to be fully compatible with indicated substrates, or provide separation materials as required to eliminate contact between incompatible materials.

C. Products: Thermoplastic Membrane Roofing: **Nominal 60 mil thickness (but not less than 54 mils actual); exposed face to be white in color with a solar reflectance index (SRI) of 78 or greater.**

2.2. ACCEPTABLE PRODUCTS: Contractor may submit one of the following products:

A. PVC Sheet: ASTM D 4434, Type II, Grade 1, fiber reinforced and fabric backed.

1. "**Sarnafil** G410 Feltback" by Sarnafil Inc.

B. PVC Sheet: ASTM D 4434, Type III, fabric reinforced and fabric backed, as follows:

1. Product: Provide "**UltraGuard** PVC" by Johns Manville International, Inc.

C. PVC Sheet: ASTM D 4434, Type IV, fabric reinforced and fabric backed, as follows:

1. Product: Provide "**FiberTite**" by Seaman Corporation.

2.3 AUXILIARY MATERIALS:

1. Sheet Seaming System: Manufacturer's standard materials for sealing lapped joints, including edge sealer to cover exposed spliced edges as recommended by manufacturer of FSR system.

2. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

3. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

4. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane

5. Bonding Adhesive: Manufacturer's standard water-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.

6. Metal termination bars, if required: Manufacturer’s standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

7. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

8. Cant strips, Tapered Edge Strips and Flashing Accessories: Types recommended by manufacturer of FSR material, provided at locations indicated and at locations recommended by manufacturer, including adhesive tapes, flashing cements, and sealants.

9. Slip Sheet: Type recommended by manufacturer of FSR material for protection of membrane from incompatible substrates.

2.4 INSULATING MATERIALS:

1. General: Provide insulating materials to comply with requirements indicated for materials and compliance with referenced standards; in sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths and lengths.

   A. Polyisocyanurate Board Roof Insulation: Rigid, cellular thermal insulation with polyisocyanurate closed-cell foam core and manufacturer's standard facing laminated to both sides; complying with FS HH-I-1972/2, Class 1; aged R-values as designated at mean temperatures indicated, after conditioning per RIC/TIMA Bulletin #281-1; and as follows:

      Surface Burning Characteristics: Maximum flame spread of 25

      Thermal Resistivity: 14.4 at 75 deg F (23.9 deg C) for 2 ½" thick insulation board.

      Provide tapered units as shown to achieve positive roof drainage.

   B. High Density Isocyanurate (Foam Down to existing LWIC with low rise foam adhesive)

      90 psi high density polyisocyanurate roof board with a coated glass facer, provided in 4 ft. x 4 ft. (1.2 m x 1.2 m) and 4 ft. x 8 ft. (1.2 m x 2.4 m) board sizes and in a thickness of 1/2 inch (12.7 mm).

   C. Board Adhesive: A two-component foamable polyurethane adhesive that is applied in one step and sets up in minutes. Dispensed using holders and hoses, available in 10 gal, 30 gal, or 100 gal sets. The minimum ambient and surface temperatures is 40°F (4.4°C) and rising.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

   1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
   2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
   3. Verify that surface plane flatness and fastening of steel roof deck comply with requirements in Division 5 Section "Steel Deck."
   4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 ROOFING INSTALLATION

A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.

1. Install sheet according to ASTM D 5036.

B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.

C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply water-based bonding adhesive to substrate at rate required by manufacturer and immediately install roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

E. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.

H. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

I.

3.4 BASE FLASHING INSTALLATION

A. Install sheet flashings and performed flashing accessories and adhere to substrates according to membrane roofing system manufacturer’s written instructions.

B. Apply solvent-based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

D. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.5 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.

1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

2. Contractor shall provide Architect a Final Statement of Compliance which states that the finished roof membrane complies with the Contract Documents.

B. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

The manufacturer's representative shall inspect the roof membrane within one year of acceptance of the roof membrane by the Board.

3.6 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07530

SECTION 07600 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 SUMMARY

A. Provide flashing and sheet metal components for building construction.
   1. Copings – aluminum and copper.
   2. Gutters and downspouts – aluminum and copper.
   3. Copper flashing and eave metal for clay tile roof.
   4. Exposed metal trim units.
   5. Miscellaneous sheet metal accessories.
   6. Existing copper gutters and downspouts to be remain.

1.02 PERFORMANCE REQUIREMENTS

A. System Design: Provide flashing and sheet metal components that are identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 710.
   1. Design wind speed, velocity and design pressures are indicated on the structural drawings.

1.03 SUBMITTALS

A. Submit for approval samples, shop drawings, product data.
B. Manufacturer Certificates: Signed by roofing manufacturer certifying that flashing and sheet metal components comply with requirements specified in "Performance Requirements" Article.

1.04 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01.A MATERIALS – ALUMINUM:

A. Copings, gutters and downspouts: Minimum **.040" formed aluminum** with welded seams for prefabricated items prior to finish coating. Provide support straps and brackets as required. Support straps for downspouts to be anchored to the wall.

B. Cleats for gutters and flashing: to be one gage heavier than adjacent metal.

C. Finish: Flouropolymer Coating: Full-strength 70% "Kynar 500" coating baked-on for 15 minutes at 450 deg.F (232 deg.C), in a dry film thickness of 1.0 mils, 30% reflective gloss. (ASTM D 523), over min. 0.2 mil baked-on modified epoxy primer.
   Colors: matching Pac-Clad "**Dark Bronze"**

2.0.1.B MATERIALS – COPPER:

A. Copper: 22 mil; **16 ounce copper** (.0216") 24 gauge for roofing copper flashing, eve metal and gutter or downspouts.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Follow recommendations of SMACNA "Sheet Metal Manual". Allow for expansion. Isolate dissimilar materials to prevent galvanic corrosion.

B. Provide an expansion joint construction for gutters in lengths that exceed 50’, per SMACNA recommendations. Coordinate expansion joint locations with downspout locations.

C. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate installation with roofing system and work of other sections to ensure weather tight performance. Anchor securely to structure to withstand inward and outward loads.

D. Restore damaged components and finishes. Clean and protect work from damage.

END OF SECTION 07600

SECTION 07900 - JOINT SEALERS

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. This Section includes joint sealers for the following locations:

1. Multi-Part, Nonsag Urethane Sealant for junctures between masonry and other materials.
2. Multi-Part, Pourable Urethane Sealant for horizontal surfaces of concrete.
3. One-Part Mildew-Resistant Silicone Sealant for around plumbing fixtures and ceramic tile work.
4. Latex-Acrylic Joint Sealants for exposed interior painted applications

B. Sealants for glazing purposes are specified in Division-8 Section "Glass and Glazing."

C. Sealing concealed perimeter joints of gypsum drywall partitions to reduce sound transmission characteristics is specified in Division-9 Section "Gypsum Drywall."

D. Sealing tile joints is specified in Division-9 Section "Tile."

1.3 SYSTEM PERFORMANCES:

A. Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.4 SUBMITTALS:

A. Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application.

B. Manufacturer's Standard Color Chart.

1.5 QUALITY ASSURANCE:

A. Installer Qualifications: Engage an Installer who has successfully completed within the last 3 years at least 3 joint sealer applications similar in type and size to that of this Project.

1.6 PROJECT CONDITIONS:

A. Environmental Conditions: Do not proceed with installation of joint sealers When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.

2.0 PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL:

A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Materials:

1. One-Part Nonsag Urethane Sealant for junctures between masonry and other materials: Type M, Grade NS, Class 25, capable of withstanding an increase and decrease of 50%; per ASTM C 920.
   a. Acceptable manufacturers:
      Dow 790 or approved equal

2. Multi-Part Pourable Urethane Sealant for horizontal surfaces of concrete. Type M, Class 25.
   a. Acceptable manufacturers:
      Pecora Urexpan NR-200
      Sonneborn Sonolastic PvJtSt
      Tremco THC-900

3. One-Part Mildew Resistant Silicone Sealant for around plumbing fixtures and ceramic tile work. Type S, Grade NS; Class 25.
   a. Acceptable manufacturers:
      Dow Corning 786 Silicone rubber, or approved equal.

4. Latex-Acrylic Sealant for exposed interior painted applications. Acrylic Emulsion Sealant, one part, non-sag, mildew resistant, comply with ASTM C 834.
   a. Acceptable manufacturers
      Acrylic latex; Tremco Acrylic Latex or approved equal.

5. Seam sealant for small metal to metal joints; Tremco Seam Sealer or approved equal.

6. Precompressed expanding foam secondary sealant; Emseal Greyflex or approved equal.

7. Miscellaneous primers, bond breakers, and backer rods to be compatible with sealant and adjacent surfaces.

8. Fire-retardant sealant; refer to Division 7 Section “Firestopping”.

9. Provide sealants in colors as selected from manufacturer's standards. Sealants shall match adjacent surfaces unless otherwise specified.

2.2 JOINT SEALANT BACKING:

A. General: Provide sealant backings of material and type which are nonstaining; are compatible with joint substrates, sealants, primers and other joint filers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonwaxing, nonextruding strips of flexible, nongassing plastic foam of material indicated below; nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance. Either open-cell polyurethane foam or closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer, for cold-applied sealants only.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint

surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.3 MISCELLANEOUS MATERIALS:

A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer-substrate testsand field tests.

B. Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

C. Masking Tape: Provide nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

2.4 JOINT FILLERS FOR CONCRETE PAVING:

A. Bituminous Fiber Joint Filler: Preformed strips of Asphalt Saturated Fiberboard, complying with ASTM D 1751.

3.0 PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellants; water; surface dirt; and frost.

2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

3. Remove laitance and form release agents from concrete. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer

manufacturer.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which 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 SEALERS:

A. General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated. Comply with requirements of ASTM 962, 804, C790, and C 919.

B. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

C. Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.

3.4 CLEANING:

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.5 PROTECTION:

A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they 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 sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF SECTION 07900

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide steel doors.
B. Provide steel door frames.
C. All exterior doors and frames shall be hurricane rated with impact glass.

1.02 SUBMITTALS

A. Submit for approval samples, shop drawings, product data.
B. Doors, frames, hardware, and steel frame components shall be as shown on shop drawings and schedules and shall be approved by the Architect before fabricating any material; this supplier shall submit complete shop drawings and schedules to the Architect for approval. Submittals are to include, but not limited to, location, size, swings, anchoring details, materials, vision lites and louvers. Architect may request samples or other additional information.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
B. Test Reports and Labeling Compliance: Where fire-rated door openings are indicated or required, provide fire-rated door and frame assemblies that comply with N.F.P.A. 80-2000 "*Standards for Fire Doors and Windows*", and have been tested in accordance with ASTME 152 "*Standard Methods of Fire Tests of Door Assemblies"*. Testing shall have been at a facility operated by Underwriters Laboratories or Warnock-Hershey. A label showing compliance shall be attached to each frame and door in a location readily visible to inspecting authorities. Note: Fire-rated doors shall be factory prepared for hardware so that it maintains the fire rating.
C. Supplier: To the greatest extent possible, obtain all doors and frames from one manufacturer. Hollow metal supplier shall have in his employ a Certified Door Consultant (CDC) or person of equal experience who will be available at reasonable times to consult with the Architect or Owner regarding the project. The hollow metal supplier shall have been in the business of fabricating hollow metal for a period of not less than ten (10) years and shall maintain an office, a fabrication shop, and a stocking warehouse within a distance of fifty miles of the School District's central office at the JE Hall center, 30 East Texar drive, Pensacola, Fl., - 32503- to properly maintain and service the project after completion
D. The manufacturer will be required to verify the State of Florida's Product Approval number, submitted in the shop drawing Submittal phase.

1.04 MANUFACTURERS:

A. Specifications apply to steel doors, steel door frames, steel frame components and architectural stick assemblies such as side-lites, borrowed lites, transom frames and window walls as detailed on architectural plans and schedules. Manufacturer shall be one of the following:

1. Steelcraft - Cincinnati, Ohio.
2. Curries - Mason City, Iowa.
3. Ceco Door – Milan, Tennessee

1.05 PACKAGING/STORAGE AND HANDLING:

A. Doors and frames are to be shipped to the jobsite clearly marked in a manner easily correlated to the approved schedules and the architectural plans. Doors are to be provided in manufacturer's original cartons.

B. Store doors and frames at the jobsite in an area protected from the weather. Do not store frames and doors in the open. Lay doors flat on wooden sills minimum of 4" from floor. Provide a ¼" space between doors to promote air circulation. Do not stack other materials on top of doors. Avoid the use of un-vented plastic or canvas coverings that may create humidity chambers. If door wrapper becomes wet, remove carton immediately.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials and Finishes:
1. Doors, frames, and frame components shall be manufactured from hot-dipped galvanized steel, G60 zinc coating conforming to ASTM specification A525.
2. All doors, frames, and frame components shall be cleaned, phosphatized and finished as standard with one coat of baked-on rust inhibiting prime painted in accordance with the ANSI A224.1 "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames."
3. Doors and frame shall be cleaned, phosphatized and finished with a baked-on rust inhibiting primer in compliance with 200-hour salt spray and 500-hour humidity test in accordance with ASTM test method B117 and D1735.

B. Construction of Doors:
1. Doors shall be full flush fabricated from hot-dipped galvanized steel (see Materials and Finishes section above), **16-gage** for 1 3/4" doors. Doors shall be reinforced, stiffened, sound deadened and insulated with impregnated Kraft honeycomb core completely filling the inside of the doors and laminated to inside faces of both panels. Doors shall have continuous vertical mechanical interlocking joints at lock and hinge edges with visible edge seams. Doors shall have beveled (1/8" in 2") hinge and lock edges. Top and bottom steel reinforcement channels shall be 14-gage and spot welded within the doors. Hinge reinforcements shall be 8-gage for 1 3/4" doors. Lock reinforcements shall be 16-gage and closer reinforcements shall be 14-gage. Galvanized doors shall have galvanized hardware reinforcements. Adequate reinforcements shall be provided for other hardware as required.
2. Provide thermally improved doors with maximum U-value of 0.24 btu/hr/sq.ft./degree F (ASTM C236) for all exterior doors and elsewhere as noted.
3. Door lite units shall be screw type, not snap in.
4. Door lites shall not be more than half glass.

C. Construction of Frames:

1. Flush Frames: Flush frames shall be formed from **16-gage** galvanized steel (see *Materials and Finishes* section B.6 above). Frames shall have 2" faces. Masonry frames shall typically have a 4" head with a 7'-0" door opening. Frames shall be set-up and arc-welded. Mitered corners shall have reinforcements with 4 integral tabs for secure and easy interlocking of jambs to head. Frames shall be supplied with factory-installed rubber bumpers, three (3) per strike jamb and two (2) per head for pair of doors. Frames for 1 3/4" doors shall have 8-gage steel hinge reinforcements, and frames shall be prepared for 4 1/2" x 4 1/2" standard or heavy weight template hinges. Strike reinforcements shall be 16-gage and prepared for an ANSI-A115.1-2 strike. Metal plaster guards shall be provided for all mortised cutouts. Reinforcements for surface closer shall be 14-gage steel. Galvanized frames shall have galvanized hardware reinforcements. Adequate reinforcements shall be provided for other hardware when required. Frames shall be furnished with a minimum of six wall anchors and two base anchors of manufacturer's standard design. Welded frames shall have a spreader bar securely welded to bottom of jambs. Spreader bar is for protection of frames during shipment and shall be removed before installing frames. Do not use this bar as an installation aid.
2. When specified, steel panels shall be 1 ¾" thick and made of same construction and materials as doors.
3. Frames for hurricane rated doors shall be 14-gage with heavy duty hinges.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Before installation begins, hollow metal supplier shall attend a pre-installation conference with the Contractor, Installer and Architect to discuss the installation procedure and clarify any questions about the installation.

B. Door and frames shall be installed in accordance with Door and Hardware Institute publication, "*The Installation of Commercial Doors and Steel Frames"* and manufacturer's instructions.

C. Fill all frames in masonry walls with grout and caulk top and sides for proper sealing. Door frames shall be set in their designated opening before being filled with grout.

D. Thresholds on exterior openings shall be embedded in a bed of sealant.

E. Fabricate work to be rigid, neat and free from seams, defects, dents, warp, buckle, and exposed fasteners. Install doors and frames in compliance with SDI-100, NFPA 80, and requirements of authorities having jurisdiction.

F. Touch-up damaged coatings and leave ready to receive finish painting.

G. When installation is complete, the hollow metal supplier shall visit the jobsite and do a walk-through inspection with the Contractor and Installer. Check frames and doors for proper installation and inform Contractor and Architect of any discrepancies.

END OF SECTION 08110

SECTION 08211 - FLUSH WOOD DOORS

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY:

A. Extent and location of each type of wood door is indicated on drawings and in schedules.

B. Types of doors: Solid core flush wood doors with **red oak veneer** faces.

C. Finish: At contractor's option provide factory-finishing or job site painting - see section 09900 - Painting for job site painting
Note: contractor to provide in his base bid the finishing of wood doors.

D. Factory-prefitting to frames and factory-premachining for hardware for wood doors is included in this section.

1.3 SUBMITTALS:

A. Product Data: Door manufacturer's technical data, including details of core and edge construction, and factory-finishing specifications.

B. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.

C. Samples: Submit samples, 12" square.

1.4 QUALITY ASSURANCE:

A. Quality Standards: Comply with the following standards:

NWWDA Quality Standard: I.S.1 "Industry Standard for Wood Flush Doors", of National Wood Window and Door Association (NWWDA).

AWI Quality Standard: "Architectural Woodwork Quality Standards"; including Section 1300 "Architectural Flush Doors", of Architectural Woodwork Institute (AWI) for grade of door, core construction, finish and other requirements exceeding those of NWWDA quality standard.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standards and recommendations of NWWDA pamphlet "How to Store, Handle, Finish, Install, and Maintain Wood Doors", as well as with manufacturer's instructions.

1.6 PROJECT CONDITIONS:

A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period to comply with the following requirements applicable to project's geographical location:

Referenced AWI quality standard including Section 100-S-3 "Moisture Content".

Referenced WIC quality standard including "Section 1 - General Information - Technical Bulletin".

2.0 PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Acceptable Manufacturers:

1. Algoma Hardwoods, Inc.
2. Eggers Industries, Architectural Door Division.
3. Mohawk Flush Doors, Inc.
4. Weyerhauser Company.
5. Buell Door Company.

2.2 INTERIOR FLUSH WOOD DOORS:

A. Solid Core Doors for Transparent Finish: Premium grade, **Natural red oak veneer**, **rift cut**. Solid core construction: 5 ply or 7 ply doors. Note: All doors for this project to be the same construction with the same wood species veneer.

B. Door stops: **Wood species** matching the door with concealed fasteners.

2.3 FABRICATION:

A. Fabricate flush wood doors to produce doors complying with AWI for tolerances and alignment.

2.4 FACTORY FINISHING:

A. General: Comply with referenced AWI quality standard including Section 1500 "Factory Finishing".

B. Transparent Finish: Comply with requirements indicated for grade, finish system, staining effect and sheen.
AWI Grade: Premium.

Finish: AWI System #2 catalyzed lacquer or #3 alkyd-urea conversion varnish as standard with manufacturer.

3.0 PART 3 – EXECUTION

3.1 EXAMINATION:

A. Examine installed door frames prior to hanging door:
Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads. Reject doors with defects.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

A. Hardware: For installation see Division-8 "Finish Hardware" section of these specifications.

B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and of referenced AWI standard and as indicated.

C. Fitting Clearances for Doors: Provide 1/8" at jambs and heads; and 1/8" from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold.

D. Bevel doors 1/8" in 2" at lock and hinge edges.

END OF SECTION 08211

SECTION 08350 - ROLLING COUNTER DOOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY

A. Type of Door: **Manual overhead coiling type shutter** were indicated on drawings

B. Provide complete operating door assemblies including door curtains, guides, counterbalance mechanism, hardware, operators, and installation accessories.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of overhead coiling door. Provide operating instructions and maintenance information, and complete information describing fire release system including electrical rough-in instructions.

B. Label Certification: Submit UL certification for doors and frames that each assembly has been constructed with materials and methods equivalent to requirements for labeled construction.

1.4 QUALITY ASSURANCE

A. Furnish each overhead coiling door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.

B. Insert and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of units. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

Provide Door by Cornell "model PFI-1" (non fire rated)
Or equal by:
Atlas Door Corp.
The Cookson Co.
Kinnear Div., Harsco Corp.
Overhead Door Corp.
Raynor Manufacturing Co.
Windsor Door Div., The Ceco Corp.
Type: Galvanized steel , counterbalanced, with hood and brackets.
Finish: Powder Coat, factory painted. Color as selected by architect from manufacture's standard colors.

2.2 OPERATION:

A. Manual Push-Up Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbs. Adjust operating mechanism so that curtain can be easily stopped at any point in its travel and to remain in position until movement is reactivated.

Provide galvanized steel lifting handle

Provide slide bolt lock for kitchen counter door on inside bottom bar.

B. Activation:
For kitchen area provide fusable link for UL approved.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports in accordance with final shop drawings, manufacturer's instructions, and as specified herein.

B. Upon completion of installation including work by other trades, lubricate, test and adjust doors to operate easily, free from warp, twist or distortion and fitting for entire perimeter.

END OF SECTION 08350

SECTION 08410 - ALUMINUM ENTRANCES AND FIXED FRAMING

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY:

A. Extent of aluminum entrances and fixed framing is indicated on drawings and schedules.

B. Aluminum entrances and fixed framing types required for the project include:

1. **Exterior entrance doors,** meeting impact resistant ratings per the State of Florida for coastal construction.
2. **Aluminum curtainwall and storefront fixed-frames,** meeting impact resistant ratings per the State of Florida for coastal construction**.**

C. Glazing: Refer to "Glass and Glazing" Section 08800 for glazing requirements for aluminum entrances and storefronts. All exterior glazing to be **Impact Resistant** to meet the requirements for the state of Florida for coastal construction.

D. Some Door Hardware for the Aluminum Entrances is included in this Section.

1.3 SYSTEM DESCRIPTION:

A. Performance Requirements: Provide aluminum entrance and storefront assemblies that comply with specified performance characteristics. Each system shall be tested by a recognized testing laboratory or agency in accordance with specified test methods. Provide certified test results.

B. Thermal Movement: Provide systems capable of withstanding thermal movements resulting from an ambient temperature range of 120 deg.F.

C. Wind Loading: Provide assemblies capable of withstanding a uniform test pressure of **160 mph** winds and as determined by the manufacturer based on the requirements of the latest Edition of the Standard Building Code and tested in accordance with ASTM E 330.

D. Transmission Characteristics of Entrances: Air Infiltration: Provide doors with an air infiltration rate of not more than 0.50 CFM for single doors and 1.0 for pairs of doors when tested in accordance with ASTM E 283 at an inward test pressure differential of 1.567 psf.

E. Transmission Characteristics of Fixed Framing: Air Infiltration of not more than 0.06 cfm per sq. ft. of fixed area per ASTM E-283 and no uncontrolled water penetration per ASTM E-331 at pressure differential of 6.24psf (excluding operable door edges).

F. Structural performance of fixed framing:
Max. Deflection = 1/175 of the span
Allowable stress with safety factor = 1.65

G . The manufacturer will be required to verify to the architect, the State of Florida's Product approval number before the product will be reviewed in the shop drawing Submittal phase.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's product specifications, technical product data, standard details.

B. Shop Drawings: Submit shop drawings for fabrication and installation of entrances and storefronts, including the following:

1. Elevations.
2. Detail sections of typical composite members.
3. Hardware, mounting heights.
4. Anchorages and reinforcements.
5. Expansion provisions.
6. Glazing details.

C. Samples: Submit 12" long sections of extrusions showing color and finish.

1.5 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Provide entrances and fixed framing produced by manufacturers with not less than 5 years successful experience in the fabrication of assemblies of the type and quality required.

1.6 PROJECT CONDITIONS:

A. Field Measurements: Check openings by field measurement before fabrication to ensure proper fitting of work; show measurements on final shop drawings.

1.7 WARRANTY:

A. Warranty period for aluminum entrances and storefront is 5 years after the date of substantial completion.

2.0 PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

1. Entrance doors: **Medium** Stile equal to **Coral MS-381** outswing entrance doors:

2. Fixed frames: **Coral PW257 Curtainwall or Coral FL550 Storefront fixed frames** (depending which frame system is needed to meet design criteria). Systems meeting the requirements by the following manufacturers:
   a. Kawneer
   b. YKK AP
   c. Vistawall Architectural Products.
   g. EFCO

2.2 MATERIALS:

A. Aluminum Members: Provide alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.

B. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by the manufacturer to be noncorrosive and compatible with aluminum components, hardware, anchors and other components.

Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.

Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For the application of hardware, use fasteners that match the finish of member or hardware being fastened.

Provide Phillips flat-head machine screws for exposed fasteners.

C. Concealed Flashing: Provide 26 gage minimum dead-soft stainless steel, or 0.026" minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.

D. Brackets and Reinforcements: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.

E. Concrete/Masonry Inserts: Provide concrete and masonry inserts fabricated from cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.

F. Compression Weatherstripping: Provide the manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.

G. Glass and Glazing Materials: Glass and glazing materials shall comply with requirements of Section 08800 "Glass and Glazing".

2.3 COMPONENTS:

A. Fixed Framing System: Provide framing system with provisions for glass replacement. Shop-fabricate and preassemble frame components where possible.

B. Aluminum Door Frames, including aluminum sliders: Fabricate tubular and channel frame assemblies, as indicated, with welded or mechanical joints in accordance with manufacturer's standards; reinforce as necessary to support required loads.

C. Stile-and-Rail Type Aluminum Doors:

1. Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods of j-bolts.
2. Design: Provide 1-3/4" thick doors; Medium stile.

3. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of stiles and rails. Provide snap-on extruded aluminum square glazing stops, with exterior stops anchored for non-removal.

2.4 HARDWARE:

A. Provide manufacturer's heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required, finished to match door.

B. Overhead Surface Closers: Provide overhead closers; comply with ANSI A156.4, grade 2. Comply with manufacturer's recommendations for size of closer, depending on door size, exposure to weather and anticipated frequency of use.

Include the following: Automatic hold open.

C. Pulls and Push bars: Provide manufacturer's standard pull and horizontal push bar in finish to match frames.

For standard doors: 1" Bronze anodized push/pulls: Equal to Kawneer "**Architects Classic**" CS-9 Pull and CP-II Push, mount back-to-back.

Finish: Clear anodized aluminum or satin stainless steel.

D. Weather stripping: Provide sliding weatherstripping retained in adjustable strip mortised into door edges.

E. Thresholds: Provide extruded aluminum threshold the full width of door openings. Set in full bed of butyl-rubber or polyisobutelene mastic sealant:

Manufacturer: Pemco model 2005AV or approved equal.

F. Exit Devices: Panic devices by the aluminum door supplier. Panic hardware to be part of a tested assembly. **See Hardware Schedule – Section 087000 for doors that require panic devices, which are to be provided by the aluminum door supplier.**

2.5 FABRICATION:

A. General: Sizes of door and frame units, and profile requirements, are indicated on drawings. Variable dimensions are indicated, with maximum and minimum dimensions required to achieve design requirements and coordination with other work.

B. Prefabrication: Before shipment to the project site, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble components only as necessary for shipment and installation. Pre-glaze door and frame units to greatest extent possible.

Do not drill and tap for surface-mounted hardware items until time of installation at project site. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal wore to prevent damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.

C. Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.

D. Reinforcing: Install reinforcing as required for hardware and necessary for performance requirements, sag resistance and rigidity.

E. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator that will prevent corrosion.

F. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

G. Uniformity of Finish: Abutting extruded aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.

H. Fasteners: Conceal fasteners wherever possible.

2.6 FINISHES:

A. For all frames and doors.
Dark Bronze Anodized Finish: Provide NAAMM AA-M12C22A41, Class II, 5-year warranty; (non-specular as fabricated mechanical finish; chemical etch, medium matte; minimum thickness 0.7 mil) **dark bronze,** anodic coating.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION:

A. Comply with manufacturer's instructions and recommendations for installation.

B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Provide proper support and anchor securely in place.

C. Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials. Comply with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85.

D. Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

E. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealants, fillers, and gaskets.

F. Refer to "Glass and Glazing" Section 08800 installation of glass.

3.2 ADJUSTING:

A. Adjust operating hardware to function properly, for smooth operation without binding, and for weathertight closure.

3.3 CLEANING:

A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.

B. Clean glass surfaces after installation. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.4 PROTECTION:

A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and fixed framing will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION 08410.

SECTION 08710 – FINISH HARDWARE

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Definition: "Finish Hardware" includes items known commercially as finish hardware which are required for doors.

B. Extent of finish hardware required is indicated on drawings and in schedules.

C. Types of finish hardware required include the following:
Hinges
Lock cylinders and keys
Lock and latch sets
Exit Devices
Closers
Thresholds

1.3 QUALITY ASSURANCE:

A. Manufacturer: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.

B. Supplier: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware in the project's vicinity for a period of not less than 3 years.

1.4 SUBMITTALS:

A. Product Data: Provide Product Data: Manufacturer’s product data sheets including details, materials description components and profiles, operational descriptions and finishes. Provide Door Hard Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

B. Hardware Schedule: Submit final hardware schedule in manner indicated below. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.

C. Final Hardware Schedule Content: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
Type, style, function, size and finish of each hardware item.
Name and manufacturer of each item.
Fastenings and other pertinent information.
Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.

Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
Mounting locations for hardware.
Door and frame sizes and materials.
Keying information.

D. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

E. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.

2.0 PART 2 - PRODUCTS

2.1 SCHEDULED HARDWARE:

A. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of finish hardware is indicated in the Finish Hardware Data Sheet and Hardware Schedule at the end of this section. Products are identified by using hardware designation numbers of the following:

B. Manufacturer's Product Designations: One or more manufacturers are listed for each hardware type required. An asterisk (*) after a manufacturer's name indicates whose product designation is used in the Hardware Schedule for purposes of establishing minimum requirements. Provide either the product designated, or, where more than one manufacturer is listed, the comparable product of one of the other manufacturers which comply with requirements including those specified elsewhere in this section.

C. ANSI/BHMA designations used elsewhere in this section or in schedules to describe hardware items or to define quality or function are derived from the following standards. Provide products complying with these standards and requirements specified elsewhere in this section.

Butts and Hinges: ANSI A156.1 (BHMA 101)
Locks and Lock Trim: ANSI A156.2 (BHMA 601)
Exit Devices: ANSI A156.3 (BHMA 701)
Door Controls - Closers: ANSI A156.4 (BHMA 301)
Auxiliary Locks: ANSI A156.5 (BHMA 501)
Architectural Door Trim: ANSI A156.6 (BHMA 1001)
Template Hinge Dimensions: ANSI A156.7
Door Controls – Overhead Holders: ANSI A156.8 (BHMA 311)
Interconnected Locks & Latches: ANSI A156.12 (BHMA 611)
Mortise Locks & Latches: ANSI A156.13 (BHMA 621)
Auxiliary Hardware: ANSI A156.16 (BHMA 1201)
Materials & Finishes: ANSI A156.18 (BHMA 1301)

2.2 MATERIALS AND FABRICATION:

A. Hand of door: Drawings show direction of swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

B. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable nameplates), except in conjunction with required UL labels and as otherwise acceptable to Architect.

C. Manufacturer's identification will be permitted on rim of lock cylinders only.

D. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI A156 series standard for each type hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

E. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.

F. Furnish screws for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

G. Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.

H. Tools and Maintenance Instructions for Maintenance: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.

2.3 HINGES, BUTTS AND PIVOTS:

A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

B. Screws: Furnish Phillips flat-head or machine screws for installation of units, except furnish Phillips flat-head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges or pivots.

C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

Steel Hinges: Steel pins.
Non-ferrous Hinges: Stainless steel pins.
Interior Doors: Non-rising pins.
Tips: Flat button and matching plug, finished to match leaves, except where hospital tip (HT) indicated.
Number of hinges: Provide number of hinges indicated but not less than 3 hinges for door leaf for doors 90" or less in height and one additional hinge for each 30" of additional height.

2.4 LOCK CYLINDERS AND KEYING:

A. General: Supplier will meet with Owner to finalize keying requirements and obtain final instructions in writing.

B. Existing System: Grand master key the locks to the Owner's existing system, with a new master key for the project.

C. Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster), either new or integrated with Owner's existing system.

D. Equip locks with manufacturer's special 6-pin tumbler cylinder, with construction master key feature, which permits voiding of construction keys without cylinder removal.

E. Permanently inscribe each key with number or lock that identifies cylinder manufacturer key symbol, and notation "DO NOT DUPLICATE".

F. Key Material: Provide keys of nickel silver only.

G. Key Quantity: Furnish 3 change keys for each lock; 5 master keys for each master system; and 5 grandmaster keys for each grandmaster system.

H. Furnish one extra blank for each lock.

I. Deliver keys to key control system manufacturer.

2.5 LOCKS, LATCHESANDBOLTS:

A. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set.

B. Lock Throw: Provide 5/8" minimum throw of latch and deadbolt used on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

Provide 1/2" minimum throw on other latch and deadlock bolts.

C. Flush Bolt Heads: Minimum of 1/2" diameter sods of brass, bronze or stainless steel, with minimum 12" long rod for doors up to 7'-0" in height. Provide longer rods as necessary for doors exceeding 7'-0" in height.

E. Rabbeted Doors: Where rabbeted door stiles are indicated, provide special rabbeted front on lock and latch units and bolts.

2.6 CLOSERS AND DOOR CONTROL DEVICES:

A. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather and anticipated frequency of use.

B. Provide parallel arms for all overhead closers.

Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1) provisions for door opening force and delayed action closing. Opening force to meet the requirements of ADA (American Disabilities Act)

2.7 HARDWARE FINISHES:

A. See Hardware Sets listed below.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION:

A. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations.

C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and counter sink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

3.2 ADJUSTANDCLEAN:

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Clean adjacent surfaces soiled by hardware installation.

3.3 ACCEPTABLE MANUFACTURERS:

A. Butts and Hinges
Stanley
Hager
Mckinney

B. Locks and Lock Trim
Corbin/Russwin ML2000 and CL33000
Trim Design: **“Princeton”**

C. Exit Devices:
Von Duprin 99 Series

D. Door Closers
Provide Door Closers, Surface Mounted (Commerical Duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with compete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard. Manufacturers: Corbin Russwin Hardware (RU) – DC6000 Series or equal. Color: BHMA 693 (black).

E. Door Trim
Baldwin
Ives
Trimco
Quality
Von Duprin

F. Door Controls
Rixson
Glynn Johnson
Russwin/Corbin

3.4 HARDWARE SCHEDULE:

Note: Provide silencers for all doors.

SET NO. 1:

2 sets	Full piano hinge	US26D
2	Exit Devices	US26D
2	Closers	
1	Cylinder	US26D
2	Lever sets	
2 sets	Weatherstripping - all four sides including bottom sweep	
1	Threshold: Pemco 2005AV	Alum

SET NO. 2:

2 sets	Offset pivots - by door mfr.	US26D
2	Exit Devices - by door mfr	US26D
2	Concealed Closers in head - by door mfr	
1	Cylinder	US26D
2	Lever sets	US26D
2 sets	Weatherstripping - all four sides including bottom sweep	
1	Threshold: Pemco 2005AV	Alum

SET NO. 3:

1 set	Offset pivot - by door mfr.	US26D
1	Exit Device - by door mfr	US26D
1	Concealed Closers in head - by door mfr	
1	Cylinder	US26D
1	Lever set	US26D
1 set	Weatherstripping - all four sides including bottom sweep	
1	Threshold: Pemco 2005AV	Alum

SET NO. 4:

3pr	Butts 2714	US26D
1 set	Flush bolts 12” (Inactive leaf)	US26D
1	Classroom Lockset AL70PD	US26D
2	Closers	Al laq.
1	Floor Stops 8016	US26D

SET NO. 5 – Alternate #2 for Amphitheater:

1 DOOR LATCH – STAND ALONE ACCESS CONTROL LOCKING DEVICES:
Stand Alone Touchscreen Lockset: ANSI A156.2, Series 4000, Grade 1 locking mechanism complete with integrated touchscreen for access and programming. Voice-guided programming with 12-digit PIN code selection and up to 1000 user option. Locks to accept standard, small format interchangeable core, security and patented cylinders. Battery-operated, with low power indicator, or hard-wired (9 Volt external power supply) option.
Manufacturer: Yale Commercial (YA) – nexTouch Series with MO lever design, touchscreen function, Z-WAVE technology, and BPS (black) finish for 1 ¾" door thickness.

1	Closer	Al Laq.
1	Floor Stop 8016	US26D

END OF SECTION 08710

SECTION 08800 - GLASS AND GLAZING

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY:

A. Extent of glass and glazing work is indicated on drawings and schedules.

B. Types of work in this section include glass and glazing for:

1. Glass for fixed framing: **1 5/16" Low-E, tinted, insulated, impact, tempered and non-tempered glass.**
2. Glass for entrance doors - 1/4" tinted tempered glass, impact resistant.
3. Glass in interior frames - 1/4" clear tempered and non-tempered glass.
4. Mirrored glass in the Men and Women's Toilet rooms.

1.3 SYSTEM DESCRIPTION:

A. Provide glass and glazing that has been produced, fabricated and installed to withstand normal thermal movement, wind loading and impact loading, as described in the 2010 International Building Code, and to remain water and air tight without deterioration or other defects.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical data for each glazing material and fabricated glass product required, including installation and maintenance instructions.

B. Samples: Submit 12" square samples of each type of glass indicated, including samples of the colored film.

1.5 QUALITY ASSURANCE:

A. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated.

1.6 WARRANTY:

A. Manufacturer's Special Project Warranty on Insulating Glass: Provide written warranty signed by manufacturer of insulating glass agreeing to furnish f.o.b. point of manufacture, freight allowed project site, within specified warranty period indicated below, replacements for those insulating glass units developing manufacturing defects. Manufacturing defects are defined as failure or hermetic seal of air space (beyond that due to glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coatings, if any, and other visual indications of seal failure or performance; provided the manufacturer's instructions for handling, installing, protecting and maintaining units have been complied with during the warranty period.

B. Warranty Period: Manufacturer's standard but not less than 10 years after date of substantial completion.

2.0 PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Acceptable Manufacturers:

1. AFG
2. Oldcastle
3. Guardian
4. PPG Industries
5. Pilkington
6. Schott
7. Viracon

2.2 GLASS PRODUCTS, GENERAL:

A. Primary Glass Standard: Provide primary glass which complies with ASTM C 1036 requirements, including those indicated by reference to type, class, quality, and, if applicable, form, finish, mesh and pattern.

B. Heat-Treated Glass Standard: Provide heat-treated glass which complies with ASTM C 1048 requirements, including those indicated by reference to kind, condition, type, quality, class, and, if applicable, form, finish, and pattern.

C. Sizes: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thicknesses indicated or, if not otherwise indicated, as recommended by glass manufacturer for application indicated.

2.3 PRIMARY GLASS PRODUCTS:

A. Clear Float Glass: Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select).

B. HEAT-TREATED GLASS PRODUCTS:

1. Manufacturing Process: Manufacture heat-treated glass by horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed, unless otherwise indicated.

2. Uncoated Heat-Treated Float Glass: Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 2 (heat absorbing and light reducing), Quality q3 (glazing select), with tint color and performance characteristics for 1/4" thick glass matching those indicated for non-heat-treated tinted float glass; kind as indicated below:

a. Kind FT (fully tempered) where indicated.

C SEALED INSULATING GLASS UNITS:

1. General: Provide preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E 774 for performance classification indicated as well as with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner design and desiccant.

2. For properties of individual glass panes making up units, refer to product requirements specified elsewhere in this section applicable to types, classes, kinds and conditions of glass products indicated.

3. Provide heat-treated panes of kind and at locations indicated or, if not indicated, provide heat-strengthened panes where recommended by manufacturer for application indicated and tempered where indicated or where safety glass is designated or required.

4. Performance characteristics designated for coated insulating glass are nominal values based on manufacturer's published test data for units with 1/4" thick panes of glass and 1/2" thick air space.

   U-values indicated are expressed in the number of Btu's per hour per sq. ft. per degree F difference.
   Performance Classification per ASTM E 774: Class A.
   Thickness of Each Pane: 1/4".
   Air Space Thickness: 1/2".

   A. Tinted Insulated Units:
   U-Value Winter = .28
   Shading coefficient (SHGS): = .27
   Visible light transmittance: 41
   Mfr: PPG SOLARBAN 60 WITH SOLAR BRONZE LOW E
   Solarbronze on Surface #2 or approved equal.

   B. MIRRORED UNITS:
   1. Provide 1/4" clear float glass with full silver coating, copper coating, and organic coating. Also, provide clips and mirror mastic as designed by mirror supplier for wall supported glass.

2.4 ELASTOMERIC GLAZING SEALANTS AND PREFORMED GLAZING TAPES:

A. General: Provide products of type indicated and complying with the following requirements:

B. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials with which they will come into contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

C. Suitability: Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants and tapes which have performance characteristics suitable for applications indicated and conditions at time of installation.

D. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.

E. Provide multi-part urethane sealant as specified in Section 07900 "Sealers" and follow manufacturer's recommendations as approved by glass supplier

F. Provide glazing tape, gaskets, cleaners, primers, sealers and joint fillers as recommended by sealant and glass manufacturers.

3.0 PART 3 - EXECUTION

3.1 EXAMINATION:

A. Glazier Contractor to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face or edge clearances; and for effective sealing of joinery.

B. Clean glazing channels and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

3.2 GLAZING, GENERAL:

A. Comply with combined printed recommendations of glass manufacturers, of manufacturers of sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.

B. Glazing channel dimensions as indicated in details are intended to provide for necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by job conditions at time of installation.

C. Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

3.3 GLAZING:

A. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but with edge nearest corner not closer than 6" from corner, unless otherwise required. Set blocks in thin course of sealant which is acceptable for heel bead use.

B. Provide spacers inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches (length plus height), except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.

C. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.

D. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

E. Provide compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and from adhering to joints back surface as well as to control depth of sealant for optimum performance, unless otherwise indicated.

F. Force sealants into glazing channels to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.

G. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when installation is subjected to movement.

H. Miter cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent pull away at corners; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

I. Lock-Strip Gasket Glazing: Comply with ASTM C 716 and gasket manufacturer's printed recommendations. Provide supplementary wet seal and weep system unless otherwise indicated.

3.4 PROTECTION AND CLEANING:

A. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. 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 immediately by method recommended 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 often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

D. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

E. Wash glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Wash glass by method recommended by glass manufacturer.

END OF SECTION 08800

SECTION 09250 - GYPSUM DRYWALL

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. This Section includes the following types of construction:

1. Steel framing members to receive gypsum board.
2. Gypsum board screw-attached to steel framing and furring members.

1.3 DEFINITIONS:

A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA 505 for definitions of terms for gypsum board construction not otherwise defined in this section or other referenced standards.

1.4 SUBMITTALS:

A. Product data from manufacturers for each type of product specified.

1.5 QUALITY ASSURANCE:

A. Fire resistance ratings: Provide materials and construction which are identical to those assemblies whose fire resistance rating has been determined per ASTM E119.

B. Single source Responsibility: Obtain each type of gypsum board and related joint treatment materials from a single manufacturer.

C. Insulation Fire performance characteristics: Provide insulation materials that have been UL tested with the following characteristics:

Surface Burning: ASTM E 84.
Fire Resistance Ratings: ASTM E 119.
Combustion: ASTM E 136.

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.

1.7 PROJECT CONDITIONS:

A. Environmental Conditions, General: Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.

2.0 PART 2 - PRODUCTS

2.1 MANUFACTURERS: Subject to compliance with the requirements, provide one of the following:

1. Steel Framing and Furring:
   a. Bostwick Steel Framing Co.
   b. Dale Industries, Inc.
   c. Gold Bond Building Products Div., National Gypsum Co.
   d. Incor, Inc.
   e. Marino Industries Corp.
   f. United States Gypsum Co.

2. Grid Suspension Systems:
   a. Chicago Metallic Corp.
   b. National Rolling Mills Co.

3. Gypsum Boards and Related Products:
   a. Domtar Gypsum Co.
   b. Georgia-Pacific Corp.
   c. Gold Bond Building Products Div., National Gypsum Co.
   d. United States Gypsum Co.

2.2 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS:

A. General: Provide components which comply with ASTM C 754 for materials and sizes, unless otherwise indicated.

B. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.

C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle-Type Hangers: Angles with legs not less than 7/8 inch wide, formed from 0.0635 inch thick galvanized steel sheet complying with ASTM A 446, Coating Designation G90, with bolted connections and 5/16 inch diameter bolts.

F. Channels: Cold-rolled steel, 0.0598 inch minimum thickness of base (uncoated) metal and 7/16 inch wide flanges, protected with rust-inhibitive paint, and as follows:

Carrying Channels: 1-1/2 inch deep, 475 lbs per 1000 ft., unless otherwise indicated.

Furring Channels: 3/4 inch deep, 300 lbs per 1000 ft., unless otherwise indicated.

G. Steel Studs for Furring Channels: ASTM C 645, with flange edges bent back 90 deg and doubled over to form 3/16 inch minimum lip (return), minimum thickness of base (uncoated) metal and minimum depth as follows:
   1. Thickness: 0.0179 inch, unless otherwise indicated.
   2. Depth: 1-5/8 inches, unless otherwise indicated.
   3. Gage: 25

H. Steel Rigid Furring Channels: ASTM C 645, hat-shaped, depth of 3/4 inch, and minimum thickness of base (uncoated) metal as follows:
   1. Thickness: 0.0179 inch, unless otherwise indicated.
   2. Gage: 25

I. Grid Suspension System: At the contractor's option, provide metal suspended grid system sized for the required loading; ASTM C 645, manufacturer's standard grid suspension system composed of main beams and cross furring members which interlock to form a modular supporting network.

2.3 STEEL FRAMING FOR WALLS AND PARTITIONS:

A. Steel Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 deg and doubled over to form 3/16" minimum lip (return) and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

   1. Thickness: 0.0179 inch, unless otherwise indicated.
   2. Depth: 3-5/8 inches, unless otherwise indicated.
   3. Gage: **Studs: 25 ga. Track: 20 ga.**
   4. Spacing for studs (unless otherwise noted on drawings): 16" o.c. for interior and exterior walls.

B. Steel Rigid Furring Channels: ASTM C 645, hat-shaped, depth and minimum thickness of base (uncoated) metal as follows:

   1. Depth: 7/8 inch.
   2. Thickness: 0.0179 inch, unless otherwise indicated.

C. Fasteners: Provide fasteners of type, material, size, corrosion resistance, holding power and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum drywall manufacturers for applications indicated.

2.4 GYPSUM BOARD:

A. General: Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end joints.

B. Thickness: 5/8 inch, comply with ASTM C 840 for application system and support spacing indicated.

C. Gypsum Wallboard: ASTM C 36, Type X, Regular; tapered edges; 5/8".

D. Water-Resistant Gypsum Backing Board: ASTM C 630; Regular, tapered edges; 5/8"

E. Finish: **Level 5**; on all exposed surfaces. Contractor to install sample of finish for approval.

2.5 TRIM ACCESSORIES:

A. Cornerbead and Edge Trim for Interior Installation: Provide corner beads, edge trim and control joints which comply with ASTM C 1047; Sheet steel zinc-coated by hot-dip process.

B. One-Piece Control Joint: Formed with vee-shaped slot per Fig. 1 in ASTM C 1047, with slot opening covered with removable strip.

2.6 GYPSUM BOARD JOINT TREATMENT MATERIALS:

A. General: Provide materials complying with ASTM C 475, ASTM C 840, and recommendations of manufacturer of both gypsum board and joint treatment materials for the application indicated.

B. Joint Tape: Paper reinforcing tape, unless otherwise indicated.

C. Setting-Type Joint Compounds: Factory-prepackaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

2.7 MISCELLANEOUS MATERIALS:

A. General: Provide auxiliary materials for gypsum drywall construction which comply with referenced standards and the recommendations of the manufacturer of the gypsum board.

B. Fastening Adhesive for Wood: ASTM C 557.

C. Gypsum Board Screws: ASTM C 1002.

D. Concealed Acoustical Sealant: Paintable, gunnable per ASTM C-919.
Acceptable manufacturers:
1. USG Acoustical Sealant
2. Tremco Acoustical Sealant

3.0 PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine substrates to which drywall construction attaches or abuts, preset hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of drywall construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

A. Ceiling Anchorages: Coordinate installation of ceiling suspension system with installation of overhead structural systems to ensure that inserts and other structural anchorage provisions have been installed to receive ceiling anchors in a manner that will develop their full strength and at spacing required to support ceiling.

B. Furnish inserts and other devices indicated, to other trades for installation well in advance of time needed for coordination with other construction.

3.3 INSTALLATION OF STEEL FRAMING, GENERAL:

A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking and bracing at terminations in the work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar construction to comply with details indicated and with recommendations of gypsum board manufacturer, or if none available, with "Gypsum Construction Handbook" published by United States Gypsum Co.

C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement, at locations indicated below to comply with details shown on Drawings:

Where edges of suspended ceilings abut building structure horizontally at ceiling perimeters or penetration of structural elements.

Where partition and wall framing abuts overhead structure.

Provide slip or cushioned type joints as detailed to attain lateral support and avoid axial loading.

D. Do not bridge building expansion and control joints with steel framing or furring members; independently frame both sides of joints with framing or furring members or as indicated.

3.4 INSTALLATION OF STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS:

A. Screw furring members to wood framing.

B. Secure hangers to structural support by connecting directly to structure where possible or other anchorage devices or fasteners as indicated.

C. Do not attach hangers to metal deck tabs.

D. Do not attach hangers to metal roof deck.

E. Do not connect or suspend steel framing from ducts, pipes or conduit.

F. Keep hangers and braces 2 inches clear of ducts, pipes and conduits.

G. Sway-brace suspended steel framing with hangers used for support.

H. Install suspended steel framing components in sizes and at spacings indicated but not less than that required by referenced steel framing installation standard.

I. Wire Hangers: 0.1620 inch diameter (8 gage), 4 ft. on center.

J. Carrying Channels (Main Runners): 1-1/2 inch, 4 ft. on center.

K. Rigid Furring Channels (Furring Members): 16 inches on center.

L. Installation Tolerances: Install steel framing components for suspended ceilings so that cross furring members or grid suspension members are level to within 1/8 inch in 12 ft. as measured both lengthwise on each member and transversely between parallel members.

M. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

N. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross furring members to each other and butt-cut to fit into wall track.

3.5 INSTALLATION OF STEEL FRAMING FOR WALLS AND PARTITIONS:

A. Install runners (tracks) at floors, ceilings and structural walls and columns where gypsum drywall stud system abuts other construction.

B. Where studs are installed directly against exterior walls, install asphalt felt strips between studs and wall.

C. Installation Tolerances: Install each steel framing and furring member so that fastening surface do not vary more than 1/8 inch from plane of faces of adjacent framing.

D. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

E. Install steel studs and furring in sizes and at spacings 24"on center.

F. Install steel studs so that flanges point in the same direction and gypsum boards can be installed in the direction opposite to that of the flange.

G. Frame door openings to comply with details indicated, with GA-219 and with applicable published recommendations of gypsum board manufacturer. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

H. Frame openings other than door openings to comply with details indicated, or if none indicated, in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.

3.6 APPLICATION AND FINISHING OF GYPSUM BOARD, GENERAL:

A. Gypsum Board Application and Finishing Standard: Install and finish gypsum board to comply with ASTM C 840.

B. Install sound attenuation blankets where indicated, prior to gypsum board unless readily installed after board has been installed.

C. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 24 inches in alternate courses of board.

D. Install ceiling boards across framing in the manner which minimizes the number of end-butt joints, and which avoids end joints in the central area of each ceiling. Stagger end joints at least 24 inches.

E. Install wall/partition boards in manner which minimizes the number of end-butt joints or avoids them entirely where possible. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs.

F. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.

G. Locate either edge or end joints over supports, except in horizontal applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

H. Attach gypsum board to steel studs so that leading edge or end of each board is attached to open (unsupported) edge of stud flange first.

I. Attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.

J. Spot grout hollow metal door frames for solid core wood doors, hollow metal doors and doors over 32 inches wide. Apply spot grout at each jamb anchor clip just before inserting board into frame.

K. Form control joints and expansion joints at locations indicated, with space between edges of boards, prepared to receive trim accessories.

L. Cover both faces of steel stud partition framing with gypsum board in concealed spaces (above ceilings, etc.), except in chase walls which are braced internally.

M. Fit gypsum board around ducts, pipes, and conduits.

N. Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4 inch to 1/2 inch space and trim edge with "U" bead edge trim. Seal joints with acoustical sealant.

O. Floating Construction: Where feasible, including where recommended by manufacturer, install gypsum board over wood framing, with "floating" internal corner construction.

P. Seal construction at perimeters, control and expansion joints, openings and penetrations with a continuous bead of acoustical sealant including a bead at both faces of partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim, and close off sound-flanking paths around or through construction, including sealing of partitions above acoustical ceilings.

Q. Space fasteners in gypsum boards in accordance with referenced gypsum board application and finishing standard and manufacturer's recommendations.

3.7 METHODS OF GYPSUM BOARD APPLICATION:

A. Install gypsum wallboard as follows:
On ceilings apply gypsum board prior to wall/partition board application to the greatest extent possible.

On partitions/walls apply gypsum board vertically (parallel to framing), unless otherwise indicated, and provide sheet lengths which will minimize end joints.

B. Wall Tile Base: Where drywall is base for thin-set ceramic tile and similar rigid applied wall finishes, install gypsum backing board.

In "dry" areas install gypsum backing board or wallboard with tapered edges taped and finished to produce a flat surface.

At "wet" areas install water- resistant gypsum backing board to comply with ASTM C 840 and recommendations of gypsum board manufacturer.

C. On ceilings apply base layer prior to application of base layer on walls/partitions; apply face layers in same sequence. Offset joints between layers at least 10 inches. Apply base layers at right angles to supports unless otherwise indicated.

D. On partitions/walls apply base layer and face layers vertically (parallel to framing) with joints of base layer over supports and face layer joints offset at least 10 inches with base layer joints.

E. On furring members apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

F. Single-Layer Fastening Methods: Apply gypsum boards to supports as follows:
1. Fasten with screws.
2. Fasten to concrete with adhesive at locations as shown on the drawings.

3.8 INSTALLATION OF DRYWALL TRIM ACCESSORIES:

A. General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.

B. Install corner beads at external corners.

C. Install control joints at locations indicated, or if not indicated, at spacings and locations required by referenced gypsum board application and finish standard, and approved by the Architect for visual effect.

3.9 FINISHING OF DRYWALL:

A. General: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects and elsewhere as required to prepare work for decoration.

B. Surface Finish: Provide Level 5 finish on all exposed gypsum surfaces. Provide Level 2 finish on all water-resistant gypsum backing board used as a substrate for tile. Provide Level 4 finish on all surfaces that are scheduled to receive wall covering.

C. Prefill open joints and rounded or beveled edges, if any, using setting-type joint compound.

D. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.

E. Finish interior gypsum wallboard by applying the following joint compounds in 3 coats (not including prefill of openings in base), and sand between coats and after last coat.

F. Water-Resistant Gypsum Backing Board Base for Ceramic Tile: Comply with ASTM C 840 and manufacturer's recommendations for treatment of joints behind tile.

3.10 INSTALLATION OF INSULATION: Install insulation complying with manufacturer’s written Recommendations.

3.11 PROTECTION:

A. Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures gypsum drywall construction being without damage or deterioration at time of Substantial Completion.

END OF SECTION 09250

SECTION 09650 - RESILIENT FLOORING

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of resilient flooring is shown on drawings.

B. Type of resilient flooring:
1. Luxury Vinyl Tile (LVT).
2. Vinyl Base.

1.3 QUALITY ASSURANCE:

A. Manufacturer: Provide each type of resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.

B. Fire Test Performance: Provide resilient flooring which complies with the following fire test performance criteria as determined by an independent testing laboratory acceptable to authorities having jurisdiction.

1. Flame Spread: Not more than 75 per ASTM E 84.
2. Smoke Developed: Not more than 450 per ASTM E 84.
3. Smoke Density: Not more than 450 per ASTM E 662.

C. Installer's Qualifications: Engage Installer who is certified in writing by resilient flooring manufacturer as qualified for installation of sheet vinyl employing heat welded seams.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical data for each type of resilient flooring and accessory.

B. Color samples: Submit color chart and two actual size tiles for each color selected by architect.

D. Maintenance Instructions: Submit 2 copies of manufacturer's recommended maintenance practices for each type of resilient flooring and accessory required.

E. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
1. Show details of special patterns.

1.5 PROJECT CONDITIONS:

A. Maintain minimum temperature of not less than 68 degrees F (20 degrees C) or more than 72 degrees F (22 deg C) in spaces to receive resilient flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of not less than 58 degrees F (15 degrees C) or more than 72 degrees F (22 deg C) in areas where work is completed.

B. Close spaces to traffic during floor tile installation. Close spaces to heavy traffic for 48 hours after floor tile installation and to light foot traffic for 24 hours after floor tile installation

C. Install resilient flooring and accessories after other finishing operations, including painting, have been completed. Do not install resilient flooring over concrete slabs until the latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by resilient flooring manufacturer's recommended bond and moisture test.

2.0 PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Acceptable Manufacturer of Luxury Vinyl Tile:

1. Vinyl Plank: **Centiva, Inc**. or equal byArmstrong, Mannington, Interface
2. Thickness: 30 or 32 mil wearing surface.

2. Acceptable Manufacturers of Vinyl Wall Base:
   a. Azrock Floor Products Div., Azrock Industries, Inc.
   b. Flexco Div., Textile Rubber Co.
   c. Johnsonite Rubber Co., Inc.
   d. Burke-Mercer Plastics Co., Inc.

2.2 RESILIENT FLOORING:

A. Vinyl Plank : **Contour Series by Centiva**

2.3 ACCESSORIES:

A. Wall Base: Provide base complying with FS SS-W-40; either Type I rubber or Type II vinyl, with matching end stops and preformed or molded corner units, and as follows:
   1. Height: 4"
   2. Style: Standard top-set cove.
   3. Finish: Matte.

   Note: Wall vinyl or rubber base susceptible to shrinkage will not be allowed.

B. Resilient Edge Strips: 1/8" thick, homogeneous vinyl or rubber composition, tapered or bullnose edge, color to match flooring, or as selected by Architect from standard colors available; not less than 1" wide.

C. Adhesives (Cements): Waterproof, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.

D. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

E. Leveling and Patching Compounds: Latex type as recommended by flooring manufacturer.

3.0 PART 3 - EXECUTION

3.1 INSPECTION:

A. Require Installer to inspect subfloor surfaces to determine that they are satisfactory. A satisfactory subfloor surface is defined as one that is smooth and free from cracks, holes, ridges, coatings preventing adhesive bond, and other defects impairing performance or appearance.

B. Do not allow resilient flooring work to proceed until subfloor surfaces are satisfactory.

3.2 PREPARATION:

A. Prepare subfloor surfaces as follows:

Use leveling and patching compounds as recommended by resilient flooring manufacturer for filling small cracks, holes and depressions in subfloors.

Follow Centiva, Inc. Installation guide, SubFloor Preparation 1.0 found at www.centiva.com.

Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.

B. Broom clean or vacuum surfaces to be covered, and inspect subfloor.

C. Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

D. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations.

3.3 INSTALLATION:

A. INSTALLATION, GENERAL:

1. Install resilient flooring using method indicated in strict compliance with manufacturer's printed instructions. Extend resilient flooring into toe spaces, door reveals, and into closets and similar openings.
2. Scribe, cut, and fit resilient flooring/to permanent fixtures, built-in furniture and cabinets, pipes, outlets and permanent columns, walls and partitions.
3. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.
4. Tightly cement resilient flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Hand roll resilient flooring at perimeter of each covered area to assure adhesion.

B. INSTALLATION OF TILE FLOORS: Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter. Lay tile square to room axis, unless otherwise shown.

1. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, cracked, chipped or deformed tile are not acceptable.
2. Lay tiles carefully, noting directional arrows on the back of tiles when present, with grain running in one direction or in pattern of colors and sizes indicated. Adhere tile flooring to substrates using full spread of adhesive applied in compliance with flooring manufacturer's directions
3. Some pre-blending may be required depending on color or shade variation, refer to section 2 of Installation instruction on Centiva website.

3.4 INSTALLATION OF BASE:

A. Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

B. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed.

3.5 CLEANING AND PROTECTION:

A. Perform following operations immediately upon completion of resilient flooring:

Sweep or vacuum floor thoroughly.

Do not wash floor- time period recommended by resilient flooring manufacturer has elapsed to allow resilient flooring to become well-sealed in adhesive.
Damp-mop floor being careful to remove black marks and excessive soil after 48 hours.
Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by resilient flooring manufacturers.

B. Clean floor, not less than 48 hours after installation, with a Centi Clean Green neutral liquid cleaner or a neutral liquid cleaner, followed by Centi Maintain, per manufacturer’s directions.

Apply protective floor polish to resilient flooring surfaces free from soil, excess adhesive or surface blemishes. Use commercially available metal cross-linked acrylic products acceptable to resilient flooring manufacturer.

Protect resilient flooring against damage from rolling loads for initial period following installation by covering with plywood or hardboard. Use dollies to move stationary equipment or furnishings across floors.

C. Clean resilient flooring not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Clean resilient flooring by method recommended by resilient flooring manufacturer.

END OF SECTION 09650

SECTION 09900 - PAINTING

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

1.2 SUMMARY

A. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.

B. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.

C. Paint exposed surfaces whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

D. Painting includes field painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

E. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

1.3 DEFINITIONS

A. "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.4 SUBMITTALS

A. Product Data: Manufacturer's technical information, label analysis, and application instructions for each material proposed for use.

B. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.

C. Samples for initial color selection in the form of manufacturer's color charts.

After color selection, the Architect will furnish color chips for surfaces to be coated.

D. Samples for verification purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. Define each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1.6 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are within the manufacturer's recommendations.

2.0 PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

Devoe and Reynolds Co. (Devoe).
The Glidden Company (Glidden).
Benjamin Moore and Co. (Moore).
PPG Industries, Pittsburgh Paints (PPG).
Pratt and Lambert (P & L).
The Sherwin-Williams Company (S-W).

B. See "Paint Schedule" at the end of this Section.

3.0 PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected.

B. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

3.2 PREPARATION

A. General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

B. Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.

D. Provide barrier coats over incompatible primers or remove and re-prime. Notify Architect in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.

E. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

F. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.

When transparent finish is required, back prime with spar varnish.
Back prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.

G. Ferrous Metals: Clean non-galvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.

H. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.

I. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

J. Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's directions.

K. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

L. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

M. Use only thinners approved by the paint manufacturer, and only within recommended limits.

N. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

C. Provide finish coats that are compatible with primers used.

D. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.

E. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.

F. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.

G. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.

H. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.

I. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

J. Sand lightly between each succeeding enamel or varnish coat.

K. Omit primer on metal surfaces that have been shop-primed and touch up painted.

L. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

   Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

M. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.

N. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.

O. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

P. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

Q. Provide satin finish for final coats.

R. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.4 CLEANING

A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

B. Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping, using care not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "wet paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINT SCHEDULE

A. Wood: Alkyd Semi-Gloss Finish: 2 finish coats over primer with total dry film thickness not less than 3.5 mils.

Primer: PPG 6-6 Enamel Undercoater
First Coat: PPG 20- Line Alkyd LO Luster Enamel
Second Coat: Same as first

B. Ferrous Metal: See Section 09960 – High Performance Coating for Exterior Steel

C. Zinc-Coated Metal:

Primer: PPG 6-209 Galvanized Primer
First Coat: PPG 6-252 Line Enamel
Second Coat: Same as first

3.7 INTERIOR PAINT SCHEDULE

A. Wood shown to be painted:

First Coat: PPG 6-6 Enamel Undercoater
Second Coat: PPG 20 Line Alkyd Lo Luster Enamel
Third Coat: Same as second

B. Stained Wood:

First Coat: Rez oil stain, Transparent
Second Coat: Rez 77-7 Satin Finish Varnish
Third Coat: Same as second

C. Gypsum wall boards at walls and ceilings:

First Coat: PPG 6-2 Sealer
Second Coat: PPG 6-70 Latex Flat
Third Coat: Same as second

D. Ferrous Metals:

First Coat: PPG 6-208 Metal Primer
Second Coat: PPG 20- Line LO Luster Enamel
Third Coat: Same as second

END OF SECTION 09900

SECTION 09960 – HIGH PERFORMANCE COATING FOR EXTERIOR STEEL

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes surface preparation and application of high-performance coating systems on the following substrates:
   1. Exterior Substrates: **Steel and steel surfaces noted to receive "high performance coating" or "special coating".**

B. Related Requirements:
   1. Section 05120 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of coating system and in each color and gloss of topcoat indicated.
   1. Submit Samples on aluminum Q-panel backing, 3" x 6".
   2. Step coats on Samples to show each coat required for system.
   3. Label each Sample for location and application area.

1.03 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. Coatings: 2 gallons of each product.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient atmospheric conditions and temperature continuously maintained within the acceptable parameters outlined by the manufacturer's product literature.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.05 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are within the acceptable parameters outlined the manufacturer's product literature.

B. Do not apply coatings when relative humidity exceeds the allowable level as stated in the manufacturer's product literature; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

1.06 COATING SYSTEM WARRANTY REQUIREMENTS

A. Coating systems shall be installed as required to qualify for manufacturer's standard fifteen (15) year warranty against corrosion, crack, check, peel, color shift, loss of gloss and chalking. Special warranty provisions by manufacturer's which have no existing warranties of the type required in effect at the time of bidding shall not be considered acceptable to satisfy the intent of the specification. Warranted product's documented commercial availability in the marketplace shall not be a shorter duration than the specified warranty term.

B. Warranty coverage shall be expressed in the following terms:
1. Fade (Color Change): DE Hunter Units per ASTM D 2244.
2. Gloss: Units as measured by a gloss meter referencing ASTM D 523-89 with 60 degree geometry.
3. Chalk: Rating as per ASTM D 4214, Method A.

1.07 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for a minimum of the duration of the specified warranty coverage. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Basis of Design:
1. **Tnemec Company, Inc**., 6800 Corporate Drive, Kansas City, MO 64120

B. Product Distribution and Technical Representation:
1. SteelCon Coating Systems, Inc.,

2.02 HIGH PERFORMANCE COATING, GENERAL

A. Performance Standards: Provide products of equal or better performance characteristics to the basis of design products as listed in this Section.

B. Colors: As selected by Architect from manufacturer's full range.

2.03 METAL PRIMERS

A. Primer, Zinc Rich Moisture Cured Urethane, Organic:
1. Tnemec Series 90G-1K97 Tnemec-Zinc
2. Formulation Description: Single Component, Zinc Rich Moisture Cured Urethane
3. Performance Criteria for Evaluation of "Or Equal" Submittals:
a. Adhesion: ASTM D 4541 (Method B, Type II Tester)/ASTM D 4541 (Method E, Type V Tester)/ASTM D 3359 (Method B, 5 mm Crosshatch)
b. Flexibility & Elongation: ASTM D 522 – Average of Three Tests
c. Humidity: ASTM D 4585 – 15,000 Hours
d. Immersion: ASTM D 870 (Tap Water) – Two Years/ASTM D 870 (Deionized Water @ 140° F) – 2,000 Hours
e. Impact: ASTM D 2794 – Average of Three Tests
f. Prohesion: ASTM G 85 – 10,000 Hours

g. Salt Spray (Fog): ASTM B 117 – 50,000 Hours

2.03 EPOXY INTERMEDIATE COAT

A. Intermediate Coat, Epoxy, Polyamide:
1. Tnemec Series 66 Hi-Build Epoxoline
2. Formulation Description: Polyamide Epoxy
3. Performance Criteria for Evaluation of "Or Equal" Submittals:
a. Abrasion: ASTM D 4060 (CS-17 Wheel, 1,000 gram load) – 1,000 Cycles
b. Adhesion: ASTM D 4541 (Method B, Type II Tester)/ASTM D 4541 (Method E, Type V Tester)
c. Hardness: ASTM D 3363 (Pencil) - gouge
d. Humidity: ASTM D 4585 – 4,500 Hours
e. Immersion: ASTM D 870 (Tap Water) – Four Years
f. Prohesion: ASTM G 85 – 5,000 Hours
g. Salt Spray (Fog): ASTM B 117 – 10,900 Hours

2.04 FLUOROPOLYMER FINISH COAT

A. Finish Coat, Advanced Thermoset Solution Fluoropolymer:
1. Tnemec Series 1070 (or 1071/1072) Fluoronar
2. Formulation Description: Advanced Thermoset Solution Fluoropolymer
3. Performance Criteria for Evaluation of "Or Equal" Submittals:
a. Abrasion: ASTM D 4060 (CS-17 Wheel, 1,000 gram load) – 1,000 Cycles
b. Adhesion: ASTM D 4541 (Method B, Type II Tester)/ASTM D 4541 (Method E, Type V Tester)
c. Carbon Arc Weathering: ASTM G 153 – 5,500 Hours
d. Cleanability: MIL-PRF-85285D Section 4.6.13 – Average of Two Tests
e. Exterior Exposure: ASTM D 1014 (AAMA 2604-98)/ASTM D 4141 (Method C, EMMAQUA)
f. Flexibility & Elongation: ASTM D 522 (Method A, Conical Mandrel) – Average of Three Tests
g. Hardness: ASTM D 3363 (Pencil) - gouge
h. Humidity: ASTM D 4585 – 3,000 Hours
i. Impact: ASTM D 2794 – Average of Three Tests
j. QUV Exposure: ASTM D 4587 (UVA 340 Bulbs, Cycle 4: 8 Hours UV/4 Hour Condensation) – 25,000 Hours
k. Salt Spray (Fog): ASTM B 117 – 10,000 Hours
l. Xenon Arc Weathering: ASTM D 6695 – 8,000 Hours

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.02 PREPARATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and 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.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulates.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and disbanded or incompatible shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
   1. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning"

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.03 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations:
   1. Use applicators and techniques suited for coating and substrate indicated.
   2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.04 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

   1. Contractor shall touch up and restore coated surfaces damaged by testing.

2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.05 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, 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 coated surfaces.

3.06 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. OZR MCU/Epoxy/Fluoropolymer System:

1. Shop Applied Prime Coat: Primer, zinc-rich, Organic
   a. Surface Preparation: Abrasive blast referencing SSPC-SP 6; 1.0 mil angular surface profile.
   b. Primer: Tnemec Series 90G-1K97 Tneme-Zinc applied at 2.5 to 3.5 mils DFT
2. Field Touchup of Shop Applied Primer:
   a. Surface Preparation: Power Tool Clean To Bare Metal referencing SSPC-SP 11
   b. Primer: Tnemec Series 90G-1K97 Tneme-Zinc applied at 2.5 to 3.5 mils DFT
3. Stripe Coat: Epoxy, Polyamide
   a. Tnemec Series 66 Hi-Build Epoxoline applied at 4.0 to 6.0 mils DFT at all corners, protrusions, and sharp edges
4. Intermediate Coat: Epoxy, Polyamide
   a. Tnemec Series 66 Hi-Build Epoxoline applied at 4.0 to 6.0 mils DFT
5. Topcoat: Advanced Thermoset Solution Fluoropolymer, Gloss/Semi-Gloss/Satin
   a. Tnemec Series 1070 (or 1071 or 1072) Fluoronar applied at 2.0 to 3.0 mils DFT

END OF SECTION 09960

SECTION 10200 - LOUVERS AND VENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide louvers and vents as indicated:
   1. Extruded aluminum louvers.

1.02 PERFORMANCE REQUIREMENTS

A. Wind Loads: Provide **aluminum louvers**, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of latest edition of ASCE 7:
   1. Design wind velocity shall be 160 mph.

B. Impact-Resistance Test Performance: Provide aluminum louvers that pass large and small missile-impact tests, as required by systems' location above grade, and cyclic-pressure tests according to testing requirements of authorities having jurisdiction.
   1. Aluminum louvers shall withstand the impact of wind-borne debris missiles in accordance with the impact and cyclic loading criteria per SBC/SSTD 12, ASTM E 1886, and ASTM E 1996.

1.03 SUBMITTALS

A. Submit for approval shop drawings, product data.

B. Manufacturer certificates: Signed by manufacturer certifying that louver assemblies comply with requirements specified in “Performance Requirements” Article.

1.04 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Extruded aluminum louvers: Stationary, wind driven rain-resistant, horizontal sight proof drainable blade louvers, 5” deep, .081 inch extruded aluminum alloy 6063-T5 frame and blades, minimum net free area 44%, 5/8” x .040 inch removable expanded, flattened aluminum bird screen on interior face; **Model EME520MD by Ruskin** Company or approved equal.

B. Finish: Kynar 500 – 70% PVDF with total dry film thickness of 1.2 mils. Color to be selected from manufacturer’ standard colors.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with AMCA Standard 500 and provide units with AMCA Certification rating seal. Comply with SMACNA "Architectural Sheet Metal Manual" except as otherwise indicated.

B. Take field measurements prior to fabrication. Install units plumb and level; isolate dissimilar materials to prevent corrosion. Touch-up damaged coatings.

C. Provide separate continuous sills where needed to prevent water penetration. Maintain equal blade-to-blade and blade-to-frame spacing for uniform appearance. Provide concealed vertical mullions with reinforcement as needed. Provide anchors, supports and accessories as needed. Provide gaskets, flashings and fillers as necessary to make installation water tight.

END OF SECTION 10200

SECTION 10440 – SPECIALTY SIGNS

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.

1.2 DESCRIPTION OF WORK:

A. Forms of specialty signs required are:

1. Unframed Acrylic plaques

1.3 QUALITY ASSURANCE:

A. Uniformity of Manufacturer: For each sign form and graphic image process indicated furnish products of a single manufacturer.

1.4 SUBMITTALS:

A. Shop Drawings: Submit shop drawings showing size, material and message.

1. Furnish full-size sample.

B. Product Data: Submit manufacturer's technical data and installation instructions.

2.0 PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following or approved equal:
   a. Mohawk
   b. APCO Graphics Inc.
   c. ASI Sign Systems, Inc.
   d. Take form Architectural Graphics

2.2 MATERIALS:

A. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested in accordance with ASTM D 790, a minimum allowable continuous service temperature of 176 deg.F (80 deg.C), and of the following general types

2.3 FABRICATION:

A. Unframed Acrylic Plaques: Fabricate unframed panel signs with edges mechanically and smoothly finished; 5/8" raised letters, with Braille designations.

1. **Building 1:**
    a. Provide **4 unframed 8" x 8"** plaques, with braille for restrooms.
        i. "Men" with HC pictogram
        ii. "Women" with HC pictogram
    b. Provide **38 unframed 6" x 6"** plaques, with braille. Names to be provided by the architect.
2. **Building 2:**
    a. Provide **1 unframed 8" x 8"** plaque, with braille for restrooms.
        i. "Restroom" with HC pictogram
    b. Provide **6 unframed 6" x 6"** plaques, with braille. Names to be provided by the architect.
3. **Restroom Bldg:**
    a. Provide **2 unframed 8" x 8"** plaques, with braille for restrooms.
        i. "Men" with HC pictogram
        ii. "Women" with HC pictogram
4. **Amphitheater (Alt. #2):**
    a. Provide **1 unframed 8" x 8"** plaque, with braille for restrooms.
        i. "Restroom" with HC pictogram
    b. Provide 1 **unframed 6" x 6"** plaque, with braille. Name to be provided by the architect.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Install signs at locations as directed by the architect. Use mounting methods in compliance with the manufacturer's instructions.

Install sign units level, plumb and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

3.2 CLEANING AND PROTECTION:

At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION 10440

SECTION 10522 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of fire extinguishers, cabinets and accessories is indicated on drawings.

B. Definition: "Fire extinguishers" as used in this section refers to units which can be hand-carried as opposed to those which are equipped with wheels or to fixed fire extinguishing systems.

C. Types of products required include:
1. Fire extinguishers.
2. Fire extinguisher cabinets.

1.3 QUALITY ASSURANCE:

A. Single Source Responsibility: Obtain products in this section from one manufacturer.

B. Coordination: Verify that fire extinguisher cabinets are sized to accommodate fire extinguishers of type and capacity indicated which will be provided by Owner under separate contract.

C. UL-Listed Products: Provide new portable fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

D. FM Listed Products: Provide new portable fire extinguishers which are approved by Factory Mutual Research Corporation for type, rating, and classification of extinguisher indicated and carry appropriate FM marking.

1.4 SUBMITTALS:

A. Product Data: Submit product data for each type of product included in this section. For fire extinguisher cabinets include roughing-in dimensions and details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, and panel style and materials.

2.0 PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

J.L. Industries
Larsen's Mfg. Co.
Johnson-Lee, Division of W.F. Lee Corp.
Muckle Manufacturing, Division of Technico, Inc.
Watrous, Inc.

2.2 FIRE EXTINGUISHERS:

A. General: Provide fire extinguishers for each extinguisher cabinet and other locations indicated, in colors and finishes selected by Architect from manufacturer's standard which comply with requirements of governing authorities.

B. Fill and service extinguishers to comply with requirements of governing authorities and manufacturer's requirements.

C. Abbreviations indicated below to identify extinguisher types related to UL classification and rating system and not, necessarily to type and amount of extinguishing material contained in extinguisher.

D. Multi-Purpose Dry Chemical Type: UL-rated 2-A:10:B:C, 10 lb. nominal capacity, in enameled steel container, for Class A, Class B and Class C fires.

2.3 FIRE EXTINGUISHER CABINETS:

A. General: Provide fire extinguisher cabinets where indicated or suitable size for housing fire extinguishers of types and capacities indicated.

B. Construction: Manufacturer's standard enameled steel box, with trim, frame, door and hardware to suit cabinet type, trim style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.

C. Cabinet Type: Recessed: Cabinet box (tub) fully recessed in walls of sufficient depth to suit style of trim indicated.

D. Baked Enamel Finish: White

3.0 PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

B. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.

C. Securely fasten fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.

D. Where exact location of surface-mounted cabinets and bracket-mounted fire extinguishers is not indicated, locate as directed by Architect.

3.2 IDENTIFICATION:

A. Identify existence of fire extinguisher in cabinet with lettering spelling "FIRE EXTINGUISHER" applied to door by Silk Screen Process.

END OF SECTION 10522

SECTION 10800 – TOILET ACCESSORIES

1.0 PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of each type of toilet accessory is indicated on drawings and schedules.

B. Types of toilet accessories required include the following:

1. Paper towel dispenser and waste receptacle - stainless steel
2. Toilet tissue dispenser - stainless steel
3. Grab bars - stainless steel
4. Robe hook - stainless steel
5. Sanitary napkin disposal – stainless steel
6. Baby changing stations

C. Mirrors are specified in Section "Glass and Glazing".

1.3 QUALITY ASSURANCE:

A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.

B. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical data and installation instructions for each toilet accessory.

B. Samples: Submit full-size samples of units to Architect for review of design and operation. Acceptable samples will be returned and may be used in the work.

C. Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices and cut-out requirements in other work.

2.0 PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

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

A & J Washroom Accessories.
American Specialties, Inc.
Bobrick Washroom Equipment, Inc.
Bradley Corporation.

Hallmack-Nutone/Div. Scovill.
McKinney/Subsidiary Kidde, Inc.
Parker-Scovill.
Watrous, Inc.

2.2 MATERIALS, GENERAL:

A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gage (.034") minimum, unless otherwise indicated.

3.0 PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install toilet accessory units in accordance with manufacturers' instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations and at heights indicated.

3.2 ADJUSTING AND CLEANING:

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish all exposed surfaces after removing temporary labels and protective coatings.

END OF SECTION 10800

SECTION 15100 - MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 CONDITIONS AND REQUIREMENTS

A. The General Conditions, Supplementary Conditions, and Division-1, General Requirements apply to this section.

1.02 GENERAL PROVISIONS

A. The contract drawings indicate the extent and general arrangement of the work. The Contractor shall be responsible for installing the proposed systems as indicated, without violation of applicable codes, standards, or specification requirements. The Contractor is also responsible for coordinating the installation and operation of these systems with the other sections of this specification to provide a complete and operable system. Equipment, piping, and ductwork arrangements shall fit the space as indicated and shall allow adequate and approved clearance for entry, servicing and maintenance. Detailed drawings of any proposed departures due to actual field conditions shall be submitted to the Architect for approval. All work shall conform to the requirements of the referenced publications and as specified herein.

1.03 CONFORMANCE WITH AGENCY REQUIREMENTS

A. Where materials or equipment are specified to conform to requirements of the Underwriters' Laboratories, Inc., Factory Mutual Systems, Air Conditioning and Refrigeration Institute, Air Diffusion Council, American Society of Heating, Refrigerating and Air Conditioning Engineers, or the Air Moving and Conditioning Association, Inc., the Contractor shall submit proof of such conformance. The label or listing of the specified agency will be acceptable evidence. In lieu of the label or listing, the Contractor may submit a written certificate from any approved, nationally recognized testing organization adequately equipped and competent to perform such services, stating that the items have been tested and that the units conform to the requirements, including methods of testing, of the specified agency. Where equipment is specified to conform to requirements of the ASME Boiler and Pressure Vessel Code, the design, fabrication, and installation shall conform to the code in every respect.

1.04 CAPACITIES

A. Capacities of all equipment and material shall be not less than those indicated, nor exceed maximum values shown on the drawings. Physical dimensions of equipment shall be verified against contract documents to ensure manufacturer=s maintenance space is available.

1.05 EQUIPMENT INSTALLATION

A. Necessary supports shall be provided for equipment, appurtenances, pipe, and ductwork as required. Isolation vibration units shall be provided to minimize the intensity of vibration transmission to the building structure where required.

1.06 ELECTRICAL WORK

A. Electric-motor-driven equipment specified herein shall be provided complete with motors and controls. Electric equipment and wiring shall be in accordance with Division 16000, "Electrical Work". Electrical characteristics shall be as indicated. Each motor shall be of sufficient capacity to drive the equipment at the specified capacity without exceeding the nameplate rating of motor when operating at proper electrical system voltage. Manual or automatic control and protective or signal devices required for the operation

herein specified and any control wiring required for controls and devices, but not shown on the electrical plans, shall be provided under this section.

1.07 APPROVAL OF MATERIALS AND EQUIPMENT

A. After notice to proceed and before purchasing, the Contractor shall submit to the Architect for approval, in five bound copies, a list of materials he proposes for the work. Items to be submitted include, but are not limited to, the items listed in each individual section. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's names, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, industry, and technical society publication references, and other information necessary to establish contract compliance of each item the Contractor proposes to furnish.

1. Shop Drawings: Drawings shall be a minimum of 8 1/2" x 11" in size, except as specified otherwise.
2. Manufacturer's Data: Submittals for each manufactured item shall be manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. All equipment selections shall be clearly marked with name designations shown on drawings (i.e., AHU-1, HPU-2, etc.).
3. Delivery and Storage: Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Architect. Damaged or defective items, in the opinion of the Architect, shall be replaced.
4. Cataloged Products: Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest design that complies with the specification requirements. Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use at least 2 years prior to bid opening. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the items need not be the products of the same manufacturer.

1.08 NAMEPLATES

A. Each major item of equipment shall have the manufacturer's name, address, serial and model numbers on a plate securely attached to the item.

1.09 VERIFICATION OF DIMENSIONS

A. The Contractor shall visit the premises to thoroughly familiarize himself with all details of the work and working conditions and verify all dimensions in the field, and shall advise the Architect of any discrepancy before performing any work. The Contractor shall be specifically responsible for the coordination and proper relation of his work to the building structure and to the work of all trades.

1.10 DRAWINGS

A. Because of the scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that are required. The Contractor shall carefully investigate the structural and finish conditions affecting his work and he shall furnish fittings, offsets, transitions, unions, etc., as may be required to meet such conditions at no additional cost to the Owner.

1.11 CUTTING AND REPAIRING

A. The work shall be carefully laid out in advance and no excessive cutting of construction will be permitted. Damage to building, piping, wiring, or equipment as a result of cutting for installation shall be repaired

by mechanics skilled in the trade involved at no additional expense to the Owner.

1.12 SAFETY REQUIREMENTS

A. Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts located so that any person can come in close proximity thereto shall be fully enclosed or properly guarded. High-temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of a type as specified herein. Items such as catwalks, ladders, and guard rails shall be provided where required for safe operation and maintenance of equipment.

1.13 MANUFACTURER'S RECOMMENDATIONS

A. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Architect prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

1.14 PAINTING

A. At the completion of all work, all equipment on this project shall be checked for damage, and any factory finished paint that has been damaged shall be repaired to match the adjacent areas. Any metal or especially covered areas that have been deformed shall be replaced with new material and repainted to match adjacent areas. Painting of new work shall be as specified herein.

1.15 FINAL CLEANUP

A. At the completion of all work, all equipment on the project shall be checked and thoroughly cleaned, including coils, plenums, under equipment, and any and all other areas around or in equipment. Any filters used during construction shall be replaced with new filters during final cleanup.

1.16 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Bound Instructions: Three (3) complete sets of instructions containing the manufacturer's operating and maintenance instructions for each piece of equipment shall be furnished to the Architect before the contract is completed. Each set shall be permanently bound and shall have a hard cover. The following identification shall be inscribed on the covers: The words "Operating and Maintenance Instructions", the name and location of the building, the name of the Contractor and the contract number. Flysheet shall be placed before instructions covering each subject. The instruction sheet shall be approximately 8 1/2" x 11", with large sheets of drawings folded in. The instructions shall include, but shall not be limited to, the following:

1. Approved wiring and control diagrams, with data to explain the detailed operation and control of each component.
2. A control sequence describing start-up, operation and shutdown.
3. Operating and maintenance instructions for each piece of equipment, including lubrication instructions.
4. Manufacturer's bulletins, cuts and descriptive data.
5. Parts lists and recommended spare parts.

END OF SECTION 15100.

SECTION 15200 - TESTING AND BALANCING AIR DISTRIBUTION SYSTEMS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions, Supplementary Conditions and Division 1, General Requirements, apply.

1.02 QUALITY ASSURANCE

A. Testing Agency:

1. Submit name, address, and qualifications of testing agency to Architect for approval prior to start of testing.

2. All system adjustments, test and balances are to be performed by a company regularly and exclusively engaged in this work. Agency shall be a member in good standing of the Associates Air Balance Council (AABC).

3. Procedures shall be as outlined in the AABC Publication "National Standards for Total System Balance," 6th edition (2002).

1.03 SUBMITTALS

A. Test Reports: After completion, submit three (3) certified copies of test and balance report to the Architect for review and as a project record document.

1.04 JOB CONDITIONS

A. Commencement of Test: Do not begin balancing until the systems have been completed and are in full working order, or at the direction of the Architect, place any part thereof in operation for the purpose of balancing.

B. Plans and Data: Furnish the balance agency one (1) complete set of all approved up-to-date mechanical plans and shop drawings of all cooling, heating and air distribution equipment.

1.05 FIELD QUALITY CONTROL

A. Performance Data: Record the following data and submit to the Architect.

1. Leak test all duct systems and submit results to Architect. Testing procedure shall conform to AABC and leakage rate shall not exceed their recommendations.

2. Air Volumes and Velocities: Determine and tabulate at each grille, diffuser, louver, outside air intake, etc., and adjust dampers, control devices and fan drives to obtain the indicated air quantities. Adjust or modify each supply grille and diffuser distribution pattern as required to maintain air motion, noise level and temperature variations within acceptable limits throughout each space. Clearly and permanently mark all dampers at final setting for reported air balance.

3. System Component Capacity: Record and calculate all data necessary to demonstrate capacity under actual operating conditions, and adjust dampers, valves, control valves and machine drives to obtain a suitable operating balance for each system. Record data for each item of equipment simultaneously with data from all associated equipment together with coincident outside air dry bulb temperatures to permit evaluation of total system performance. Data to include the following:

   a. Supply, return and outside air quantities for each air conditioning and ventilation system.
   b. Air volumes and velocities for each fan, cooling coil and air cleaning assembly.
   c. Entering and leaving air dry bulb and wet bulb temperature for each cooling and heating coil. Leaving dew point for each cooling coil.
   d. Static pressures for all air handling units and major fans.
   e. Actual voltage and current input for each motor.
   f. Test and adjust each diffuser grille, and register within 10 percent of design requirements. Test and record temperature rise, voltage, and current across duct heaters.

4. In readings and test diffusers, grilles and registers include required fpm velocity and test fpm velocity, and required cfm and test cfm after adjustments.

1.06 TEMPERATURE CONTROLS

A. Set adjustments of all controllers to operate as indicated. Make four hour temperature traverse of each area or zone. Provide testing agency personnel with instruments to verify reports to Architect.

1.07 FINAL TEST

A. At conclusion of testing agency's work, demonstrate to the Architect that the equipment is mechanically sound, that the systems deliver the rated output without objectionable noise, distress or vibration, and that the temperature controls are functioning properly.

END OF SECTION 15200.

SECTION 15400 - PLUMBING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The work to be performed under this section of the Specification shall include all labor, materials, equipment, transportation, construction, facilities, and incidentals necessary for the proper execution and completion of all Plumbing work as shown and indicated on the Contract Drawings, and/or specified herein with the intent that the installation shall be complete in every respect and ready for use. The work required under this section of the specification shall include specifically, but is not limited to the following:

B. Cold water piping and connections to new fixtures as shown or indicated on the drawings.

C. Hot water supply piping including connections to new fixtures as shown or indicated on the drawings.

D. A system of sanitary soil, waste, and vent piping including connections to existing services, and new fixtures as shown or indicated on the drawings.

E. A system of thermal insulation for all new potable water piping.

F. All fixtures and equipment as herein after specified, completely installed and operational.

G. All necessary cutting and/or core drilling to install plumbing systems in this section.

1.02 RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 1 specification sections apply to work specified in this section

1.03 GUARANTEE

A. All materials and equipment provided and/or installed under this section of the specifications shall be guaranteed for a period of one year from the date of acceptance of the work by the Owner. Should any trouble develop during this period due to defective materials or faulty workmanship, the Contractor shall furnish all necessary labor and materials to correct the trouble without any cost to the Owner. Any defective materials or inferior workmanship noticed at the time of installation and/or during the guarantee period shall be corrected immediately to the satisfaction of the architect.

1.04 CODES AND REGULATIONS

A. All work performed under this section shall conform with all local governing regulations, and in case of conflicting requirements, the most stringent shall apply. Minimum requirements shall be the Florida Building Code. All electrically operated equipment specified in this section shall comply with the National Electrical Code.

B. Should it be found that any part of the work shown or specified is not in accordance with local regulations, the Architect shall be so advised at the time of bidding and all work installed as required to meet the local codes.

C. The Contractor shall comply with the latest revisions of all county, district, municipal, or local building codes, interpretations, buildings permits to include but not be limited to:

2017 Florida Building Code
2017 Florida Fuel Gas Code
2017 Florida Mechanical Code
2017 Florida Plumbing Code
NFPA-101 - Life Safety Code
Local Municipal Codes
2014 National Electrical Code (NFPA 72)

1.05 FEES AND PERMITS

A. The Plumbing Subcontractor shall obtain and pay for all permits, fees for inspection, and other charges that may be necessary for fully completing the work. The Plumbing Subcontractor shall make all necessary tests required by City, County, or State authorities, legal regulations, and/or the Architect, and return to the Architect any certificates of approval issued in this district for plumbing work, etc. signed by the inspector in charge of each particular part of the work.

1.06 RECORD DRAWINGS

A. Contractor shall keep a set of released for construction drawings on site at all times and log all changes made during construction period. No deviations from the drawings and specifications shall be made without full knowledge and consent of the Architect. Record drawings shall show dimensions, locations, and depth of all buried and concealed piping, plugged outlets, and equipment, and shall keep up-to-date. No plumbing progress payments will be approved unless as-built drawings are up-to-date. Upon completion of work, construction as-built drawings shall be turned over to the Architect.

1.07 COOPERATION

A. The Contractor shall lay out and proceed with his work so that this work will be executed in harmony with all other contractors and trades on the job.

1.08 VISITING THE PREMISES

A. The Contractor, before submitting his bid on the work, must visit the site and familiarize himself with all existing conditions. As a result of having visited the premises, the Contractor shall be responsible for the installation of the work as it relates to such existing conditions. The submission of a bid will be considered an acknowledgment on the part of the bidder of his visitation to the site.

1.09 VERIFICATION OF CONTRACT DRAWINGS

A. The drawings and specifications are intended to cooperate. Any materials, equipment, or systems related to this section and exhibited on the architectural and plumbing drawings, but not mentioned in the specifications are to be executed to the intent and meaning thereof, as if it were both mentioned in the specification and set forth on the drawings. Where the Contractor finds the specification and/or drawings to be in conflict or where they are not clear, same shall be brought to the attention of the Architect prior to submitting a bid.

B. The plans indicate the general arrangement of the existing utilities. The locations of piping are approximate for clarity. Exact locations shall be determined in the field by the Contractor. In the event it should become necessary to change the locations of any work due to building construction, etc., the Contractor shall secure the approval of the Architect before making the changes. Any changes approved by the Architect shall be made without added cost to the Owner. Under no circumstances shall the sizes indicated on the drawings be changed without securing written approval of the Architect.

C. The drawings are diagrammatic and do not necessarily show or indicate all fittings, offsets, and accessories which may be required. The Contractor shall carefully investigate the structural and finish conditions affecting all his work as well as the operational requirements of each system and shall arrange such work accordingly, furnishing such fittings, etc., as may be required for the proper and efficient functioning of each system. No unnecessary or unauthorized offsets will be permitted.

1.10 WORKMANSHIP

A. All workmanship performed under this section shall be executed in a first class manner in accordance with the best practices of the trade. The Architect reserves the right to accept or reject workmanship and determine when the Contractor has complied with the requirements herein specified. Only competent mechanics skilled in their respective trades shall be employed by the Contractor.

1.11 RESPONSIBILITY OF BIDDER

A. Each bidder shall visit the site of the proposed work and fully acquaint himself with conditions relating to the construction requirements so that he may fully understand the facilities, difficulties and restrictions contingent upon the execution of the work under this contract. The failure or omission of any bidder to receive or examine any form, instrument, addendum or other document shall in no way relieve any bidder from his obligations with respect to his bid or the contract. The submission of a bid shall be taken as prima fascie evidence of compliance with this paragraph and that he has included in his proposal every item of cost necessary for a complete installation of air conditioning, heating and ventilation operations strictly as planned, specified, and intended.

1.12 NOISE AND VIBRATION

A. This Contractor shall be held responsible for elimination of all noises or vibrations transmitted to occupied areas from equipment which he may install. This applies particularly to vibration and noises in piping. He shall furnish and install water hammer arrestors, flexible connectors for piping, etc., as may be necessary to provide a functionally safe piping system.

1.13 SUBMITTAL DATA

A. Materials and equipment schedules shall be submitted as soon as practicable, but not later than 30 days after the date of award of contract, and before commencement of installation of any material or equipment. A complete schedule of the material and equipment proposed for installation shall be submitted in proper binders (3-ring or fastener type), properly marked for approval by the Architect. The schedule shall include catalogs, cuts, diagrams, drawings, specifications and such other descriptive data as may be required by the Architect. The schedule and supplementary data shall be submitted in six (6) copies, and approval obtained. All materials required to be submitted for approval under this section shall be submitted at one time.

B. Partial submittals will not be considered. Each item submitted shall be identified by its applicable drawing number.

C. Where equipment named as equivalent or approved equal are proposed for use by the Contractor, he shall be responsible to coordinate any changes with all trades affected.

D. The following equipment and material shall be submitted for approval:

1. Valves
2. Cleanouts
3. Access Panels
4. Insulation
5. Pumps
6. Oil Holding Tank
7. Plumbing fixtures, including traps, supplies, and carriers
8. Water Hammer Arrestors
9. Floor Drains
10. Trap Primers

1.14 START-UP SERVICE

A. The Contractor shall put all items installed under this section into operation and shall instruct the Owner's maintenance personnel in all points requiring service and maintenance. Further, the Contractor shall make all adjustments and/or service requirements to said equipment during the first 60 days of actual occupancy.

1.15 PIPING

A. Provide pipe sleeves through masonry construction, and install escutcheon plates around exposed piping in all rooms.

B. Soil, waste and vent lines shall be Schedule 40 PVC-DWV in accordance with Commercial Standards CS272-65 or ASTM Standards D2665-68. Soil, waste, and vent lines penetrating a fire rated wall or floor shall be service weight cast iron at the point of penetration only.

C. All plastic pipe shall bear the NSF Seal of Approval, and such other markings as required by the aforementioned standards.

D. Above slab cold water and hot water piping shall be Type "L" hard copper with sweated joints, using wrought fittings and non-corrosive flux. Below slab cold water piping shall be type "K" soft copper tubing.

Waste piping serving within the first thirty feet of the dishwasher, pot sinks, floor drains inside the cooking area, or other areas where temperatures may be expected to exceed 140 degrees F shall be Spears® LabWasteTM CPVC piping or equal. Soil, waste, and vent systems penetrating a fire rated wall or floor shall be cast iron soil pipe. Below grade installation of thermoplastic pipe shall be installed in accordance to the ASTM D 2321* standard.
* most current edition

E. Where pipes pass through firewalls, fire partitions, or fire-rated floors, an approved UL Fire Seal shall be provided. System employed shall be assigned an approval number in accordance with 1990 Fire Resistance Directory published by Underwriters' Laboratories.

1.16 PIPE SUPPORT

A. Hangers: Support all suspended piping with clevis type hangers equal to Piping Technology and Products Fig. 83 spaced in accordance with IPC Table 308.5, or at 8'-0" o.c., whichever is less. Within the storm shelter area, the maximum hanger spacings shall be lessened to one-half the distance in accordance with IPC Table 308.5, or at 4'-0" o.c., whichever is less. When attached to open-web bar joists, the hanger shall be supported from both chords at the same time. The hanger is preferred to pass between the chords, not attached to the webbing member, and supported on top of the chords. This is a concentric application. Architect shall approve all methods of attachment of hangers to construction. Hangers in contact with copper piping shall be copper, or copper plated.

B. Vertical Support: Steel bar base clamped to pipe or grip strut channel with offset clamps. Support members to be of same material as supported material where possible.

C. All anchorages shall be to studs or solid blocking built into the wall. No plumbing straps shall be used.

1.17 PIPING PLACEMENT

A. Place in most direct manner permitted by construction, free of unnecessary offsets, making changes in direction by means of standard fittings.

B. Grade 2" waste lines 1/4" per foot and 3" and 4" waste lines 1/8" per foot for positive flow. Secure all piping to structure.

1. Changes in direction of drainage pipe shall be made by means of suitable bends and branches of Y's and long sweeps. Short radius quarter bends are prohibited. Make no change in direction of flow greater than 90□. Where different sizes of drainage pipes or fittings are connected, use standard increasers and reducers of proper size. Do not reduce size of drainage piping in direction of flow. Drilling and tapping of house drains, soil waste or vent pipes, and use of saddle hubs and bands are prohibited.

   Waste Arms: Type "K" copper or IPS brass pipe typical; Alloy steel or IPS brass pipe at urinals.

   Test Fittings: Not shown on the drawings; provide where required for partial tests. Provide test tees at base of all stacks.

2. Hand holes with brass ferrules and brass trap screws for cleanouts shall be placed at ends of soil and waste pipe and where otherwise shown on plans or as required on job. Cleanouts to be brought flush with face of walls. All threaded plugs shall be full size of pipe on which placed up to 4".

C. Soil Pipe: Support to firm earth below floor slabs.

1. Changes in direction of drainage pipe shall be made by means of suitable bends and branches of Y's and long sweeps. Short radius quarter bends are prohibited.
2. Connections of vertical soil pipe to all connections in horizontal soil pipe to be made by "Y" fittings.

D. Vent Pipes:

1. Main soil pipe stacks to be extended up through the building full size with increaser through roof per code.

2. Connect branch vents into main stacks with connections not less than 4 feet above the highest fixture.
3. All vent stacks shall be connected at the bottom to main drainage system and all horizontal runs shall be graded so as to discharge all water or condensation.

E. Water Piping: Place supply pipes as shown or as directed in neat arrangement and parallel or at right angles to walls, joists, etc.

1. Place shock absorbers at each fixture group as recommended by manufacturer. Shock absorbers shall be PDI certified.
2. Place valves on all water pipe risers and branch lines at point where risers and branch lines connect to main water lines.

PART 2 – PRODUCTS

2.01 WATER PIPING

A. All water piping, unless otherwise shown or specified shall be copper pipe Type L or K as specified having a wall thickness of not less than .035 inches. It shall be clean, round, straight, and true to size, free from flaws and other defects.

B. All fittings on copper pipe shall be copper. The pipe and fittings shall be thoroughly cleaned before inserting into the joint and then soldered with lead free solder.

2.02 GAS PIPING

A. All piping above grade shall be Schedule 40 black steel ASTM 120. Fittings shall be 150 pound black malleable screw pattern for all sizes 2" and smaller.

B. All piping shall be installed in accordance with NFPA recommendations, and the International Fuel Gas Code complete with all necessary appurtenances.

C. Horizontal piping shall grade with a slope of 1" on 40 feet-0" to drip legs at all low points as required. Drips shall be provided at all low points and at bottom of risers. Drips shall be same size as the piping where installed and shall be a minimum of 12" long.

D. Use ground joint unions in all screw piping joints.

E. Natural gas piping shall be painted yellow and labelled on 12’ centers.

2.03 UNIONS

A. Unions shall be provided on inlet and outlet of all apparatus and equipment. Where valves are adjacent to equipment, unions shall be between valves and equipment.

B. Unions in copper pipe shall be cast bronze, WOG pattern, ground joint, 150 psi type.

C. Unions in steel pipe shall be malleable iron, WOG female pattern brass seat, ground joint, 150 psi type.

D. Unions connecting dissimilar metals shall be dielectric type.

2.04 TRAP PRIMER DISTRIBUTION UNIT

A. A trap primer distribution system shall be equal to Precision Plumbing Products DU Series to serve fixtures. Unit shall be installed per manufacturer's instructions.

2.05 VALVES AND COCKS

A. Valves and cocks shall be installed where shown on the drawings, and/or where found to be necessary for proper operation of the system. All branches from risers, all branches from mains, and all fixtures or equipment not having stops shall be provided with valves whether shown or not.

B. Angle or straightway chromium plated stops on the supplies to all fixtures accessible from the same room in which the fixtures are located.

C. All valves shall be the product of one manufacturer as cataloged by Milwaukee, Stockham, Crane, or Nibco.

D. For water piping, valves shall be equal to 125 psi SWP/200 psi WOG Nibco as follows:

1. Gate valves 1/2" to 3" = S-111.
2. Ball valves 1/2" to 2" = S-585.
3. Check valves 1/2" to 3" = S-413W.

2.06 WALL HYDRANTS

A. Interior wall hydrants shall be encased, anti-siphon, automatic draining, keyed with nickel bronze face plate. Mount flush with wall. Wall hydrant shall be equal to Zurn Z-1330. Coordinate wall thickness at installation location. Adjust location as necessary to enclose piping within the wall.

B. Exterior wall hydrants shall be encased, anti-siphon, automatic draining, non-freeze, with nickel bronze faceplate, keyed hinged cover. Wall hydrant shall be equal to Zurn Z-1322-EZ. Coordinate wall thickness at installation location. Adjust location as necessary to enclose piping within the wall.

2.07 THERMAL INSULATION WORK

A. All insulation work shall be performed by experienced insulation application mechanics thoroughly familiar with and experienced in the application of insulation materials. All insulation materials shall be applied in accordance with manufacturer's published recommended methods. Installation and finish of insulation materials shall meet with complete data for approval of materials and application methods as proposed for use. All piping shall be pressure tested and all surfaces shall be thoroughly cleaned before covering is applied. Insulation materials, including sealer, adhesive, finished, etc., shall meet NFPA Standards with regard to flame spread and support of combustion.

B. All domestic cold water piping and all hot domestic water piping less than 1-1/2” in diameter shall be covered with 1" thick heavy density fiberglass sectional pipe insulation equal to Owens Corning Fiberglass 25 ASJ/SSL, excluding piping below grade or chromium plated fixture connections. All hot domestic water piping 1-1/2” in diameter or larger shall be covered with 1-1/2" thick heavy density fiberglass sectional pipe insulation equal to Owens Corning Fiberglass 25 ASJ/SSL, excluding piping below grade or chromium plated fixture connections. All piping inside masonry walls shall be insulated; no exceptions. Armaflex type insulation shall be allowed only before building is dried-in in those locations which will be inaccessible for the installation of the aforementioned fiberglass insulation. All exposed hot and cold water piping shall be labelled as required by ASME A13.1.

C. Fittings for the above shall be insulated with premolded fitting insulation of the same material and thickness as the adjacent insulation and shall be covered with a premolded plastic (PVC) vapor barrier and sealed with vapor barrier lagging adhesive. Covering adjacent to unions and other points of termination shall be finished with the plastic material neatly beveled.

D. It shall be the responsibility of the insulation subcontractor to coordinate hanger locations and prevent crushing or breaking finishes. Provide saddles with blocking as necessary.

E. Contractor shall insulate hot water supply assembly and P-Trap assembly with insulation kit equal to Brocar or Trubro on handicapped lavatories.

2.08 FLOOR, WALL, AND CEILING PLATES

A. Nickel plated floor, wall, and ceiling plates shall be provided on all pipes passing through floor, ceiling, or partition. Nickel or chromium plated escutcheons shall be provided on all fixture supplies.

2.09 PLUMBING FIXTURES AND EQUIPMENT

A. Provide roughing-in for and connect to supply lines, waste and vent lines, all equipment, fixtures, drains, etc., specified herein or in other sections of the specifications which require such connections.

B. Provide stops in hot and cold water connections to each fixture, equipment items, etc. Where not otherwise specified, stops shall be same as specified hereinbefore for ball valves. Provide deep escutcheon on all sinks and lavatories where waste pipe goes into wall. Anchor all supplies from wall securely within wall construction.

C. Provide stops for all fixtures. Traps for all fixtures shall be 17- gauge chromium plated brass.

D. Plumbing fixtures shall be equal to Kohler, American Standard, Zurn, Acorn, Bradley, Crane, Just, or Elkay. Faucets and valves shall be equal to Sloan, Zurn, Delta, American Standard, Kohler, Just, Fiat, or T&S Brass. No others will be accepted.

E. Plumbing fixtures shall be as follows:

P-1 WATER CLOSET: Kohler K-96053 elongated standard height bowl, floor mounted, floor outlet, 1.6 gpf flush valve type with Sloan Royal 111 flush valve. Provide Olsonite 10SSC white open front seat (less cover) and two bolt caps.

P-1A HANDICAP WATER CLOSET: Kohler K-96057, 16-5/8" bowl rim height elongated bowl, floor mounted, floor outlet, 1.6 gpf flush valve type with Sloan Royal 111 flush valve. Provide Olsonite 10SSC white open front seat (less cover) and two bolt caps. Install per ADA requirements.

P-2 URINAL: Kohler K-4960-ET, wall hung, vitreous china with Sloan Royal 186 -1.0 flush valve and Zurn Z1222 wall carrier.

P-2A HANDICAP URINAL: Kohler K-4960-ET, wall hung, vitreous china with Sloan Royal 186-1.0 flush valve and Zurn Z1222 wall carrier. Mount fixture in compliance with ADA for handicap use.

P-3 LAVATORY: Kohler K-2005, 20" x 18" wall hung vitreous china with Delta 505 single lever faucet and grid waste. Bowl depth not to exceed 5-1/2". Provide 1-1/4", 17-gauge P-Trap, flexible supplies equal to Brasscraft, stops, Leonard model 170 thermostatic mixing valve, and Zurn Z1231 concealed arm carrier. Provide insulation kit on all exposed piping.

P-3A HANDICAP LAVATORY: Kohler K-2005, 20" x 18" wall hung vitreous china with Delta 505 single lever faucet and grid waste. Bowl depth not to exceed 5-1/2". Provide 1-1/4", 17-gauge P-Trap, flexible supplies equal to Brasscraft, stops, Leonard model 170 thermostatic mixing valve, and Zurn Z1231 concealed arm carrier. Install per ADA requirements. Provide insulation kit on all exposed piping.

P-4 WATER COOLER: Dual type, wall mounted, barrier free, Elkay EZSTL8C with 17-gauge P-Trap and rough brass stop. Provide with Zurn Z-1225-BL floor-supported plate carrier and mount in compliance with ADA for handicap use.

P-4A WATER COOLER: Dual type, wall mounted, barrier free, Elkay EZSTL8WSLK with 17-gauge P-Trap and rough brass stop. Provide with Zurn Z-1225-BL floor-supported plate carrier and mount in compliance with ADA for handicap use. Unit to have bottle-filling unit on lower side.

P-5 JANITOR'S SINK: Kohler K-6714 wall mounted enameled cast iron sink with K-6672 2" p-trap. Provide with Kohler K-8907 splash mounted utility faucet. Provide vacuum breaker, flexible supplies and stops, and Zurn Z1231 concealed arm carrier. Provide insulation kit for all exposed piping. Wall hydrant shall be equal to Zurn Z1325 or J.R.Smith 5560QT. Coordinate wall thickness at installation location. Adjust location as necessary to enclose piping within the wall.

2.10 CLEANOUTS

A. Provide in cast iron sanitary piping at all changes in direction at ends of branches, at intervals not exceeding 40' on straight runs, and elsewhere as shown. Cleanouts shall be full opening type completely accessible. Size same as lines in which they occur, but not larger than 4". Tees and extensions shall be of same weight as pipe. Plugs shall be countersunk type. Catalog numbers from Josam or approved equal.

B. Outside cleanouts to grade shall be brought up flush with finished grade and installed in 18" x 18" x 6" concrete pad, cleanout plug shall be countersunk.

C. In Tile Floors: 56030-2, adjustable, cast iron body with ABS plug and satin finished square scoriated Nikaloy top; where soft tile occurs, provide 56030-12-2 recessed square Nikaloy cover.

D. In Concrete Floors: 58190, adjustable head, cast iron head and ferrule with ABS plug, round loose set scoriated tractor cover.

E. In Outside Line: 58190 cast iron head and ferrule with ABS plug. Terminate at grade or pavement in 18" x 18" x 6" concrete pad with tooled edges.

F. In Finished Walls: 58790 cast iron cleanout tee with ABS plug and stainless steel wall plate cover. Where distance from plug to finish wall will exceed 4", provide 58710 extend cover from sanitary tee to bring plug within 4".

G. In Quarry Tile Floors: 56040-13-1, adjustable cast iron head and ferrule, ABS plug and round brass terrazzo cover and rim.

2.11 ELECTRIC WATER HEATERS

A. Provide electric water heater with high efficiency stainless steel sheathed elements which comply with ASHRAE Standard 90-75. Water heaters shall have capacity as scheduled and shall be equal in all respects to Rheem-Ruud PowerPack ASME commercial electric water heaters. Provide with auxiliary drain pan, T&P relief valve, expansion tank, thermometer on discharge piping, and vacuum breaker.

B. Provide Watts 100XL temperature and pressure relief valve, Watts N36 vacuum relief valve, galvanized drain pan, and 5-year warranty on tank. See schedule for electrical characteristics.

C. Provide water heater with automatic time clock type controls to turn the system off when heated water is not required.

2.12 GAS-FIRED WATER HEATERS

A. The water heater shall have a minimum input rating and recovering capacity as scheduled on the drawings and shall be operated on natural gas. It shall have a storage capacity as scheduled.

B. The tank shall be glass lined and shall be insulated with fiberglass insulation. The heater will also be equipped with multiple anodes for cathodic protection. Heater(s) shall be equipped with 1-1/2" npt water inlet and outlet openings. The heater(s) shall be constructed in accordance with ASME code, and the entire unit listed by Underwriters Laboratories.

C. Heater(s) shall be equipped with a powered gas burner with electronic flame safeguard, intermittent electronic ignition, main and pilot automatic gas valves, redundant solenoid gas valve, gas pressure regulator, diaphragm switch for proof of boiler operation, and flame inspection port.

D. Controls and other components shall include manual-reset high-temperature limit control, upper and lower thermostats, combination temperature and pressure gauge, low-water cutoff, CSA certified and ASME rated T&P relief vale, drain valve, and draft regulator.

   a. Provide water heater with automatic time clock type controls to turn the system off when heated water is not required.

E. The heater(s) shall meet or exceed the thermal efficiency and/or standby loss requirements of the U.S. Department of Energy and current edition of ASHRE/IESNA 90.1. The tank shall have a 3-year limited warranty against failure.

F. Water heater and boiler system design and installation must comply with all requirements of the State of Alabama "Boiler and Pressure Vessel Safety Act". The accompanying Permit Request to Install Boiler or Pressure Vessel, and the Boiler and Pressure Vessel Inspection Report must be approved for each water heater of over 200,000 BTU or over 120 gallons. Each such water heater must also be ASME certified. Contact the chief boiler inspector, Alabama Department of Labor, for additional information. Upon completion of installation, the contractor shall arrange for the State of Alabama Boiler and Pressure Vessel Safety Division inspector to visit the job site for inspection and approval of the water heater installation. This must be done prior to the building being certified for occupancy.

PART 3 - EXECUTION

3.01 COMPLETION OF WORK

A. This Contractor shall arrange for the installation of all equipment in order that it progresses along with the general construction of the building, and in no case shall be hold up other phases of the work due to the fact his equipment is not properly installed.

3.02 TESTING

A. General: Perform all tests in the presence of the Architect or his representative. Test shall conform to local code requirements. File copies of all test reports in duplicate to physical plant.

B. Soil, Waste, and Vent Systems: Plug all openings, fill entire system with water to point of overflow and hold for at least one hour before inspection. System must remain full during the test without leakage. Each vertical stack with its branches may be tested separately, but any portion tested must have a 10' head. Provide test tees and plugs for all tests as required.

C. Drainage and Vent Systems final test. Fill all traps with water and then introduce into the entire system a pungent, thick smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof, the stack openings shall be closed and a pressure equivalent to a one-inch water column shall be held for a test period of not less than 15 minutes. The plumbing contractor shall provide all materials, equipment and labor to perform this testing.

D. Water Supply System: Test and secure acceptance of entire system before the piping or hot water heaters are otherwise concealed. Test as follows: Disconnect and cap all outlets to plumbing fixtures and all other equipment not designed for the full test pressure. Fill the system with water; apply 150 psi hydrostatic pressure and hold until inspection is completed. All piping throughout shall be tight under test. Water piping shall remain under normal water pressure during construction where freezing conditions do not exist.

3.03 DISINFECTION

A. Disinfect all domestic water piping in accordance with local health department guidelines.

END OF SECTION 15400

SECTION 15510 - FIRE SPRINKLER SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, tools, and equipment, and perform all work and services necessary for or incidental to the installation, complete, of the fire protection system which shall be completely coordinated with the work of all other trades. All work shall be performed by an automatic sprinkler contractor licensed in the State of Florida who shall certify the complete installation.

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

C. The subcontractor for the fire sprinkler system shall include in the cost of the work, detail sprinkler system drawings, custom designed to the actual field conditions and the installation shall exactly match the drawings prepared. Such sprinkler system design shall incorporate features to cause maximum insurance rating benefit to the Owner. In addition, drawings shall be prepared per the requirements of NFPA 13. Documents shall be signed and sealed by a professionally registered engineer and submitted for permitting.

D. Shop drawings shall be suitable for permitting and signed and sealed by a professional engineer registered in the State of Florida.

1.02 DESCRIPTION OF WORK

A. Work included in this section of the specifications shall consist generally of, but is not limited to, the following major systems or categories of work:

The work includes the modification of an existing dry pipe system. Modifications require existing sprinkler heads to be removed and new sprinkler heads installed in new locations. New locations shall be determined subject to areas with new floor plans. It is intended the design, equipment, materials, installation and workmanship shall be in strict accordance with the required and advisory provisions of NFPA 13, except as modified herein. System shall include all materials, accessories, and equipment necessary to maintain the existing automatic system which is complete and ready to use. Design and install system to give full consideration to lighting blind spaces, piping, electrical equipment, ductwork, and all other construction and equipment to afford complete coverage in accordance with prevailing code requirements. Devices and equipment for fire protection service shall be of an approved make and type listed by the Underwriters' Laboratories, Inc., or approved by the Factory Mutual System.

1.03 SPRINKLER CODES AND STANDARDS

A. Entire system shall be in accordance with the following codes and standards for the occupancy hazards as hereinbefore specified.

B. Standards of the National Fire Protection Association: Sprinkler Systems No. 13.

C. Any special requirements of the building's Insurance Underwriter or IRA.

D. Requirements of the fire inspection bureau having jurisdiction.

E. Florida Building Code.

1.04 INSTALLATION

A. Modify the fire protection system in accordance with this specification and as required by state and local governing codes.

B. System modifications require piping and sprinkler heads to be relocated in designated areas of work.

C. The Contractor shall conduct a flow test to insure available flow and pressure at point of connection.

D. The system classification shall be for light hazard occupancy to protect the facility. Should particular areas of the facility be classified other than as indicated coordinate with Engineer.

1.05 SUBMITTALS

A. Submit a 1/8" = 1'-0" minimum scale reproducible shop drawing in accordance with NFPA #13 to the Architect. Verify all clearances, lighting fixtures, piping, etc., at job site or from contract documents.

B. Approval by Architect will be for general location only. Approval by insurance carrier will be for specific recommendations which shall be strictly adhered to. Where there is conflict between authority's recommendations and these drawings and specifications, recommendations by the authority shall govern.

C. Submit to Architect for approval actual photographs or samples of all items of equipment which will be visible with the finished work. Include such items as sprinkler heads, etc.

PART 2 - PRODUCTS

2.01 MATERIALS SPECIFICATIONS

A. All material and equipment shall be furnished by an established and reputable manufacturer. All material and equipment shall be new, unused, and of first class construction designed and guaranteed to perform the service required and shall be approved by NFPA and UL.

B. Above grade piping shall be black steel, Schedule 10 for sizes 2-1/2" and larger; ASTM A135. Fittings shall be UL and FM approved mechanical couplings. Piping 2" and smaller shall be Schedule 40 black steel with 175 lb. screw pattern fittings. Provide thrust restraints where steel piping is connected to cast iron.

2.02 PIPE HANGERS

A. Pipe hangers shall be spaced in accordance with requirements of NFPA. Hangers, hanger rods, inserts and clamps shall be constructed as approved by same and have zinc or galvanized coating. Hangers shall be same type as specified in plumbing section.

2.03 DRAINS

A. Install approved drains at low points of all piping and elsewhere as required to permit complete drainage of system without disconnection of any piping. Drain and test connections on end of sprinkler branches shall be piped to exterior of building.

2.04 SPRINKLER HEADS

A. Install sprinkler heads as required by NFPA No. 13. Heads shall be rated for various temperatures and flows as determined by National Fire Protection Association. In no case shall they be rated at more than

165EF.

B. Furnish spare sprinkler heads and wrench as required by NFPA and place in metal cabinet on job site where directed by Architect.

C. Sprinkler heads shall be of type and operating temperature as required by specific location of installation. Srinkler heads in finished areas with lay-in acoustical ceilings shall be recessed type covered by white metal plates. Sprinkler heads in plaster or hard finished ceilings shall be semi-recessed with chromium plated finish. Sprinkler heads shall be equal to those manufactured by Grinnel, Automatic Sprinkler or Viking.

2.05 SPACE LIMITATIONS

A. Route piping to avoid interferences with ducts, piping, lighting, etc. Necessary offsets, crossover or other routing shall be provided to permit all systems to be installed in available space. Offsets, crossovers, etc., are not shown on drawings. Investigate mechanical, electrical, and architectural drawings to ascertain how work of other trades affect installation.

PART 3 - EXECUTION

3.01 TESTS AND INSPECTION

A. Work included herein shall include all tests and inspections by State authority and/or local Fire Marshall and all permits or inspection fees connected therewith. At completion of work and prior to acceptance by Owner, demonstrate complete operation of system including alarms.

3.02 DRAWINGS

A. Drawings are diagrammatic. Field route all piping on job site. All piping in finished spaces shall be run concealed.

3.03 COORDINATION

A. Sprinkler contractor shall coordinate with utility the requirements of pressure and water supply for satisfactory operation of this system.

END OF SECTION 15510.

SECTION 15800 - HEATING, VENTILATION, AND AIR CONDITIONING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The work consists of furnishing all labor, materials and incidentals necessary for a completely functional system. In general, the work shall include, but not necessarily be limited to the following major components, products and materials.

Ductwork, Grilles, Registers and Diffusers
Temperature Controls
Insulation Materials
Split System Direct Expansion Heat Pump Units
Packaged 100% Outdoor Aire Pretreatment Air Conditioning Units
Fans (exhaust)
Louvers
Dampers

1.02 CODES, FEES, PERMITS

A. The Contractor shall comply with all county, district, municipal, or local building code, interpretations, building permits and assessments of fees for building permits, and ordinances.

B. The Contractor shall obtain and pay for all required permits, inspections, and certificates of inspection. Certificates of inspection shall be delivered to the Architect upon completion of the job.

C. The Contractor shall comply with the latest revisions of all county, district, municipal, or local building codes, interpretations, buildings permits to include but not be limited to:

ASHRAE, 2012 "HVAC Systems and Equipment" - Chapter 19, Duct Construction
SMACNA Standards for Duct Construction
Florida Building Code - 2017
Florida Mechanical Code - 2017
Florida Plumbing Code – 2017
ASHRAE 90.1
ASHRAE 62.1
NFPA-90A (2015) - Installation of Air Conditioning and Ventilation Systems
NFPA-101 (2015) - Life Safety Code
Local Municipal Codes

1.03 RESPONSIBILITY OF BIDDER

A. Each bidder shall visit the site of the proposed work and fully acquaint himself with conditions relating to the construction requirements so that he may fully understand the facilities, difficulties and restrictions contingent upon the execution of the work under this contract. The failure or omission of any bidder to receive or examine any form, instrument, addendum or other document shall in no way relieve any bidder from his obligations with respect to his bid or the contract. The submission of a bid shall be taken as prima facia evidence of compliance with this paragraph and that he has included in his proposal every item of cost necessary for a complete installation of air conditioning, heating and ventilation operations strictly as planned, specified, and intended.

1.04 SUB-DIVISIONS OF WORK

A. Each sub-division of work includes furnishing and installing all materials to make that part of work complete, and shall comprise all auxiliaries, setting of equipment, sleeves through building construction where required and etc., all in complete coordination with General Contractor and in cooperation with other trades. It is contemplated that all sub-divisions of work when completed will form a fully operational heating, air conditioning, and ventilation system for this project.

1.05 DRAWINGS

A. The drawings for the Heating, Ventilating and Air Conditioning for this job are diagrammatic. The Contractor shall make his own measurements at the site and in the building during construction and install the systems as the work progresses in such a manner that the equipment, piping, conduit, panels, and ductwork will fit into the finished space provided while maintaining headroom; and be neatly installed. All equipment and its interconnecting piping, ductwork, conduit, etc., shall be provided.

B. Due to differences between various manufacturers, it is not practicable to show exact dimensions of units, nor to show or specify all minor details of equipment. Contractor shall provide all valves, fittings and accessories as necessary for a complete installation, whether or not specifically mentioned or shown.

C. Equipment shall not be acceptable if operated in excess of the recommended and published ratings of the manufacturer.

1.06 FOUNDATIONS

A. The Contractor shall furnish all special foundations and supports for equipment, ductwork and piping which he installs, and which are separate and distinct from building construction as shown by Architectural drawings.

1.07 SAFETY PROVISIONS

A. Contractor shall be required at all times to perform his work in strict accordance with the Williams-Steiger Occupational Health and Safety Act of 1970.

B. Equipment with any projecting or rotating parts shall be totally enclosed or properly guarded.

1.08 NOISE AND VIBRATION

A. This Contractor shall be held responsible for elimination of all noises or vibrations transmitted to occupied areas from equipment which he may install. This applies particularly to airborne noises in ductwork, vibration and noises in piping, and vibration from mechanical equipment transmitted through bases to building structure.

B. This Contractor shall furnish and install all flexible connectors for ductwork connected to motor driven equipment.

C. Contractor shall closely coordinate work for location of mechanical equipment and roof openings.

1.09 CUTTING AND PATCHING

A. Mechanical subcontractors shall not do cutting and patching. This work shall be performed only by the original contractor whose work was cut or patched. No structural members may be cut, patched or disturbed without approval of the Architect.

B. The Contractor shall be responsible for blocking out and sleeving all openings in floors, walls, and ceilings for new piping, ductwork, etc., before concrete is poured.

1.10 RELATED WORK

A. The following items of material and labor incidental to or related to the work will be provided as follows:

1. Concrete forming and pouring, custom metal fabrication, painting, and general corrosion proofing and any other collateral work made necessary by the requirements of this section shall be performed by persons who are qualified in and specialize in that type of work or trade.

1.11 MOTORS AND STARTERS

A. This Contractor shall be responsible for the furnishing in place of all electric motors required for the operation of all heating, ventilating and air conditioning equipment. Electrical Contractor to provide all power wiring and conduit required for the operation of electrical motors as specified. Electric motors shall be selected in sizes as required to properly operate the equipment furnished but in no case smaller than those indicated on Equipment Schedules. Verify all electrical characteristics from electrical drawings before releasing motors for shipment. Electric motors shall have a service factor of 1.15 and power factor in accordance with ASHRAE 90-75.

B. This Contractor shall furnish all magnetic motor starters required to operate heating, ventilating, and air conditioning equipment and turn over to the Electrical Contractor for installation. All motor starters shall be provided with:

1 thermal overload per phase leg.

A 110 volt coil and a hand-off-automatic switch, if motors are subject to electrical interlock unless otherwise specified.

C. If equipment is provided with R.L.A. in excess of design conditions the Mechanical Contractor shall stand the expense of associated electrical changes.

D. It is the responsibility of the Mechanical Contractor to provide thermal overloads of the proper size as required by the actual motor nameplate amps. Motor starters shall comply with the requirements of the latest edition of the National Electrical Code and the local utility service company.

E. Enclosures: Enclosures for starters and other controls equipment installed indoors may be NEMA 1. Outdoor enclosures shall be NEMA 4 or 4X of aluminum, stainless steel, or reinforced polyester resin construction.

1.12 PAINTING

A. All equipment furnished without factory paint or galvanized finish shall be thoroughly cleaned and given a prime coat, then a finish coat of paint in a color as selected by Architect/Engineer. Any equipment finish that is damaged or chipped, shall be spot painted to match existing surface. Any miscellaneous metals used by this Contractor that are not galvanized shall be given two coats of paint in color specified by Architect. Any rusty or corroded finishes shall be thoroughly cleaned and painted two coats of paint - one prime and one finish coat.

1.13 TESTS AND GUARANTEES

A. After completion of his work, and when the building is ready for occupancy, this Contractor shall operate the air conditioning or heating system for a period of two days. During the tests, the Contractor shall adjust controls, outlets, etc.

B. The Contractor shall repeat operational sequence during heating and/or cooling season, whichever had not been subject to prior test period.

1.14 SHOP DRAWINGS

A. Materials and equipment schedules shall be submitted as soon as practicable but not later than thirty (30) days after the date of award of contract, and before commencement of installation of any material or equipment. A complete schedule of the material and equipment proposed for installation shall be submitted for approval. The schedule shall include catalogs, cuts, diagrams, drawings, specifications and such other descriptive data as may be required by the Engineer. All materials required to be submitted for approval under this section shall be submitted at one time. Partial submittals will not be considered. They will be returned as "not approved".

B. Shop drawings shall be submitted for approval on the following items of equipment: Subject drawings shall include all data pertinent to the performance and installation of all equipment.

Air Distribution Devices - Grilles, Diffusers, Registers
Temperature Controls
Insulation Materials
Split System Direct Expansion Heat Pump Units
Packaged 100% Outdoor Aire Pretreatment Air Conditioning Units
Exhaust Fans
Louvers
Dampers

1.15 QUALITY OF MATERIALS AND EQUIPMENT

A. It is not the intent of these specifications to limit material and/or equipment selections to one manufacturer; however, the Engineer reserves the right to be the final and sole judge with regard to equals.

B. Approvals of equipment are based on capacities, equality of workmanship and components, or general and special construction features. Approval of equipment does not relieve the Contractor of coordination responsibility with other trades. Equipment shall fit within the physical space of equipment shown and have same general connection as that shown on drawings. Manufacturer’s required clearances shall be maintained for servicing and maintaining equipment.

C. Where equipment submitted varies from the general arrangement of that specified, Contractor shall submit detailed sheet-metal and equipment brochures. Shop drawings shall indicate any and all sheet-metal, electrical, piping and structural changes required to facilitate change. Any and all additional costs incurred by changes will be borne by this Contractor.

1.16 PRODUCT DELIVERY, STORAGE & HANDLING

A. Deliver distribution devices in individual wrappings to prevent damage to finish surface of device. Store in a dry, protected area until installed. After installation of devices, clean soiled surfaces.

PART 2 – PRODUCTS

2.01 SINGLE WALL LOW PRESSURE DUCTWORK

A. The sizes, runs, and connections of ducts shall be as indicated. Adhere to drawings as closely as possible. The right is reserved, however, if required to meet structural or other interferences, to vary run and shape of ducts and offsets during progress of work, at no extra cost to the Owner. Ductwork specified herein shall have rectangular cross section, unless otherwise indicated.

B. Materials - Methods of Construction: Details of construction and materials not specified herein shall be in accordance with SMACNA Low Velocity and ASHRAE "Guide" recommendations. Fabricate ductwork in workmanlike manner with airtight joints presenting smooth surface on inside, neatly finished on outside. Seal all duct joints airtight with approved tape or mastic before insulation is applied. Construct ductwork air extractors, spin-in taps with air scoops, turning vanes, splitter dampers, etc., to ease air flow and balancing of air. The joint between the trunk duct and any air extractor or spin-in tap shall be sealed with approved tape or mastic. Unless otherwise indicated, where square elbows have to be used, provide fixed deflectors. Construct, brace and support ducts in manner that they will not sag or vibrate to any perceptible extent when fans are operating at maximum speed and capacity. Ductwork shall be galvanized sheet steel unless otherwise specified. Distance between joints of any size duct shall not exceed 8'.

C. Sheet metal gauges for rectangular duct construction shall be:

Steel U.S. Std. Gauge	Maximum Size Inches	Type of Transverse Joint Conn.	Bracing
24	up to 12	S-Drive, pocket or bar clips on 7"-10" centers	None
24	13 to 24	S-Drive, pocket or bar clips on 7"-10" centers	None
24	25 to 30	A-Drive, pocket or bar clips on 7"-10" centers	1x1x1/8" angle
20	30 and greater	S-Drive, pocket or bar clips on 7"-10" centers	1x1x1/8" angle

D. Duct Support: Support horizontal ducts with hangers spaced not more than 8' apart, place hangers at changes in directions. Use metal strap hangers for ducts up to 30" wide, angle hangers for ducts over 30" wide. Make strap hangers 1" by 16-gauge minimum, extended down both sides of duct and turn under bottom 2" minimum, fasten sides and bottom with sheet metal screws.

E. Provide flexible duct connectors between ducts and air handler. Connectors shall be constructed of 29 ounce, fire resistant, neoprene-coated fiberglass approximately 6" wide, bordered by crimping to sheet metal and fastened to ducts with screws not more than 2" on centers. Connection shall meet pressure classification of duct system used. Acceptable manufacturers shall be Ductmate, DuroDyne, or FanAir.

F. Flex duct runouts to air devices shall be the acoustical insulated type with mechanical lock helix. Flex duct shall have factory wrapped, fiberglass insulation and fire retardant, reinforced metalized aluminum vapor barrier. Helix shall be corrosion resistant galvanized steel, formed and mechanically locked to fabric. Flexible duct shall have a CPE inner film liner. Ductwork shall be in accordance with UL 181. Flexible duct shall have a working pressure of up to 6" w.g. positive pressure (thru 16" diameter). Operating temperature shall be from -20 °F to 200 °F. Flame spread shall be less than 25 and smoke developed rating shall be less than 50. Ductwork shall have a minimum insulating value of R=6.0. Maximum length shall be limited to 8'-0". Where branch duct runouts exceed 8'0" in length install round snap-lock duct from trunk duct take-off to within 8'0" of air device as required for flex duct connection. Flexible duct shall be Flexmaster Type 9M or equal. Fabric type duct supports are not acceptable.

G. Spin-in fittings for connecting flex duct run-outs to trunk duct shall be Air-Trac, Flexmaster, Ductmate, or approved equal. Fitting shall have a balancing butterfly damper and air extractor. Provide minimum 22-gage spin-in and scoop with a 20-gage damper. Perimeter clearance of damper in spin-in shall not exceed 1/8".

2.02 DAMPERS

A. Provide splitter and deflecting vanes for control of air volume and direction, and for balancing system where indicated, specified, directed or required.

B. Dampers shall be of same materials as duct, at least one gauge heavier than duct, reinforced where directed, and shall have an accessible location indicating quadrant, locking device for adjusting and locking dampers in position.

C. Stiffen duct at damper location, install damper in manner to prevent rattling.

D. Manual volume dampers shall be of the opposed blade type. They shall be furnished in sizes shown on plans. Frame and blades shall be 16-gauge galvanized steel with mill galvanized finish. Frames shall be structurally equivalent to 13-gage U-channel. Blades shall have horizontal orientation. Provide with 2" hand quadrant standoff bracket for insulated ductwork. Manual volume dampers shall be suitable for application in HVAC systems with velocities up to 1500 fpm. Dampers shall be tested in accordance with AMCA 500. Equal to Ruskin Model MD35.

E. Automatic (motorized) dampers shall be of the parallel blade type. They shall be furnished in sizes shown on plans. Frame and blades shall be 14-gage galvanized steel with mill galvanized finish. Blades shall have horizontal orientation and be airfoil type for low pressure drop and low noise generation. Linkage and hardware shall be zinc plated steel. Dampers shall be provided with solid stops for tight closing with sales on the blade edges and the sides of the damper frame which will stand a temperature of up to 200°F. These stops shall be so assembled that they may be easily replaced if they become damaged. Damper gasket shall be continuous 3/16" x 1/2" closed cell neoprene type. Bearings shall be corrosion resistant oil tight stainless steel sleeve type. Dampers shall be tight closing and shall be capable of less than 3.5% leakage based on an approach velocity of 1500 feet per minute when closed against a pressure of 4" w.g. Submit leakage and flow characteristic data. Motorized dampers shall be suitable for application in HVAC systems with velocities up to 2000 fpm. Motorized dampers shall be equal to Ruskin No. CD60.

F. Manufacturers: Dampers may also be manufactured by Air Balance, Arrow United Industries, Greenheck, Industrial Louvers, Louvers and Dampers, or Nailor-Hart.

2.03 ACCESS DOORS

A. Air duct access doors shall be steel of the double wall insulated type complete with hinges and camlock latches. Insulation shall be 1" thick fiberglass with "K" factor of .26 at 75°F mean temperature. Provide access doors at all fire dampers and where indicated. Doors smaller than 8" shall have plexiglass window. Coordinate access door locations with Architectural reflected ceiling plan (this contractor to furnish).

Duct Diameter	Access Opening
8" thru 10"	7" dia.
11" thru 13"	10" dia.
14" thru 19"	13" dia.
20" and over	10" dia.

B. For rectangular ducts, the nominal size of the access opening shall be:

When mounted on minor axis:

Minor Axis	Access Opening
8" thru 11"	8" x 12"
12" thru 13"	12" x 12"
14" and over	14" x 20"

When mounted on major axis:

Major Axis	Access Opening
8" thru 16"	8" x 12"
17" thru 24"	12" x 12"
25" and over	14" x 20"

C. When used with insulated ducts, the access sections shall have glazed covers to prevent condensation.

2.04 GRILLES, REGISTERS, AND DIFFUSERS

A. Location of ceiling mounted type, sidewall type and floor mounted type air devices shall be as shown on plans. Install and fasten air distribution devices per manufacturer's detailed drawings. Use gaskets to make air-tight joints with adjoining construction. All air devices shall be sized not to exceed a N.C. level of (25).

B. Ceiling diffusers shall be equal to Titus series TDC-AA- adjustable type with 24" x 24" lay-in panel with opposed blade balancing damper of size and capacity as indicated on drawings. Provide with square to round duct connection. Round duct connection and face size shall be as shown on plans. Delete panel for ceiling diffusers installed in rigid ceilings. Ceiling surface mounted diffusers shall have a beveled drop face border type frame. Finish shall be off-white color.

C. Ceiling mounted return and transfer air grilles shall be equal to Titus Series 50F. Grilles shall be of aluminum construction with a 1/2"x1/2"x1/2" aluminum grid. Grille shall have a 90% free area (minimum). Provide with opposed blade damper (except for transfer/pressure relief). Border shall have countersunk screw holes for a neat appearance. Sizes shall be as indicated on plans. Finish shall be off-white color.

D. Location of ceiling mounted air distribution devices shall be coordinated with the architectural reflected ceiling plan. Floor mounted air distribution devices shall be coordinated with the architectural floor plan. Install and fasten ceiling diffuser and return air grilles as per manufacturer's detailed drawings, use gaskets to make airtight joints with adjoining construction, join neatly with adjoining finished surface.

E. Acceptable manufacturers are Carnes, Nailor, Greenheck, Metal-aire, Titus, Price, or an approved equal.

2.05 INSULATION

A. General: All insulation work shall be done by workmen thoroughly competent in this trade and employed by a full-time insulation contractor. Failure to finish work neatly, failure to vapor proof joints, ragged edges, failure to cover all fittings, valves, dents on surface, etc., shall be proper cause to reject this work. This Contractor shall call same to the attention of the Architect before such work has progressed beyond the point of economical correction.

B. All material used shall be new and of first line quality and shall be as recommended by the manufacturer for the service intended. All insulation materials, including sealer material, adhesive, finishes, etc., shall be non-combustible. Complete installation shall be in accordance with manufacturer's requirements.

C. This Contractor shall be responsible for the removal from the site of all excess materials, cartons, scrap, etc. He shall protect equipment installed by others, cleaning such equipment should mortar, plaster, adhesive, etc., fall on same.

D. The following service shall be insulated with the listed thickness of materials:

SERVICE	INSULATION MATERIAL	THICKNESS	FINISH
Condensate Drain Piping & Refrigerant Piping	Armaflex Type ER	3/4"	Paint with acrylic protective paint where exposed to sun
Rectangular Supply, Return, Exhaust, and Outside Air Ductwork	1 lb. density blanket type fiberglass duct wrap (minimum R=6.0)	2”	Reinforced aluminum foil

E. All Armaflex insulation shall be slipped over piping with all butt joints and seams brushed with manufacturer’s recommend adhesive and sealed with an approved exterior grade mastic.

F. All insulation shall be installed as per material manufacturer's printed instructions.

G. Where piping insulation for condensate drain lines and/or refrigerant piping is exposed to the sun, the Contractor shall paint the insulation with two (2) coats of acrylic protective paint for UV protection. The first coat shall be white and the second coat shall be gray.

H. Insulation subcontractor shall submit complete product data brochures on insulation materials, jackets, finishes, mastics, cements, etc., for approval along with complete installation brochures for all materials used on this project. Installation methods shall be in accordance with printed instructions from material manufacturers.

I. It shall be the responsibility of the insulating subcontractor to coordinate hanger locations and prevent crushing or breaking of finishes.

J. All insulation materials, jackets, adhesives, coatings, etc., shall meet the Underwriters' Laboratories fire hazard classification (UL 723), for flame spread rating of 25, smoke developed rating of 50, and fuel contributed rating of 50.

K. Duct wrap insulation shall be applied to the outside surface of all heating, air conditioning and exhaust ductwork for a 100% coverage in accordance with SMACNA Standards. Insulation shall be constructed of glass fiber and shall be 1.0 pound density, 2" thick and comply with NFPA Bulletins 90A and 90B (minimum R value = 6). Insulation shall be secured with duct bands. All joints in insulation shall be butted together and brushed with adhesive. Insulation shall be by Owens Corning, Knauf, Pittsburg Corning, or equal.

2.06 REFRIGERANT PIPING

A. Piping shall be type "K" hard drawn copper, ASTM Spec. B280, and shall be mill cleaned, dried, and capped.

B. Fittings shall be extra heavy wrought copper in accordance with ANSI B9.1 with joints soldered using a high content silver alloy solder.

C. Installation shall be in accordance with unit manufacturer's requirements with all piping secured to walls and suspended above ceilings with approved galvanized hangers and clamps. Entire installation shall be in accordance with ANSI Standard B31.5 for refrigerant piping.

D. Insulate refrigerant suction line with 3/4" wall foamed plastic insulation slipped over tubing and all joints thoroughly sealed. Paint insulation with two coats of acrylic protective paint where insulation is exposed to weather. The first coat shall be white; the second coat shall be dark gray. Protect insulation with metal saddles and shields at all hanger points.

E. Suspend overhead piping and pipe runs above ceiling as detailed on the drawings with trapeze hangers at 4'-0" on center.

F. If field piping is used, piping diagrams shall be submitted by unit manufacturer showing pipe sizes, traps, service valves, etc., required for proper operation of equipment. Pre-charged tubing may be used at Contractor's option.

G. Test refrigerant system at 300 psi before charging system where units are to be field charged. System is to be thoroughly purged and evacuated before charging with refrigerant in accordance with manufacturer's recommendations. If factory pre-charged tubing is used, unit shall be checked and monitored for proper charge and efficient operation.

2.07 SPLIT SYSTEM HEAT PUMP CONDENSING UNIT

A. Units shall be completely factory assembled, wired, and statically tested. Units shall be ARI certified and rated in accordance with the latest ARI Standard for Heat Pump Units.

B. Construction shall be heavy gage galvanized steel with a weather resistant powder finish. Unit shall have a corrosion and weatherproof base.

C. Condenser coil shall be copper tube type with aluminum fins mechanically bonded to the tubes. If all aluminum coils are provided, manufacturer shall provide five-year warranty for the coil. Condenser coil shall be protected on all four sides by louvered panels.

D. Condenser fan shall be propeller type, vertical discharge with vinyl coated fan guard. Fan shall be electronically balanced to eliminate vibration and noise. Fan motor shall be direct drive, inherently protected with sealed ball bearings.

E. Compressors shall be designed for split system direct expansion use.

F. Compressors shall be sealed hermetic type with external vibration isolating mounts. Compressors shall have crankcase heaters to prevent oil dilution. Compressor section to contain filter drier and accumulator. Compressors shall have factory-mounted suction and discharge line service valves. Manufacturer shall provide five-year warranty on compressors and file warranty with Architect.

G. Controls shall be factory mounted and wired in an accessible enclosure within the compressor compartment. System controls shall have a fully automatic defrost cycle for heating operation. Safety controls shall consist of high-low pressure cut-out and compressor overload protection. Cabinet shall be set standard of quality in appearance and construction. Cabinet shall be of zinc coated sheet steel and finished with epoxy paint. Compressor section shall have a large access panel for ease of service.

H. Unit shall be provided with the following options:
Anti-short cycle timer
Evaporator defrost control
Indoor fan delay
Seacoast coil coatings and hardware kit
Low ambient kit
Rubber isolators

I. Unit shall have capacities as per schedule on drawings and shall be Trane, Carrier, Lennox, York, or an approved equal. EER (or SEER) and COP shall meet minimum requirements of heat pump unit schedule on the drawings.

2.08 SPLIT SYSTEM HEAT PUMP AIR HANDLING UNIT

A. Unit shall be completely factory assembled with direct expansion coil, insulated drain pan, fan and toolless filter section. Units shall be designed for vertical mounting as shown on the plans.

B. Evaporator coil shall be direct expansion, R-410A, copper tube with aluminum fins mechanically bonded. Thermal expansion valves shall have bypass line and check valve installed for heat pump use. Minimum tube size shall be 1/2" o.d

C. Evaporator fan shall be forward curved double inlet mounted on a common shaft with permanently lubricated ball bearings. Fan shall be statically and dynamically balanced for smooth operation. Evaporator fans shall have V-belt drives with adjustable pitch pulley or direct driven fans with multiple speed taps for adjustment.

D. Cabinet shall be constructed of hot dip galvanized sheet steel a minimum thickness of 18-gauge. Interior panels and top shall be covered with insulation to prevent heat gain and noise transmission. Drain pan shall be coated to prevent condensation and corrosion.

E. Filter shall be of standard size throwaway and not less than 1" thick. Filter section shall be toolless accessible from front of unit. Filters shall be a minimum of MERV 7 per ASHRAE 52.2.

F. Units shall have capacity as per schedule on drawings and shall be Trane, Carrier, Lennox, York, or an approved equal.

G. Electric heaters shall be UL listed and factory installed as an integral part of the air handler with timed defrost control. See section Electric Heaters hereinafter specified.

2.09 ELECTRICAL DUCT HEATERS - AUXILIARY TYPE

A. Electrical duct heaters shall be factory installed and shall be furnished complete with air limiting and safety devices as required by National Electrical Code. Units shall bear UL approval for use in indoor A/C unit. Size of electric heater shall be as scheduled on the drawings including number of steps, voltage, and KW.

2.10 PACKAGED ROOF TOP 100% OUTDOOR AIR INTAKE AIR CONDITIONING UNIT

A. General: Furnish and install a dedicated 100% outside air air conditioner per plans and specifications.

B. Approvals: Unit shall be design certified to conform to appropriate UL Standards by Applied Research Laboratories or other nationally recognized testing laboratory.

C. Cabinet: Cabinet shall be constructed of G-90 galvanized steel with minimum gauge thickness of: Bases - 16-gauge; Corner Posts and Tops - 18-gauge; Access Panels - 20-gauge. The interior of the evaporator air side is to be thermally insulated with 1" thick fiberglas with an "R" Value of 4.2. A closed cell neoprene liner is to be installed on the underside of the base pan for noise reduction and weather seal to the roof curb. The cabinet is to be mounted on two (2) steel rails to facilitate installation.

D. Non-Rust Base: Base pan shall be poured with minimum 1/4" hot asphalt to prevent rain water or condensate from contacting base bottom.

E. Electro-Deposition Acrylic Paint Finish: All exterior parts shall be thoroughly cleaned chemically, zinc-phosphate coated, and sealed with chromic rinse. Paint shall be electrically deposited by immersion dipping in a cationic electro-deposition paint system.

F. Assembly and Test: The unit shall be completely factory assembled and wired and thoroughly leak and safety control tested. After assembly, each unit is to be charged and run tested.

G. Refrigerant System: The refrigerant system shall include the compressor with crank-case heater, air-cooled condenser coil, high latent heat evaporator coil, thermal expansion valve, filter-drier, sight glass-moisture indicator, suction line accumulator, and refrigerant pressure service valves. The evaporator and condenser coils are to be copper tube-aluminum plate fin. (The hermetic compressor is to be equipped with hot gas bypass for up to 50% capacity reduction. DCA051 through 141.) The refrigerant compressor shall be warranted by the manufacturer for five (5) years from date of installation.

H. Air Side: The direct drive condenser fans designed for vertical air discharge are to be driven by inherently protected sealed ball bearing fan motors. The 100% outside air evaporator supply blower shall be a forward curved type DIDW mounted on a solid steel shaft supported in sealed ball bearings. Both the blower and housing are to be galvanized steel. Blower drive shall be belt type with adjustable pulley. One-inch metal mesh cleanable type filters are to be mounted behind the outside air intake panel. The outside air face velocity cannot exceed 320 feet per minute through the evaporator coil.

I. Drain Pan: The condensate drain pan shall be fabricated from G-90 steel, painted in an electro-deposition paint system, and overcoated with an asphalt based mastic. The bottom shall be insulated with 1" fiberglass insulation. The drain pan shall be furnished with single or dual 3/4" or 7/8" (threaded) drain fittings exposed to the exterior of the cabinet.

J. Controls: Internally wired controls are to include the compressor, fan, and blower motor contactors or starters with thermal protection (auto-reset) on all inductive loads. The 24-volt control circuit is to include a 75 VA rated transformer. Refrigerant controls are to include a high pressure control (manual-reset), low pressure control (auto-reset), head pressure control, field adjustable refrigerant system lock-out, and compressor anti-short cycle timer.

K. For dedicated 100% outside air cooling units with refrigerant (hot gas) reheat, the following sequence is required:

- The standard compressor ambient lock-out thermostat shall control the cooling operation at a setting between 65° and 70°F. Operation of the compressor is thus limited to temperatures above the setpoint.

- Activation of the hot gas reheat solenoid(s) is from a duct mounted or wall thermostat set as necessary to control the air temperature to the space.

- The electric heater shall be locked out during compressor operation (the ambient thermostat has both close-on-rise, used for the cooling cycle and open-on-rise contacts) and shall be controlled from a duct mounted thermostat set between 60° and 70°F.

L. Full Perimeter Curb: The unit manufacturer=s factory built curb is to meet the National Roofing Contractors= Association August 1985 guidelines for roof mounted installations. Shipped completely assembled, the curb is to be 14" high and of all-welded, 16-gauge galvanized steel construction with a 2 x 4 pressure treated wood nailer strip furnished on the outside.

M. Include with unit:

- Electric heaters factory mounted and wired.
- Non-fused disconnect factory mounted and wired.
- Hot gas reheat circuit and coil.
- Hurricane tie-down kit.
- Copper fins, copper tube evaporator and/or condenser coil.

2.11 DRAIN CONNECTIONS

A. Inside A/C Equipment: Provide drain connection with manufacturer's recommended deep seal trap for all air conditioning units. Drain piping shall be Type "M" copper pipe with drainage pattern fittings and solder type joints. Piping shall be insulated with 3/4" wall fire retardant closed cell elastomeric insulation slipped over piping. Provide fire safing and sleeves at floor penetrations. See mechanical plans for trap detail.

B. Roof Mounted and Ground Supported Elevated Frame Mounted A/C Equipment: Provide drain connection with 3" deep seal trap for all air conditioning units. Drain piping shall be schedule 40 PVC pipe with drainage pattern fittings and fusion welded type joints.

2.12 EXHAUST FANS

A. All exhaust fans shall bear the AMCA Seal of Approval and shall be currently listed in the current AMCA Directory.

B. Exhaust fan for toilet rooms shall be ceiling mounted type fans with 1/2" thick acoustical lined steel housing, direct drive centrifugal fan, back draft damper and integral aluminum ceiling grille. Fan control shall be by separate wall mounted switch. Fans shall be equal to Greenheck SP Series.

2.13 IN-LINE EXHAUST FAN

A. Duct mounted exhaust fans shall be of the centrifugal belt driven, in-line type. The fan housing shall be of the square design constructed of heavy gauge galvanized steel and shall include square duct mounting collars.

B. Fan construction shall include two removable access panels located perpendicular to the motor mounting panel. The access panels must be of sufficient size to permit easy access to all interior components.

C. The fan wheel shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.

D. Motors shall be heavy duty ball bearing type, carefully matched to the fan load and furnished at the specified voltage, phase, and enclosure. Motors and drives shall be mounted out of the airstream. Motors shall be readily accessible for maintenance.

E. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L50) life in excess of 200,000 hours at maximum cataloged operating speed.

F. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.

G. Motor pulleys shall be adjustable for final system balancing. A NEMA 1 disconnect switch shall be provided as standard. Factory wiring shall be provided from motor to the handy box.

H. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.

2.14 A/C CONTROL OPERATIONS

A. General space temperature shall be controlled by wall mounted thermostats located within the spaces as indicated on drawings. Thermostats shall be 7-day programmable (auto change over) and have battery back-up with night low and high limit settings. Thermostats shall have auxiliary output signal for control of a motorized damper in the outdoor air.

B. All controls including thermostats, humidistats and subbases shall be furnished by the a/c equipment manufacturer and installed by Mechanical Contractor.

C. Wiring: All control wiring external to the heat pump equipment shall be installed by the Controls sub-contractor under the direct supervision of the HVAC subcontractor. Control wiring shall be installed in conduit (see below) and shall be color coded to match system wiring diagrams and shall be installed in accordance with the electrical section of the project specifications.

D. Note: All power wiring required for equipment operations shall be by the Electrical contractor. This contractor shall also provide all conduits as required for control wiring.

E. Test all units for two (2) 8-hour days under the supervision of manufacturer's representative, who shall make all necessary adjustments and instruct designated operating personnel in operation and maintenance of equipment and controls.

2.15 TEMPERATURE CONTROL SYSTEM

A. The automatic temperature controls (ATC) portion of this project as specified under Section 15900 shall be included in the base bid by the Mechanical Contractor.

B. Controls shall be provided and installed under the supervision of the ATCS contractor responsible for warranty and servicing of the system.

C. It shall be the Division 15000 contractors responsibility to include all costs in his bid, associated with the controls work.

2.16 AUTOMATIC SHUT-DOWN

A. Air conditioning equipment shall have smoke detectors installed in supply air and return air duct. Mechanical contractor shall install smoke detectors provided by electrical contractor under Division 16000. Mechanical contractor shall install smoke detectors in return air duct prior to mixing with any outdoor air. Smoke detectors shall be for automatic shut down of unit.

B. All duct mounted smoke detectors, remote alarm panels, low voltage wiring, relays, contactors, etc., necessary for interlocking air handling units for complete unit shut down upon smoke detection shall be furnished and installed by the mechanical contractor. Rigid conduit for low voltage wiring shall be furnished and installed by the electrical contractor. Smoke detectors shall be photoelectric 24 volt duct mountable or plenum mountable type as indicated on the drawings and shall be equal to AFirex@ (Photoelectric). A remote wall mounted alarm panel with audible and visual alarm, test/reset switch, trouble indicator and pilot light shall be provided for each smoke detector and located in a continuously monitored area as indicated on the drawings. The remote alarm panel shall also be equal to AFirex@. Each alarm panel shall be labeled with plastic, etched labels clearly indicating the air handling unit being monitored.

2.17 AIR CONDITIONING FILTRATION

A. Air Conditioning Systems Filtration Notes: It is the mechanical contractors responsibility to ensure the inside of each air handling unit with associated air distribution system is kept cleaned and not allow construction dust to infiltrate the system. Should the system become contaminated as determined by Architect, Engineer or Owner, the mechanical contractor shall be responsible for cleaning. The mechanical contractor shall take any precautions necessary to prevent construction dust from entering the system which shall include as a minimum:

B. Prior to activating the air conditioning system for building finish work, all filters shall be installed in each air handling unit.

C. The mechanical contractor shall maintain clean filters at all times. Regular filter replacement is recommended.

D. Prior to the Owner taking possession of the building, all filters in each air handling unit shall be replaced new. One complete set of replacement filters for each air handling unit shall be turned over to Owner for future installation.

E. At no time are any air handling units to be operated without air filters. Return grilles are to be covered with filter media during construction when units are in operation.

PART 3 - EXECUTION

3.01 TESTING AND BALANCING

A. Reference Specification Section 15200.

3.02 GUARANTEE

A. The Contractor shall guarantee, in writing, the entire system when completed to be free from any and all defects and shall guarantee the entire system, controls, and other equipment against defective materials and workmanship for a period of one (1) year from date of completion and acceptance.

B. Upon receipt of notice from the Owner of the failure or any part of the guaranteed equipment during the guarantee period, the affected part or parts shall be promptly repaired or replaced with new parts by and at the expense of the Contractor.

C. Under the guarantee clause, the Contractor shall include free routine maintenance for a period of one (1) year from the date of final acceptance. At the end of one year of operation, the mechanical contractor shall inspect and repair any problems which may exist. Contractor shall lubricate bearings, adjust or replace belts, replace filters, and provide all necessary preventative and corrective maintenance required. Contractor shall provide Engineer with a table identifying each air handler unit model and serial number, quantity and size of filters, filter manufacturer and efficiency, belt manufacturer and size, motor HP, frame, and power supply.

3.03 CLEANING VENTILATING SYSTEMS

A. All ducts shall be thoroughly cleaned and blown out to prevent any debris from damaging fan wheels or discharging through diffusers when systems are placed in operations. All temporary connections required for blowing out the system, cheesecloth for all duct openings, and any other equipment or labor for cleaning shall be provided by the heating and ventilating subcontractor. All filters shall be renewed after ventilating systems have been cleaned. The cost of renewal shall be borne by the General Contractor.

END OF SECTION 15800

SECTION 16100 - ELECTRICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General and/or Special Conditions Sections are a part of this specification and the Contractor shall consult them in detail for instructions pertaining to this work. Section 16 is sub-divided for convenience only.

1.02 SCOPE

A. Furnishing of all labor, material, equipment, supplies, and services necessary to construct and install the complete electrical systems as shown on the drawings and specified herein. Work shall include but is not necessarily limited to the following items:

Demolition
Service
Grounding
Interior Distribution/Branch Circuits
Lighting
Equipment Connections
Telecommunication Systems

1.03 JOB CONDITIONS

A. Site Inspections: Before submitting proposals, each bidder should visit the site and should become familiar with all job conditions and shall be fully informed as to the extent of the work. No consideration will be given after bid opening date for alleged misunderstanding as to the requirements of work involved in connecting to the utilities, as to requirements of materials to be furnished, or as to the extent of demolition required.

B. Existing Conditions: All utilities, existing systems, and conditions shown on the plans as existing are approximate, and the Contractor shall verify before any work is started.

C. Scheduled Interruptions: Planned interruptions of utilities service, to any facility affected by this contract, shall be carefully planned and approved by the Architect at least ten (10) days in advance of the requested interruption. The Contractor shall not interrupt services until specific approval has been granted by the Architect. The request shall indicate services to be affected, date and time of interruption and duration of outage. Request for interruption of service will not be approved until all equipment and material required for the completion of that particular phase of work are on the job site. The work may have to be scheduled after normal working hours.

D. Maintaining Service: Any existing service (or operating system) which must be interrupted for any length of time shall be supplied with a temporary service as necessary for continuation of the normal operation of this facility.

E. Removal of Existing Work: Where noted or indicated on the drawings, or specified herein, existing electrical materials and equipment shall be removed from the building. All materials designated to be removed by the Contractor, and not required to be reinstalled, including scrap, shall become the property of the Contractor, and shall be promptly removed from the site. Hazardous materials shall be disposed of in approved hazardous material disposal facility. Existing items required to be removed temporarily in order to properly install new work shall be replaced in a satisfactory manner upon completion.

1.04 TEMPORARY POWER

A. Furnish and maintain temporary wiring system for light and power for use during construction by all trades. Use solidly grounded system. Limit over-current protection to 20 amperes on No. 12 conductors. Pay for all charges incurred while furnishing power for construction. Verify whether charges for electrical power consumption are specified in Division One; if so, payment of bills for power consumption are not included under this section.

B. Accidental Interruptions: All excavation and/or remodeling work required shall be performed with care so as not to interrupt other existing services (water, gas, electrical, sewer, sprinklers, etc.). If accidental utility interruption resulting from work performed by the Contractor occurs, service shall be immediately restored to its original condition without delay, by and at the expense of the Contractor, using skilled workmen of the trade required.

1.05 CODES, PERMITS AND INSPECTIONS

A. The installation shall comply with all local, state, and federal laws and ordinances applicable to electrical installation and with the regulations of the latest published edition of the National Electrical Code (N.E.C.) where such regulations do not conflict with those laws and ordinances. The Contractor shall obtain and pay for all permits and inspection fees, and after completion of the work, shall furnish the Architect a certificate of final inspection and approval from the applicable local inspection authorities. Any charges by a utility for providing service as shown shall be included in the bid and paid by the Contractor.

1.06 DRAWINGS AND SPECIFICATIONS

A. The drawings and these specifications are complimentary each to the other. What is called for by one shall be as binding as if called for by both. Where the drawings and/or specifications differ as to quantity or quality, the greater quantity or higher quality shall be provided. Omissions from the drawings and specifications of details of work which are evidently necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such work. In any case of discrepancy in the figures or catalog numbers, the matter shall be submitted to the Architect, who shall promptly make a determination in writing. Any adjustment by the Contractor shall be at the Contractor's own risk and expense. Electrical drawings are diagrammatic only. Do not scale these drawings. All equipment shall be installed in accordance with manufacturer's recommendations and any conflicting data shall be verified before bidding.

1.07 STANDARDS OF MATERIALS AND WORKMANSHIP

A. Materials: All materials shall be new and shall be listed and approved by the Underwriters' Laboratories, Inc., in every case where a standard has been established for a particular type of material in question. All work shall be executed in a workmanlike manner and shall present a neat appearance.

B. Prior Approvals: Equipment and materials of the same type or classification and used for the same purpose, shall be products of the same manufacturer. It is the intention of these specifications to indicate a standard of performance and quality for all materials incorporated in this work. Manufacturer's names and catalog numbers are used to designate the item of equipment or material as a means of establishing grade and quality. Where several manufacturers are named, only those named manufacturers' products will be considered and the Contractor's bid shall be on their products. The first named of several manufacturers is the manufacturer whose product was used in engineering the project. Other named manufacturers, although acceptable as manufacturers, shall guarantee that their product will perform as specified and will meet space requirements. Where performance characteristics of such equipment differs from the equipment scheduled on the drawings, the Architect shall reserve the right to reject it. Where use of such equipment requires different quantity or arrangement of foundations, supports, ductwork,

piping, wiring, conduit and any other equipment, the Contractor shall furnish said changes and additions and pay all costs for all changes to the work and the work of others affected by using such equipment.

C. For approval of products other than those specified, bidders shall submit to the Architect, a request in writing, at least ten (10) days prior to bid date. Requests received after this time will not be reviewed or considered regardless of cause. Requests shall clearly define and describe the product for which approval is requested. Requests shall be accompanied by manufacturer's literature, specifications, drawings, cuts, performance data, model numbers, list of references or other information necessary to completely describe the item. Approval will be in the form of an Addendum to the specifications issued to all prospective Prime Contract Bidders on record. The Addendum will indicate the additional products which are approved for this project.

D. If a bidder proposes to use substitute materials or equipment for the following items, he shall obtain a minimum of ten (10) days before Bid "Prior Approval" or longer as described in "Instructions to Bidders" for the items indicated below:

1. Lighting controls.
2. Lighting fixtures.

E. Approval on other items shall be handled in the normal manner, as described in "Instructions to Bidders", under the heading "Approval of Materials".

F. Substitutions: Reference to a particular product by manufacturer, trade name, or catalog number establishes the quality standards of material and equipment required for this installation and is not intended to exclude products equal in quality and similar design. The Architect reserves the sole right to decide the equality of materials proposed for use in lieu of these specified. It shall be the Contractor's responsibility to furnish the information and data sufficient to establish the quality and utility of the items in question, including furnishing samples if required.

G. Shop Drawings: The Contractor shall submit a list of items proposed for use. He shall also submit catalog data and shop drawings on proposed systems and their components, panelboards, safety switches, starters and contactors, transformers, lighting fixtures, and wiring devices. Where substitutions alter the design or space requirements, the Contractor shall defray all items of cost for the revised design and construction including costs to all allied trades involved. Data shall be submitted within ten (10) calendar days after the contract is awarded. Provide six (6) copies of shop drawings unless a greater number of copies is required by the General Conditions. Each submittal data section shall be covered with an index sheet listing Contractor, Sub-Contractor, Project Name, and an index to the enclosed submittals.

H. Each major section of submittals such as power, equipment, lighting equipment, fire alarm, etc., shall be secured in a booklet or stapled with a covering index which lists the following information:

1. General contractor with phone number and project manager.
2. Subcontractor with phone number and project manager.
3. Supplier of equipment with phone number and person responsible for this project.
4. Index of each item covered in submittal and model number as proposed in the attached.
5. Any deviation from contract documents shall be specifically noted on submittal cover index and boldly on specific submittal sheet.

1.08 TYPE OF PERMANENT ELECTRICAL SERVICE

A. Existing service is 208 volt 3. Contractor shall verify all details of electrical service with the serving utility company prior to bid. Contractor shall include any and all costs associated with the service in his bid price and shall pay these costs to the serving utility company.

1.09 DOCUMENTATION

A. Operating and Maintenance Manuals: At completion of the work, furnish three (3) copies of written operation instructions which shall include manufacturer's descriptive bulletins, operating and maintenance manuals and parts lists of all equipment installed. Also include in such instructions, the specified size and capacity ratings of all equipment installed. Each set of instructions shall be assembled into a suitable looseleaf type binder and presented to the Architect for delivery to the Owner.

B. Record Drawings: Maintain one extra set of black-line, white print drawings for use as record drawings. Records shall be kept daily, using colored pencil. As the work is completed, relevant information shall be transferred to a reproducible set, and copies made to be given to the Architect.

C. Comply with the following for all work specified in this document. As-built information shall be shown to scale, using standard symbols listed in the legend. As a minimum, show the following:

1. Location of stub-outs dimensioned from permanent building lines.
2. Location and depth of under-slab and in-slab raceways.
3. All routing of raceways.
4. Corrected panelboard and equipment schedules.
5. Corrected circuit numbers as they appear on panelboard directories.
6. Corrected motor horsepower and full load amperages.
7. Number, size, type of insulation, and number of wires in each conduit or multiconductor cable whether in conduit or exposed.
8. Location of junction boxes and splices.
9. Location of access panels.

1.10 INTERFACE WITH OTHER CONTRACTS

A. It shall be the responsibility of the Contractor to cooperate with all other crafts working on this project. All cutting, trenching, backfill, and structural removals to permit entry of the electrical system components shall be done by this Contractor. All patching and finishing shall be done by the General Contractor.

B. This Contractor shall furnish and install all conduit and pull strings for control wiring provided under other contracts. Control wire conduit requirements shall be coordinated with the proper trade.

1.11 EQUIPMENT FURNISHED UNDER OTHER SECTIONS

A. This Contractor shall furnish and install complete electrical roughing-in and connection to all equipment furnished under other sections as indicated on drawings. All such equipment shall be set in place as work of other sections.

1.12 EQUIPMENT CONNECTIONS

A. In general, provide electrical power and control systems connections to all equipment shown on drawings. Included are wiring raceways, disconnects, starters, and other devices shown. Excluded are devices furnished integrally with the manufacturer's package and work specified in other sections of these specifications.

B. Residential appliances are furnished with cords, cord caps, and will be set in place by contractors performing work under other divisions of specifications. Packaged air conditioning units are all with starters and contactors. Provide disconnecting means and connect. Low voltage control of these devices is specified for installation in Division 15.

1.13 GROUNDING

A. Provide grounding and bonding systems in strict accordance with the latest published edition of N.E.C., except where more stringent requirements are specified herein. Inter-connection of neutral and ground is not permitted except at service entrance equipment. Install grounding conductors to permit shortest and most direct path to ground. Concealed joints shall be made by Cadweld method. Where grounding conductors are in raceway, bond conductor and raceway at both ends. Grounding and bonding fittings used shall be UL listed and be compatible with metals used in system. Sheet metal type strap are not acceptable.

B. Service entrance ground electrode system shall consist of driven electrodes, connection to water piping, and building grounding grid, as required by NEC Article 250-50. Unless otherwise shown on drawings, each driven electrode shall consist of one 3/4 inch diameter 10 ft. long copperweld steel rod. Rod made of wrought iron may be used in lieu of copperweld at option of contractor. Water pipe connection shall be made to a minimum one inch diameter metallic cold water pipe. Extend grounding conductor to main telephone equipment space. Interconnect conduits entering and leaving service entrance equipment using grounding bushing and copper.

C. A green insulated ground conductor shall be run in all branch circuit and feeder conduit with phase and/or neutral conductors. Ground conductor shall be sized per NEC or as noted on drawings. Minimum size #12 AWG. Conduit box to device strap or yoke screw connection is not sufficient. Provide an insulated grounding jumper for receptacle circuits.

1.14 GUARANTEE AND SERVICE

A. Upon completion of all tests and acceptance, the Contractor shall furnish the Owner of a written guarantee covering the electrical work done for a period of one (1) year from date of acceptance. Guarantee includes equipment capacity and performance ratings specified without excessive noise levels. Upon notice from the Architect or the Owner, the Contractor shall, during the guarantee period, rectify and replace any defective material or workmanship and repair any damage caused thereby without additional cost.

PART 2 - PRODUCTS

2.01 GENERAL

A. All equipment and materials shall have ratings established by the recognized independent agency or laboratory. The Contractor shall apply the items used on the project within the ratings and subject to any stipulations or exceptions established by the independent agency or laboratory. Use of equipment or materials in applications beyond that certified by the agency or beyond that recommended by the manufacturer shall be cause for removal and replacement of such misapplied items.

2.02 PANELBOARDS

A. General

1. The Contractor shall furnish and install the panelboards as specified and as shown on the contract drawings.
2. The panelboards and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA and UL as follows:
   a. UL 67 -- Panelboards
   b. UL 50 -- Cabinets and boxes
   c. NEMA PB1

d. Fed. Spec. W-P-115C
e. Circuit breaker -- Type I class I

3. The manufacturer of the panelboard shall be the manufacturer of the major components within the assembly, including circuit breakers and fusible switches.

B. Ratings - Panelboards shall be fully rated to the short-circuit rating indicated on the drawings.

C. Construction

1. Interiors shall be completely factory assembled devices. They shall be designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.
2. Trims for lighting and appliance panelboards shall be supplied with a hinged door over all circuit breaker handles. Doors in panelboard trims shall not uncover any live parts. Doors shall have a semiflush cylinder lock and catch assembly. Doors over 48 inches in height shall have auxiliary fasteners.
3. Distribution panelboard trims shall cover all live parts. Switching device handles shall be accessible.
4. Surface trims shall be same height and width as box. Flush trims shall overlap the box by 3/4 of an inch on all sides.
5. A directory card with a clear plastic cover shall be supplied and mounted on the inside of each door.
6. All locks shall be keyed alike.

D. Bus

1. Main bus bars shall be plated copper sized in accordance with UL standards to limit temperature rise on any current carrying part to a maximum of 65 degrees C above an ambient of 40 degrees C maximum.
2. A bolted ground bus shall be included in all panels.
3. Full-size (100%-rated) insulated neutral bars shall be included for panelboards shown with neutral. Bus bar taps for panels with single-pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral busing shall have a suitable lug for each outgoing feeder requiring a neutral connection.

E. Circuit Breakers

1. Molded case circuit breakers shall provide circuit overcurrent protection with inverse time and instantaneous tripping characteristics. Ground fault protection shall be provided where indicated.
2. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-center switching mechanism that is mechanically trip-free. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be nonwelding silver alloy and arc extinction shall be accomplished by means of arc chutes. A push-to-trip button on the front of the circuit breaker shall provide a local manual means to exercise the trip mechanism.
3. Provide shunt trips, bell alarms, and auxiliary switches as shown on the contract drawings.

F. Enclosure shall be at least 20 inches wide made from galvanized steel. Provide minimum gutter space in accordance with the National Electric Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided. Enclosures shall be provided with blank ends.

G. Nameplates - Provide a mechanically fastened engraved phenolic nameplate for each panel section.

H. Finish - Surfaces of the trim assembly shall be properly cleaned, primed, and a finish coat of gray ANSI 61 paint applied.

2.03 SAFETY SWITCHES

A. General - The Contractor shall furnish and install the low-voltage fused and non-fused switches as specified herein and as shown on the contract drawings.

B. Provide heavy duty switches as shown on drawings, with the following ratings:

1. 30 to 1200 amperes
2. 250 volts AC, DC; 600 volts AC (30A to 200A 600 volts DC)
3. 2, 3, 4, and 6 poles
4. Fusible and non-fusible
5. Copper/aluminum standard mechanical lugs.

C. Construction - Switch blades and jaws shall be plated copper. Switches shall have a handle that is easily padlockable in the OFF position. Switches shall have defeatable door interlocks that prevent the door from opening when the handle is in the ON position. Switch assembly and operating handle shall be an integral part of the enclosure base. Switches rated 100A to 600A shall have reinforced fuse clips. Switch blades shall be readily visible in the OFF position. Switch Operating mechanism shall be non-teasible, positive quick-make/quick-break type.

D. Enclosures. - All enclosures shall be NEMA 1 general purpose unless otherwise noted.

E. Nameplates - Nameplates shall be phenolic type, front cover mounted, contain a permanent record of switch type, ampere rating, and maximum voltage rating. Nameplates shall be mechanically fastened.

2.04 WIRING METHODS

A. Conduit Systems: Acceptable types of conduit:

1. Hot dipped galvanized rigid steel (GRS) - Shall be galvanized steel, protected inside and outside.
2. Electrical Metallic Tubing (EMT) - Shall be steel, protected inside and outside by a coating of approved corrosion-resistant material such as zinc or cadmium.
3. Rigid Nonmetallic - Shall be polyvinyl chloride (PVC), schedule 40 or schedule 80, as indicated on the drawings.
4. Flexible Metallic Conduit (½" min. trade size) (FLEX) - shall be galvanized steel, protected inside and outside.
5. Liquid Tight Flexible Metallic Conduit (½" min. trade size) (LQFLEX) - shall be galvanized steel, protected inside and outside with an extruded outer liquid tight, non-metallic, sunlight resistant jacket. Use with standard liquid tight fittings.

B. Raceway Fittings:

1. Rigid Metal Conduit - Shall have threaded fittings, galvanized steel or threadless compression galvanized steel or threadless compression cadmium plated malleable iron. Fittings shall be rain tight/concrete tight.
2. Electrical Metallic Tubing (EMT) - Material of steel or malleable iron is acceptable. Couplings and connectors shall be concrete and rain tight, with connectors having insulated throats. Use gland and ring compression type couplings and connectors for conduit sizes 2” and smaller. Use set screw type couplings with four set screws each for conduit sizes over 2”. Use set screws of

casehardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding. Indent type connectors or couplings are prohibited. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.

3. Rigid Non-Metallic Conduit - shall have polyvinyl chloride (PVC) fittings suited for the purpose and joined together by a method approved for the purpose. Schedule 80 conduit sections may be joined together with threaded fitting connectors.
4. Flexible Metal Conduit - fittings shall be zinc plated steel or cadmium plated malleable iron screw type with insulated throat and angular wedge fitting between convolutions of conduit.
5. Liquid tight Flexible Metal Conduit - fittings shall be cadmium plated, malleable iron or steel with compression type steel ferrule and neoprene gasket sealing rings, with insulated throat.
6. Wireway fittings shall be steel with rust resistant undercoat and finish coat to match the wireway. The fittings shall be so designed that the sections can be electrically and mechanically fitted together to form a complete system. Dead ends shall be closed.
7. Couplings and Unions shall be galvanized steel, tapered thread standard conduit couplings for intermediate metal conduit and rigid metal conduit. PVC couplings for rigid non-metallic conduit shall use approved adhesive, and threaded couplings shall be used for schedule 80 conduit. Split couplings shall be galvanized steel. Unions shall be ground joint type galvanized steel.

C. Conduits installed concealed in earth fill, concrete or, solid masonry structures shall be PVC 40, 3/4" minimum. PVC shall not be installed in any exposed locations. All exposed exterior conduits shall be GRS. Any GRS installed below grade or in concrete shall have two coats of bitumastic applied prior to installation. See paragraph "E" for EMT requirements.

D. Conduits used for connection to recessed lighting fixtures shall be FLEX not over 6 feet in total length. Conduits for connection to motors or vibrating equipment shall be LQFLEX not less than 18" long and not over 60" long.

E. Conduits run concealed in the hollow space of non-masonry walls or, above suspended/hard ceilings shall be EMT. Exposed conduits shall be run at right angles to or parallel with building lines and exposed structure. In all cases, conduit runs shall be grouped together where possible and shall be supported from the building structure, not from any suspended ceiling support system.

F. PVC 80 shall not be used unless specifically indicated on the drawings. Where approved for installation, install conduits passing through building sidewalls or through beams below grade with expansion/deflection fittings. Install expansion fittings where conduit crosses an expansion joint. Where conduit penetrates damp-proofing membranes, cut the membrane carefully around the conduit and seal the joint with pressure sensitive tape.

G. Support raceways securely with pipe straps, wall brackets, conduit hangers or ceiling trapeze. Fastenings shall be by wood screws or screw type nails to wood, by toggle bolts to concrete block, expansion bolts on concrete or brick, and beam clamp types on steel or bar joists. Raceways shall not be fastened to suspended ceiling supports but must have independent support from the structure. Supporting devices shall be of materials having corrosion protection at least equal to the raceway. A support shall be provided as close as practical to, and not exceeding 18" from an unsupported box or from change of direction. In horizontal runs, this support may be omitted if the box is independently supported and the box connection is not made with chase nipple or threadless box connector. In vertical runs, load produced by weight of the raceway and conductors shall not be carried by the raceway terminal, but must be carried entirely by conduit supports. Install conduit supports in strict accordance with the following table, except as required by support for boxes and changes in direction:

TRADE SIZE	LOCATION OF RUNS	MAXIMUM SUPPORT SPACING

½, 3/4	Exposed, Horizontal	7 feet
1 and larger	Exposed, Horizontal	10 feet
All sizes	Concealed, Horizontal	10 feet
½, 3/4	Exposed, Vertical	7 feet
1, 1 1/4	Exposed, Vertical	8 feet
1 1/2 and larger	Exposed, Vertical	10 feet
All sizes	Concealed, Vertical	10 feet

H. For conduit runs that are not sized on drawings, the maximum conduit fill shall be computed using the requirements for Type THW conductors although the actual wiring is with Type THWN or other type of conductors having smaller cross-sections. This requirement is made to provide spare conduit capacity.

I. Install all required sleeves for conduits passing through concrete slabs. Fire proof space between conduit and sleeve after installation using mineral wool.

J. Bushings: Shall be provided at the end of all conduits prior to pulling cables to protect the insulation of the conductor. Provide grounding bushings for metal raceways, boxes, and cabinets to ensure that all metallic surfaces are effectively grounded. Metallic raceway may be bonded to cabinets, boxes and panelboards by double locknut and bushing to ensure the metallic parts are all effectively grounded.

K. Expansion Joints:

1. Conduits 3” and larger, that are secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. Install couplings in accordance with the manufacturer’s recommendations.
2. Provide conduits smaller than 3” with junction boxes on both sides of the expansions joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 5” vertical drop midway between ends. Flexible conduit shall have a green copper ground-bonding jumper installed. In lieu of this flexible conduit, expansion and deflection couplings as specified above for three inches and larger conduits are also acceptable for conduits smaller than 3”.
3. Expansion fittings shall be provided for raceways to compensate for thermal expansion and contraction in conduit runs 200ft or greater and at building expansion joints. Bonding jumpers shall be provided for electrical continuity of the raceway system at the expansion fittings.

L. Conductors: All conductors shall be installed in conduit. Conductors for building wiring shall have THHN/THWN, 600-volt insulation and shall be soft-drawn copper of standard American Wire Gauge (AWG) size. Minimum size shall be No. 12. 20-amp branch circuits more than 100 feet in length shall be upsized to No. 10. Provide individual neutral conductors for all single-pole branch circuits. Tied breaker handles are not acceptable. All wire No. 8 and larger shall be stranded. All branch circuits No. 10 and smaller shall be wired with color-coded wire with the same color used for a system throughout the building. Power feeders and branch circuits larger than No. 10 shall either be fully color coded or shall have black insulation and be similarly color coded with tape or paint in all junction boxes and panels. Where tape or paint is used to identify conductors, apply at all terminations, junction boxes, pull boxes and wireways. Apply tape, butt lapped, or paint for a minimum distance of 2" and, where applied to ends of conductors, start at cut end of the conductor insulation. Tape shall not cover manufacturers conductors shall be color coded or labeled as necessary for clear identification. Color coding of all conductors shall be as follows:

Grounding	Bare or Green
208Y120 volt Three Phase (wye)	
Phase Conductors:	φA-Black, φB-Red, φC-Blue
Neutral:	White

480Y277 volt Three Phase (wye)

Phase Conductors:	φA-Brown, φB-Orange, φC-Yellow
Neutral:	Natural Grey

2.05 JUNCTION AND PULL BOXES

A. Junction and pull boxes shall meet requirements of National Electrical Code. Standard manufactured boxes shall be listed by Underwriters' Laboratories, Inc. Where custom designed and fabricated boxes are needed, they shall meet the construction standards of Underwriters' Laboratories, Inc. and the N.E.C.

B. Junction and pull boxes shall be installed where required by National Electrical Code and where necessary to facilitate pulling of wire or cable. Considerations are sizes of wire and cable, number of bends in raceway, and conductor support requirements in vertical raceways. Maximum distance between terminations at junction or pull boxes, cabinets, or other points of termination shall not exceed 250 feet for straight horizontal runs. This length shall be decreased 50 feet for each 90° bend.

C. Junction boxes for exposed work shall be FS or FD type. Boxes shall be threaded, cadmium-plated iron with weatherproof stainless-steel cover and neoprene cover gaskets.

2.06 OUTLETS

A. Outlet boxes shall be one piece or projection welded, galvanized stamped steel for gang sizes required. Where several devices are located on drawings in the same general location, use multi-gang boxes. Sectional boxes are not acceptable. Boxes shall be sized in accordance with National Electrical Code. Boxes required for communications systems, mechanical control devices, etc., shall be installed under this section of the specifications. Verify outlet box locations and sizes required for systems other than electrical power from shop and manufacturer's drawings and install outlets as per those requirements.

B. Boxes for wall and ceiling outlets shall finish flush and straight. Wall outlets in exposed concrete block, masonry, and tile walls shall be installed with extra deep square corner boxes or with standard boxes and square cornered tile wall covers so that conduit offsets are not required. Openings in concrete blocks or masonry walls shall be saw cut with an opening tolerance of 1/8" on all sides, the opening shall have bottom of box at nearest masonry joint to dimension indicated. For other wall finishes, boxes shall be installed with plaster or device type covers as required. No outlets shall be installed back-to-back. Where outlets occur in stud walls back to back on opposite sides, they shall be isolated by a stud between them.

C. Floor Boxes (at grade) shall be four-compartment cast iron combination box equal to Wiremold Catalog No. RFB4-CI-1, complete with two CIHT-D internal duplex receptacle brackets and two CILT-2AB communication brackets. Provide brass-colored flanged activation kit (cover), UL listed for use on tile, terrazzo, carpet, and wood floors, equal to Wiremold Catalog No. S36BBTCBS.

D. Floor Boxes (above grade) shall be poke-through type, UL listed as suitable for use on tile and terazzo floor applications, equal to Wiremold RC3ATCAB, complete with a 20A prewired duplex receptacle.

E. Multi-Outlet Assemblies (Horizontal Mounting) shall be electrically pre-wired steel raceways with receptacles mounted 24' on center, equal to Wiremold Catalog No. V4000HR1024, equipped with two-circuit power wiring, and ready to accommodate Pass & Seymour activation inserts.

F. Multi-Outlet Assemblies (Vertical Mounting) shall be electrically pre-wired steel raceways with receptacles mounted 24" on center, equal to Wiremold Catalog No. V4000TD8, equipped with two-circuit power wiring, and ready to accommodate Pass & Seymour activation inserts.

2.07 WIRING DEVICES

A. Colors: Wiring device and wall plate colors shall be selected by Architect for individual rooms from one of the following colors (unless another color is noted): Almond, black, brown, white, gray, ivory, light almond, or stainless steel.

B. Receptacles: Duplex receptacles shall be specification grade, 20 amps,125 volts with grounding terminal.

C. Switches: Switches shall be specification grade, 20 amps, 120/277 volts A-C only, single pole, three-way or four-way as shown, single throw with screw terminals arranged for side wiring.

D. Device Plates: Shall be of the constructed of polycarbonate.

E. Ground Fault Receptacles: Furnish and install receptacles with ground fault circuit interrupters as indicated on plans. Receptacles shall be NEMA 5-20R configuration with 120V ac 20 amperes circuit rating. All receptacles shall be such depth as to permit mounting in outlet boxes 1 1/2" or greater in depth without the use of spacers. Units shall have line and load terminals such that connection to load terminals will provide ground fault protection for other receptacles. All receptacles shall accept standard duplex wall plates. All receptacles shall be noise suppressed and shall be UL listed.

F. Isolated Ground (IG) Receptacles: Furnish and install specification grade type IG receptacles, orange in color. Plates for these devices shall also be stainless steel, compatible with the receptacle type.

G. Automated Lighting Controls: Where indicated on the drawings, provide occupancy sensors, time switches, control relays and wiring for automatic control of lighting fixtures. Controls shall be as manufactured by Watt-Stopper, Crestron, Lutron, nLight, Sensorswitch, Philips, or Leviton.

2.08 THERMOSTATS

A. Thermostats for HVAC equipment shall be provided as part of that equipment, connected up by the electrical subcontractor, and be tested by the HVAC subcontractor. Coordinate with HVAC subcontractor for wiring requirements.

2.09 LIGHTING FIXTURES

A. Provide wired, cleaned, and with lamps specified, all fixtures designated on drawings. Contractor shall verify the ceiling construction for correct trim and support arrangement of lighting fixtures; corrosion resistant plaster frames are required in plaster ceilings. Shop drawing submittals shall consist of properly identified copies of manufacturer's catalog pages showing all features and accessories specified.

B. Secure mounting and support of all lighting fixtures shall be accomplished under this section of these specifications. Lighting fixtures shall be installed plumb, square, and level with the ceiling, wall, and in alignment with adjacent lighting fixtures. Mounting heights indicated shall be to the bottom of the fixture for ceiling-mounted fixtures and to center of fixture for wall-mounted fixtures. Lay-in troffer fixtures shall be supported with a minimum of 4 ceiling support wires per fixture and not more than 6 inches from each corner of the fixture. For fixtures smaller in size than the ceiling grid, provide a minimum of four wires per fixture. Do not support fixtures by ceiling acoustical panels. All concealed fixture mounting accessories shall be securely tied to structure. Flexible connections to fixtures shall not exceed 6 feet in length. Fixtures shall be solidly grounded to raceway system.

C. In areas where the reflected ceiling plan is shown, all work shall be in conformance with this plan. If the ceiling grid is installed other than shown on the electrical plan, it shall be the responsibility of the installer

of the lighting fixtures to call this fact immediately to the attention of the Architect and Contractor, and work shall not proceed until Architect's decision in the matter is obtained.

D. Fluorescent ballasts shall be electronic type, class A noise rating, class P safety standards, high power factor greater than .98, programmed start, auto restart, 10% total harmonic distortion or less, 42 kHz – 54 kHz hertz ballast frequency, .85 or greater ballast factor, less than 1.7 lamp current crest factor, meeting the requirements of ANSI/IEE C62.41 & C82.11, FCC Part 18 (RFI & EMI), CBM, UL, Public Law No. 100-357, and NAECA. All ballasts shall include internal fusing. Ballast shall be compatible for use with energy saving lamps. For outdoor applications ballast shall be rated for zero degrees Fahrenheit starting temperature.

E. High Intensity Discharge (HID) lamp ballasts shall be high power factor type greater than .98, protected by in-line fuse, UL 1029, UL class P, ANSI C82.4, 15% total harmonic distortion or less, 100 kHz – 200 kHz ballast frequency, end-of-life detection and shutdown. Ballasts in fixtures for interior spaces shall be encapsulated in a Class H potting compound to provide a Class A noise rating. Ballasts in fixtures installed outdoors shall be weatherproof. Provide 0 degrees Fahrenheit starting temperature for HID below 250W. Provide -20 degrees Fahrenheit starting for HID 250W and above.

F. LED drivers shall be highly efficient, class A noise rating, 0.9 or greater power factor, power supplies rated for the wattage requirements of the fixture. THD at full load shall be <10% at 120v and <20% at 277v. <3% line regulation, <1W stand-by power. LED power up time to be <1 sec. Load regulation <5%. Provide over voltage protection, non-latching output short circuit protection, current reduction LED load temperature protection. Ambient operating temperature range -30 degrees Celsius to 50 degrees Celsius at 85% non-condensing relative humidity. Driver shall meet ANSI C62.41 Cat.A 2.5kv transient protection. Power supply shall be field programmable with 1mA resolution. Programmer shall not require the power supply to be powered up or connected to AC line voltage while programming. Provide integrated configurable LED thermal protection. Drivers shall be universal voltage input. Power supply shall be UL Class 2. LED dimming drivers shall provide continuous flicker-free dimming from 100%-1%.

G. All lamps shall be the product of one manufacturer and shall be as manufactured by General Electric Osram/Sylvania, or Phillips. HPS lamps shall comply with the current published ANSI standards.

2.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protections: Take necessary precautions to protect all material, equipment, apparatus, and work from damage. Failure to do so to the satisfaction of the Architect will be sufficient cause for the rejection of the material, equipment, or work in question. Contractor is responsible for the safety and good condition of the materials installed until final acceptance by the Owner.

B. Cleaning: Conduit openings shall be capped or plugged during installation. Fixtures and equipment shall be tightly covered and protected against dirt, moisture, chemical, and mechanical injury. At the completion of the work, the fixtures, material and equipment shall be thoroughly cleaned and delivered in condition satisfactory to the Architect.

PART 3 - EXECUTION

3.01 EXCAVATION, TRENCHING AND BACKFILLING

A. Trenches for all underground conduits shall be excavated to the required depth. The bottom of trenches shall be tamped hard. Before backfilling the excavation shall be cleaned of trash and debris. Backfill shall consist of excavation or borrow of sand, gravel, or other approved material free of trash, lumber, sawdust or other debris. Backfill shall be placed in 9” thick moistured and hand or machine tamped layers. Backfill shall be brought to suitable elevation above ground to provide for anticipated settlement

and shrinkage. All paving broken up shall be repaired and returned to the original condition.

3.02 PAINTING

A. Contractor shall touch-up or refinish all items of electrical equipment furnished with a factory finish coat of paint and which may have been damaged regardless of cause.

3.03 TESTING AND BALANCING

A. Balance all single-phase loads connected to all panelboards to ensure an approximate equal division on these loads on main power supply serving building. All tests shall be made in accordance with the latest standards of the IEEE and the NEC. The installation shall be tested for performance, grounds and insulation resistance. "Megger" type instruments shall be used. Contractor shall perform circuit continuity and operational tests on all equipment furnished or connected by Contractor. The tests shall be made prior to final inspection. The Contractor shall provide all testing equipment and all costs shall be borne by him. Written reports shall be made of all tests. These reports shall be turned over to the Architect at time of final inspection. All faults shall be corrected immediately.

3.04 CLEANING UP

A. The Contractor shall remove all oil, grease, or other stains resulting from his work performed in the building or the exterior thereof.

END OF SECTION 16100

AUDIO – VISUAL SYSTEMS

PART 1 GENERAL

1. RELATED SECTIONS

(A) The Drawings, General, Special and Supplementary Conditions of the Contract to the Work of this Section.

(B) All project construction documents correspond to this Section.

(C) The Specification Sections of other disciplines correspond to this Section, insofar as contractor coordination and the requirements for interconnection with the work of other contractors are required, and insofar as they apply.

(D) Division 16000 – Electrical Systems

2. SYSTEM DESCRIPTION

(A) Audio Reinforcement Systems consist of loudspeakers, digital audio processing platform, amplification, equipment cabinet, cabling, rigging materials, and wiring.

(B) Video Reinforcement system consists of laser lamp projector, motorized projection screen, HDBaseT transmitter and receiver, processor, cabling and connectors.

(C) Integration of any owner furnished equipment (OFE), furnishing and installation of specified products, as well as incidental equipment, hardware and cabling required providing complete and fully functional systems. Furnish, deliver, erect, and connect all the material and equipment described herein and in the drawings, and also all other incidental material and tools, transportation, etc. required to make work complete, in accordance with these plans and specifications, as required to leave the system in first class operating condition, excluding those items designated WORK BY OTHERS (WBO) or NOT IN CONTRACT (NIC).

(D) Verify dimensions and conditions at the job site prior to installation, and perform installation in accordance with these specifications, manufacturers' recommendations and all applicable code requirements.

(E) The AV systems include the following major items:

a) Digital audio mixing, processing and routing components
b) Loudspeakers and loudspeaker mounting or support hardware
c) Video displays, video processors, support cabling & hardware
d) Equipment Racks, Cabinetry, and Furniture
e) Cables, Connectors, Plates, and Wiring
f) Preparation of submittal information
g) Installation in accordance with the contract documents, manufacturer's recommendations, and all applicable code requirements
h) Specific control system programming, training & support
i) Initial tests and adjustments, demonstration for approval, final adjustments and documentation
j) Instruction of operating personnel; provision of manuals
k) Maintenance services; warranty

(F) Provision of system testing, system documentation and instruction of Owner Personnel.

(G) Guarantees and Warranties.

3. REFERENCES

In addition to the references in Division 1, all requirements of the latest published edition, unless otherwise noted, including but not limited to the following, shall apply. In the event of conflict between cited or referenced standards, the more stringent shall govern.

a) National Electric Code (N.E.C).

b) Federal Communications Commission (F.C.C.) Rules and Regulations, Part 76.

c) Society of Cable Television Engineers (S.C.T.E.)

d) Society of Motion Picture and Television Engineers (S M P.T.E.)

e) American Society for Testing Materials (A.S.T.M.)

f) National Cable Television Association (N.C. T. A.)

g) Electronic Industries Association (E.I.A)

h) Telecommunications Industries Association (T. I.A.)

i) “Handbook for Riggers”, 1977 Revised Edition, Newberry, W. G., Calgary, Alberta Canada.

j) “Basic Principles for Suspended Loudspeaker Systems”, Technical Notes Volume 1, Number 14, JBL Professional.

k) Davis, Don and Carolyn, Audio system Engineering, Second Edition, Howard W. Sams and Co., Indianapolis, Indiana, 1986.

l) DOE Standard DOE-STD-1090-99 Hoisting and Rigging

4. SUBMITTALS

(A) Provide shop drawings and record drawings using the following scales:

a) Details – not less than 1/4”=1’-0”

b) Plans – not less than 1/8”=1’-0”

(B) Mark all submittal documents to show the project name, date, Architect, Contractor, Sub-Contractor, and this specification Section number.

(C) Make each specified submittal as a coordinated package complete with all information. Uncoordinated sets will be returned without review.

(D) Cable and Connector Submittal: Submit sample cable with connections and wire labels. Cable sample should be 18” in length. Submit cable/connector assemblies for each type of cable to be used on the project. Manufacturer’s cable jacket ID lettering must be included on the sample cable.

(E) Product Data: Submit manufacturer’s product data sheets for each item of equipment that will be provided as part of this contract. Provide a complete list of proposed equipment broken down by system. Provide a budget summary page listing price by system. Binders shall be 3-ring binders sized to handle materials plus 34% excess. All cut sheets shall be arranged by system type and then by specification number with tabbed dividers between sections. A table of contents shall appear at the front of the binder.

(F) Submit heat load calculations showing how loads were derived if requested by Owner or

Owners Representative.

(G) Custom Software Programming including Graphical User Interface (as required). Provide for approval at least three (3) weeks prior to system commissioning, electronic copies of all custom software. It is the Contractor's responsibility for all custom software programming for the systems they are controlling. Coordination with the Consultant is required for the development of this software.

(H) Provide Panel Fabrication Details including panel engraving schedule to Owner and Consultant prior to ordering panels.

(I) Any technical questions shall be submitted by email to the AV Consultant, unless otherwise noted by the Owner, Architect or Purchasing Agent.

Walthall & Associates, Inc.
200 Swift Creek Drive; Suite G
Cantonment, FL 32533
Electronic mail: chuck@walthall.us
Telephone (850) 478-9002

5. QUALIFICATIONS

(A) Bidder shall be an A/V systems contractor, normally engaged in the full time business of A/V systems installation. Show proof that bidder has been in the communications system installation business for a period of no less than five years and has completed projects of similar size and scope. The Owner and/or Owner's representative reserves the right to reject any bids submitted by firms without sufficient experience in projects of this size, complexity, or any other terms the owner or owner's representative may deem relevant.

(B) No sub-contractor or contract employees will be permitted to perform the contractor's responsibilities as defined herein, unless specifically identified in the bid submission and approved by the Owner and/or Owner's representative. The contractor shall have sole responsibility for the satisfactory execution of the work, even though he may have sub-contracted a portion of the work, or had certain manufacturers install their own products.

(C) The Contractor shall provide resumes of the project coordinator (manager) and lead installer planned to be used for this project. This shall be presented at the presentation of proposal. The Contractor shall maintain the same project manager and lead installer throughout the course entire course of the project. If a personnel change is required the Contractor shall notify the Owner and/or Owner's representative and the General Contractor 30 calendar days prior to the change.

6. QUALITY ASSURANCE

(A) Review architectural, civil, structural, mechanical, electrical, and other project documents relative to this work.

(B) Verify all dimensions on the site.

(C) Coordinate the specified work with all other trades.

(D) Provide all items not indicated on the drawings or mentioned in the specifications that are necessary, required or appropriate for this work to realize complete, stable and safe operation.

(E) Review project documentation and continuously make known any conflicts discovered and provide all items necessary to complete this work to the satisfaction of the Owner and/or Owner's representative without additional expense. In all cases where a device or item or

equipment is referred to in singular number or without quantity, each such reference shall apply to as many such devices or items as are required to complete the work.

(F) Provide additional support or positioning members as required for the proper installation and operation of equipment, materials and devices provided as part of this work as approved by the Owner and/or Owner's representative, without additional expense.

(G) Regularly examine all construction, and the work of others, which may affect the work to ensure proper conditions for the equipment and devices before their manufacture, fabrication or installation. Contractor shall be responsible for the proper fitting of the systems, equipment, materials, and devices provided as part of this work.

(H) Promptly notify the Owner and/or Owner's representative of any difficulties that may prevent proper coordination or timely completion of this work. Failure to do so shall constitute acceptance of construction as suitable in all ways to receive this work, except for defects that may develop in the work of others after its execution.

(I) The Systems Contractor shall maintain the same Project Coordinator (Manager) and Field Supervisor throughout the entire project. The Systems Contractor shall provide contact information to the client, AV Consultant, General Contractor and Electrical Contractor, for both parties prior to commencing on-site project work.

(J) Source Limitations: Obtain as many products as possible from a single manufacturer. Obtain each item as a completely newly manufactured unit, including necessary mounting hardware, manuals and accessories.

7. OWNER'S RIGHT TO USE EQUIPMENT

(A) The Owner reserves the right to use equipment, material and services provided as part of this work prior to final acceptance without incurring any obligation to:

a) Accept material and equipment or completed systems until all punch list work is completed and all systems are acceptable.

b) Pay additional cost or charge.

c) Commence the warranty period for any system or device provided as part of the work.

8. PERMITS AND INSPECTIONS

(A) Obtain all required permits and inspections.

(B) Furnish material and workmanship for this work in conformance with all code requirements

(C) Perform all tests required herein, or as may be reasonably required to demonstrate conformance with the specifications.

9. DELIVERY, STORAGE, AND HANDLING

(A) Store equipment and materials safely and securely inside at the job site in a manner that will not interfere with the work of other trades.

(B) Replace all damaged or defective work or material at no additional cost, prior to acceptance.

(C) Check, and if necessary, clean all systems, equipment, devices and components included in the work after acceptance and completion of the work of all other trades.

(D) Store materials in designated areas.

(E) Provide and maintain suitable barriers, guards, fences and signs wherever necessary for the safety of others relative to and/ or for the protection of this work.

(F) Protect all materials and equipment to prevent the entry or adhesion of concrete, plaster, unintended paint, or other damaging debris or materials.

10. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

(A) Submit shop drawings, product data and samples together in one package within thirty (30) days after award of the Contract and prior to ordering equipment.

(B) Submit catalog data sheets, neatly bound with title page, space for submittal stamps, and tabbed dividers between Sections. Provide a complete list of proposed equipment. Provide a summary of pricing broken down by system. Denote all substitutions.

(C) Submit rack layouts indicating the proposed arrangement of mounted equipment including junction boxes and locations of conduit penetrations.

(D) Submit construction details of all custom fabricated items and approved equipment modifications. Include complete parts lists, schematic diagrams, and all dimensions required for proper assembly.

(E) Submit finish schedule indicating proposed color selections and finishes for custom fabricated items, wall plates and custom labels.

(F) Submit mounting and support details for all items mounted overhead, including loudspeakers complete with parts lists and dimensions. Include a full plan view, front elevation and side elevation of each unique item with corresponding support structure and mounting hardware.

(G) Approval of shop drawings or submittal indicates only the acceptance of the manufacturer and quality. Specific requirements, arrangements, and quantities still must comply with the intent of the contract documents as interpreted by the Owner and/or Owner's representative unless specifically approved in writing.

(H) Submittals, which are incomplete, deviate significantly from the requirements of the Contract Documents, or contain numerous errors, will be returned without review for rework.

11. PROJECT RECORD DRAWINGS (As Built Drawings)

(A) Approved shop drawings, updated to accurately document the final conditions of the system installation. Legibly mark to record actual construction:

a) Field changes of dimension and detail.

b) Changes made by Revision Order, Directive or other modifications.

c) Details not in original contract drawings.

d) Any other miscellaneous items installed under this contract. At a minimum, the ends of each line should have the type of termination, coordinate and elevation indicated.

e) Layouts of system devices showing actual device locations.

f) Results of all Field Quality Control Tests in this Section.

12. OPERATION MANUALS

(A) Operation manuals shall include, but not limited to the following sections:

a) Table of Contents.

b) Typed description of system including key features and operational concepts (e.g. remote control features, switching functions, and mixing capabilities).

c) Setup diagrams and typed instructions for use in typical situations as directed by the Owner.

d) Small scale plans showing locations and circuit numbers for all system outlets and receptacles.

e) Single-line block diagrams showing all major components of the systems.

f) Manufacturer's operation manuals for user-operated equipment (tape decks, processors, communication equipment, etc.).

13. MAINTENANCE MANUALS

(A) Provide the owner any maintenance manuals that come packaged with equipment.

14. PROJECT CONDITIONS

(A) If project conditions indicate a need to vary from the Specifications or Drawings, notify the Owner and/or Owner's representative, make recommendations, and proceed with the necessary changes only after receipt of approval from the Owner and/or Owner's representative.

(B) All accessories provided by equipment manufacturer shall retain the property of the owner. Collect, inventory and present to owner after Acceptance Testing.

15. WARRANTY

(A) Provide a one (1) year System Warranty, and the following, at no additional cost to the Owner.

(B) Warranty shall contain the following:

a) Date, project title and number.

b) Contractor's name, address, telephone number and point of contact.

c) Title and number of each as-built document.

d) Signature of contractor, or its authorized representative.

e) Include the name of a contact person for service or maintenance and define the limits of the system warranty.

(C) During the System Warranty period, answer all service calls and requests for information within twenty-four (24) hours. Repair or replace faulty items and correct faulty workmanship on site within twenty-four (24) hours of all service calls.

(D) Conduct all warranty repairs and service at the job site unless in violation of manufacturer's warranty. In the latter event, provide substitute systems, equipment, and/or devices, acceptance to the Owner, for the duration of such off site repairs. Transport warranty materials, parts, and personnel to and from the job site at no additional cost.

(E) For products with manufacturer's warranties lasting more than one (1) year, register warranties in the Owner's name.

16. SUBSTITUTIONS

(A) Denote any substitutions for consideration by the Owner or Owner's representative.

18. BRAND NAMES AND ACCEPTABLE ALTERNATIVES

(B) The brand name(s) and model number(s) mentioned are used in this specification as a measure of quality and performance. Any brand or manufacture of acceptable or better quality and performance than that specified will be considered for acceptance by the Owner and/or Owner's representative at time of Bid. However, the Owner and/or Owner's representative reserves the right to reject and deny any substitution that it may, in it's sole discretion, deem unequal, and the findings in this regard shall be accepted by the bidder as final and binding.

19. OWNER FURNISHED EQUIPMENT (O.F.E.)

(A) Certain equipment may be identified as Owner Furnished (OFE or Existing). This Owner Furnished Equipment may presently be part of the Owner's system, or will be provided by the Owner, and will be delivered to the contractor's off-site construction facility, delivered to the contractor's on-site secured storage area, or installed on site by others, as appropriate, for incorporation into the system.

(B) Clean and inspect the OFE, and notify the Owner and/or Owner's representative of damage or defect and the extent of repair and/or adjustment required to bring the OFE to original specification. Service OFE only if directed by the Owner and/or Owner's representative under the arrangements of a separate contract.

(C) Connect, terminate and properly incorporate OFE into the proper system for its type. Reconnect any equipment disconnected for installation of new equipment. Verify proper operation and control functions as before removal.

20. INSURANCE

(A) Insure materials against theft, vandalism, damage due to the elements, fire, etc., to their full value. Materials and the flawless condition of materials shall remain the responsibility of the contractor until acceptance of the system by the Owner.

(B) Contractor shall be responsible for having in force the following insurance protection, this protection shall also be required for any subcontractors the Contractor may hire. Certificates of insurance shall be provided within five (5) calendar days upon request.

a) Workers Compensation Coverage for all workers

b) General, Automobile and Excess or Umbrella Liability Coverage

c) General Liability Coverage – Occurrence Form Required

d) Business Automobile Liability Coverage

21. WORK BY OTHERS (WBO, BY OTHERS) NOT IN CONTRACT (NIC)

(A) As noted on drawings and in project documentation

22. BEST VALUE ITEMIZED PROPOSAL

(A) As noted elsewhere, the AV contractor shall furnish items meeting or exceeding the specifications, items which are new and of the latest technology.

(B) Each item or system group of items shall be individually priced with the understanding ST ANDREW'S CULTURAL CENTER may select any single or any combination of items as required meeting any budget constraints. Where the contractor chooses, an alternate item or system may be proposed in addition to the items specified.

(C) Award will be based on best value to ST ANDREW'S CULTURAL CENTER, so proposers are required to attach literature as required, on each individual component proposed and may

include with each a narrative explaining the merits of the component.

(D) In addition to above, the AV contractor shall include a narrative at the beginning of his proposal describing the Project Approach, personal experience and overall relative value to ST ANDREW'S CULTURAL CENTER. This narrative should not exceed two double-spaced typewritten pages and may include any other points the proposer wishes to include.

PART 2 PRODUCTS

1. GENERAL

(A) All equipment, except OFE, and materials shall be new, latest version at time of bid, and shall conform to applicable UL, CSA, or ANSI provisions. Re-manufactured or "B" stock equipment will not be accepted without prior written consent from the Owner and/or Owner's representative. Evidence of unauthorized re-manufactured, or "B" stock equipment on the project site will be deemed evidence of the contractor's Failure to Perform the Work. Take care during installation to prevent scratches, dents, chips or disfiguration.

(B) Regardless of the length or completeness of the descriptive paragraph herein, each device shall meet all of its published manufacturer's specifications. Verify performance as required.

(C) Asbestos Prohibition: No Asbestos containing materials shall be used under this section. The contractor shall insure that all materials incorporated in the project are Asbestos free unless specifically authorized in writing by the Owner and/or Owner's representative.

(D) All products listed below are listed for sole source information and establishment of the level of quality required by this project. Refer to the project drawings to establish quantities.

(E) Install all rack mounted equipment with black steel 10-32, button head machine screws with plastic cup washers protecting equipment panel. Do not over torque, round out, strip or mar screws.

(F) Provide and install an escutcheon ring around all pipes, poles and mounts that penetrate the ceiling. Color to be determined by owner.

(G) Some rack-mounted equipment may require shaft locks, covers, or removal of knobs; provide and install during Acceptance Testing

(H) Provide plastic permanent approved labels at the front and rear of all rack-mounted power amplification and signal processing equipment. Mount labels on the equipment rack or equipment chassis, and attach in a neat, plumb, and permanent manner. Embossed labels will not be accepted. Label equipment with schematic enumeration reference, and with descriptive information regarding its function or area it is serving. Similarly, provide permanent approved labels at the rear only of equipment mounted in furniture consoles.

(I) All engraving shall be 1/8" block lettering unless noted otherwise. On dark panels or push-buttons, letters shall be white. Letters shall be black on stainless steel, brushed natural aluminum plates or light-colored push buttons.

(J) All accessories provided by equipment manufacturer shall retain the property of the owner. Collect, inventory and present to owner after Acceptance Testing.

(K) Per IEC-268 standard, all XLR connectors not mounted on equipment shall be wired pin 2 hot (high), pin 3 (low), and pin 1 screen (shield).

2. AUDIO SYSTEMS MATERIALS

(A) The materials or description of work in this section is typical for all systems in this section and all following specification sections.

(B) All equipment items required to provide a fully functional system may not be noted or depict-

ed on the schematic diagrams. Confirm your quote includes all required equipment documented in the system drawings and any required equipment not listed or shown. Report any missing or required equipment to the Consultant prior to submitting your quote.

(C) Mounting Hardware exposed to the weather shall be aluminum, brass, and epoxy painted galvanized steel, or stainless steel. Apply corrosion inhibitor to all threaded fittings. AV Contractor can sub the control system programming, training and support from a certified programmer/company.

(D) AUDIO-VISUAL SYSTEM

Reference AV drawings for make, model and quantity of AV components. Notify AV Consultant of any discrepancies prior to submitting bids or shop drawings. Failure to notify does not constitute change order (add) approval.

Verify with system drawings, on-site inspection and requirements to provide a fully functional system(s).

Provide all materials, labor, training and miscellaneous equipment required.

Provide all display mounting devices; wall, ceiling, truss, etc. as required.

Provide proper lensing (T/W) as noted on the schematic and plan drawings to properly fill the screen with no less than 10% +/- tolerance.

Provide all industry standard patch bays, fiber trays, patch cords and fiber link cables as required.

Provide all required network, audio, video POE, POE+ and control cables as required.

3. CABLES AND CONTROL WIRING

(A) All electrical conductors installed under this contract, except where otherwise specified, shall be soft drawn annealed stranded copper having a conductivity of not less than 98% of pure copper and shall be Anaconda, Triangle, General or approved equal for power, and Alpha, Belden, or West Penn for low voltage. Cables in plenum rated ceilings outside conduit shall be similar to those listed above, except plenum rated.

(B) Homerun ALL Loudspeaker Cables, Reinforcement Loudspeaker Cables, Monitor and Foldback Loudspeaker Cables. Cables between loudspeakers interconnect junction boxes and racks to be at least No. 12 AWG jacketed pair equal to West Penn CL3 rated product or as shown on the AV drawings.

(C) Other Loudspeaker Cables to be at least No. 16 AWG jacketed pair equal to West Penn CL3 rated product or as shown on the AV drawings.

(D) Line Level and Microphone Level Cables to be at least No. 22 AWG shielded jacketed pair eq

(E) ual to West Penn CL3-452 or CL3-291 or as shown on the AV drawings.Multi-conductor High Resolution Video Cable shall be manufactured by Extron Electronics or West Penn CDT.

(F) Coaxial Cable for video and RF transport shall be RG-6 quad-shielded with a solid copper center conductor. Any other cable if installed shall be removed and replaced with approved cable at no additional expense to the owner.

(G) Low Voltage Control Cabling to be at least No.18AWG shielded CL3 rated cable, conductor count to be determined by application.

(H) All cables that are not in conduit and are run through plenum rated spaces shall be plenum rated cable of the gauge and conductor count required for the application.

4. ADD OPTIONS

(A) Provide pricing on the following add option for purchasing consideration by the Owner. Ensure pricing includes all necessary components, parts and labor to provide a fully functional system.

5. DELETE OPTIONS

(A) Provide pricing on the following delete options for purchasing consideration by the Owner. Ensure pricing includes all necessary components, parts and labor to provide a fully functional system.

a) DELETE OPTIONS are at Owner's discretion upon receipt of proposal.

6. FABRICATION

(A) Equipment Racks

a) Pre-assemble and test all racks before delivery to the job site, provide a written report on pre-assembly and test results to Owner/Owner's Representative.

b) Verify the depth of each rack prior to assembly to ensure that mounted equipment will fit completely inside with the front and rear door closed.

7. SOURCE QUALITY CONTROL TESTS

(A) Use the following test equipment meeting the following minimum specifications to perform the Source Quality Control Tests and Field Quality Control Tests. Furnish the same test equipment for the performance of Acceptance Testing.

a) Digital Multimeter

DC to 20 kHz bandwidth
300 V range, 100 mV resolution
10 megohms input impedance
Direct reading of dBm across 600-ohm load
DC resistance to .1 ohm
Dual Trace Oscilloscope *(if required or requested)*
100 MHz bandwidth
1 mV/CM sensitivity
Dual time base capability

b) Sine/Square Wave Generator

5 Hz to 5 kHz bandwidth
Output level of 0 dBm with less than .5% THD

c) Impedance Bridge

Range: 1 ohm to 1 megohm
Three test frequencies, minimum, ranging from 250 Hz to 4 kHz

d) Sound Level Meter

ANSI Type 2 with one-octave filter set

(B) Measurements

a) Measure and record impedances curves for each loudspeaker line entering rack at 1000 Hz.

b) Grounding System tests as described in the Technical Systems Specification.

8. MISCELLANEOUS CONNECTORS

(A) Certain connectors not identified in specific paragraphs, or indicated on the drawings, are specified by generic “type”. At all times, match connector types used in adjacent project areas, including existing audio, television and audiovisual systems.

a) D(*)F - Switchcraft D(*)F or Neutrik NC(*)F
b) D(*)M - Switchcraft D(*)M or Neutrik NC(*)MP
c) TRS-F - Switchcraft 121
d) TRS-M - Switchcraft 280 or Neutrik NP3C-BAG
e) TRS-FJ - Switchcraft 14B or Neutrik NJ3FP6C-BAG
f) S4FC - Neutrik NL4FC
g) S4MP - Neutrik NL4MP
h) BNC - Canare BCJ-R
i) BNCL - Canare BCP-S4
j) BNC-R - Canare BCJ-RU

PART 3 EXECUTION

1. INSTALLATION

(A) Verify existing conditions before starting work.

(B) Execute all work in accordance with Part 1.3 References in this guideline, and with all local and state codes, ordinances, and regulations.

(C) Install equipment according to manufacturer’s recommendations.

(D) Install all rack-mounted equipment with black steel 10-32, button head machine screws, using plastic cup washers to protect equipment panel.

(E) Rack mounted equipment shall be mounted into racks and fully wired and tested, before delivery to job site. *(Does not apply when racks are existing)*

(F) Install flat black blank panels in all unused rack positions. Use no larger then a two space panel.

(G) Ensure that levels and impedances are properly matched between components.

(H) Choose colors and finishes of all exposed and custom fabricated items and labels to blend in with the surroundings as approved by the Owner and/or Owner’s representative.

(I) Firmly and permanently attach electrical boxes, enclosures and permanent equipment to the building. Rigidly mounted equipment and devices shall be level, plumb and square.

a) Set “flush-mounted” units so that the face of the cover, bezel, or escutcheon is in the same plane as the surrounding finished surface.

b) Mount boxes, panels and trim so that there are no gaps, cracks, or obvious lines between the trim and the adjacent finished surface, and ready them to receive final finish, as applicable.

c) Provide access panels where needed to access boxes, panels and enclosures in walls or ceilings, as indicated and dimensioned on the shop drawings.

d) Finish panels to match the surrounding surfaces.

(J) Supports and mounts for equipment to be installed over public areas shall be permanently attached to suitable building structure adequate to support the equipment loads with a safety factor of at least five.

(K) Use attachment hardware with a minimum SAE Grade 5 load rating. Do not use formed eye-bolts or lag screws for support or connection of suspended equipment.

(L) Verify capacity of mounting methods used in the work and associated liabilities. All attachments, attachment points, reinforcement requirements, and hardware selection shall be executed in accordance with the references in PART 1.

2. GROUNDING, SHIELDING AND ISOLATING

(A) Mount and enclose all electrical and electronic equipment in metal enclosures, pedestals or equipment racks.

(B) All junction boxes shall be bonded to the building safety ground.

(C) Use EMT type conduit for all wiring outside of equipment racks except plenum rated wiring above a lay-in ceiling, and outdoor conduits and raceways, where separate insulated ground wiring shall be supplied.

(D) Use flexible conduits and PVC fittings to provide insulated connections of the building electrical raceways to equipment racks. Mount all equipment racks at the job site in a manner that provides electrical isolation from the building structure and electrical raceways.

(E) Electronics racks and cabinets shall be boned to the isolated ground technical power system only. Refer to Section 16770 for coordination and test with the Electrical Contractor.

(F) In the case where a metal equipment cabinet or rack is located on a suspended, concrete or bonded flooring system, the enclosure shall be placed on a Santoprene isolating mat with a minimum thickness of 3/32” and a Durometer of 80A,.

3. WIRING PRACTICES

(A) Where specific instructions are not given, perform all wiring in strict adherence to standard broadcast and sound engineering practices in accordance with the references listed in PART 1.

(B) Group all wiring into the following classifications by power level or signal type:

a) Microphone Level: less than -20 dBm.

b) Line Level Audio and DC Control Circuits: -20 dBm to +30 dBm.

c) Speaker Level: greater than +30 dBm.

d) AC Mains Power Circuits

(C) Separate wiring of differing classifications by at least six (6) inches, wherever possible. Wherever lines of differing classification must come closer together than six (6) inches, cross them perpendicular to each other.

(D) Neatly harness wires together within racks by power level classification using horizontal and vertical wiring supports as required. Rigidly support all wires within 6” of fixed connection points. Leave service loops of sufficient lengths to allow rack hinges or slides to fully extend to facilitate access to rear panel connectors from the front of each rack. Do not use self-adhesive anchor pads for support of cables.

(E) Observe consistent polarity throughout the audio systems as follows:

a) Use only balanced differential inputs throughout all audio systems unless otherwise noted.

b) Use approved transformers where directed to reduce objectionable system noise to acceptable levels.

(F) Exercise care in wiring to avoid damaging the cables and equipment. Use grommets around cutouts and knockouts where conduit or chase nipples are not installed. Use bushings where conduit terminal connections are exposed in or out of junction boxes.

(G) Cut off unused wire ends approximately one-half inch (1/2“) past the wire jacket. Fold them back over the jacket, and secure in place with heat-shrink tubing. In multi-conductor cables, preserve all unused conductors for future use. Failure to do so may result in replacement of cables at the contractor’s expense.

(H) Provide a minimum 6” service loop or enough cable to allow for three (3) subsequent terminations which ever is greater.

(I) All cable jacket exposed stripped ends shall be dressed with the appropriate sized heat shrink.

(J) All drain cables shall be protected from the jacket strip to the point of termination. Exposed bare wire is not acceptable.

(K) Make all connections using rosin-core solder in conjunction with approved mechanical connectors unless other is specified by manufacturer. Connect microphone, control, and line level wiring through approved connectors. Connect speaker level wiring using approved terminal barrier strips. Mount all terminal devices on a non-conductive (electrically) rigid surface. Provide 10% spare terminals at each location. Label each terminal with a unique number.

(L) Make all power amplifier output connections directly into amplifier binding posts, friction fit connectors are not acceptable. In the event the amplifier doesn’t have binding posts, and has barrier strip connections, crimp and solder the appropriate fork lug to the cable and torque screws to manufacturer’s specification.

(M) All fiber optic cable splicing shall utilize the fusion splice method. The maximum allowable loss per fusion splice shall be 0.5 dB.

4. LABELING

(A) Label products in a logical, legible, and permanent manner corresponding to the Drawings. Wording, format, style, color, and arrangement of text will be subject to the Owner and/or Owner’s representative’s approval. Submit samples and labeling schedule for approval. Labeling will be verified at final adjustment and equalization

(B) Label all wall plates for input, output, and control receptacles as well as connector mounting plates in all boxes using 1/8” engraved lettering filled with black or contrasting paint, as approved.

(C) Use engraved plastic labels similar to Lamicoid, squarely and permanently attached, to label the following:

a) Patch panel designation strips.

b) Front and back of all rack mounted equipment including controls

c) Barrier strips, terminals, transformers, switches, relays, volume controls, and similar devices.

(D) Label pushbutton switches with engraved lettering filled with contrasting color paint.

(E) Label all permanently installed wires on both ends with approved permanent clip-on type or sleeve type markers. Wrap-around adhesive labels will not be accepted unless completely covered with clear heat shrink tubing.

(F) Label all portable equipment with engraved block letters using initials and/or words. Label all portable cables similarly with printed heat-shrinkable tags located 12 inches from the male connector end. Verify lettering through the Owner and/or Owner’s representative prior to en-

graving or printing.

(G) Label access panels and backboards with designations corresponding to the drawings. Where devices are concealed above access ceilings, provide permanent lamicoid labels, on the ceiling supports corresponding to the drawings in finishes and sizes approved by the Owner and/or Owner's representative.

5. FIELD QUALITY CONTROL TESTS

(A) Maintain a competent supervisor and supporting technical personnel, acceptable to the Owner and/or Owner's representative during the entire installation.

(B) Before connecting any equipment to AC power outlets, measure the AC voltages between hot, neutral, and ground and verify correct voltage and polarity of AC power. Equipment damaged by connecting to improperly wired outlets shall be replaced at no addition cost to the Owner.

(C) Upon completion of the system installation, it shall be the responsibility of the contractor to perform the necessary adjustments and balancing of all signals and amplifier gain, and other level controls to ensure proper system operation. The Owner shall physically inspect the system and/or Owner's representative to assure that all equipment is installed in a neat and workmanlike manner as called for by the plans and specifications.

(D) Determine the proper sequence of energizing systems to minimize the risk of damage.

(E) After successfully energizing the systems, make all preliminary adjustments and document the setting of all controls, parameters of all corrective networks, voltages at key system interconnection points, gains and losses, as applicable.

(F) Verify the performance parameters of the individual systems following established professional procedures, in addition to those specified herein.

(G) Measure and record impedance curves of all loudspeaker lines at amplifier rack terminal barrier strips prior to connecting to amplifier outputs.

(H) Apply a sine-wave sweep signal to each loudspeaker system, sweeping from 50 Hz to 5000 Hz at a sound pressure level which is 10 dB below the loudspeaker's rated electrical input power. Listen for rattles or objectionable noise and correct if apparent.

(I) Using a +4 dBm sine-wave input, set controls of each component to produce a +4 dBm sine-wave output. Under these conditions (unity gain), the presence of any waveform, distortion, interference signals, or oscillations shall be unacceptable.

(J) Check for proper polarity of ceiling mounted loudspeakers by applying music program or pink noise to each system and walking through the transition areas of coverage from one loudspeaker to the next. Transition should be smooth with no apparent shifting of source from one loudspeaker to the next.

(K) Drive each ceiling distributed loudspeaker system with one octave of pink noise centered at 1000 Hz at a sound pressure level which is at least 10 dB above the ambient noise. Adjust power amplifiers to provide uniform distribution of sound throughout the seating areas within a tolerance of ±3 dB. Use an ANSI Type 2 sound level meter set for slow meter damping to take readings at seated ear height.

(L) Individually drive each reinforcement loudspeaker with one octave of pink noise centered at 1000 Hz at a sound pressure level, which is at least 10 dB above the ambient noise. Adjust power amplifiers to provide an equal sound pressure level from each loudspeaker on its aiming axis in the seating area. Use an ANSI Type 2 sound level meter set for slow meter damping to take readings at seated ear height.

(M) Upon completion of initial tests and adjustments, notify the Owner and/or Owner's representative the system is ready for final equalization and acceptance testing.

6. TEST EQUIPMENT

(A) Provide the following test equipment on site during construction and available to the Owner and/or Owner's representative during final adjustment and acceptance testing:

a) Digital Multi-meter

b) 100 MHz Dual Trace Storage Oscilloscope

c) Video Test Pattern Generator *(XGA, Component, YC and Composite)*

d) Sine/Square Wave Generator

e) Impedance Bridge

f) Sound Level Meter - ANSI Type 2 with one-octave filter set

7. FINAL ADJUSTMENT AND EQUALIZATION

(A) Schedule a time for the Owner and/or Owner's representative to perform the Final Adjustment and Equalization. Notify the Owner and/or Owner's representative and Consultant at least twenty one (21) days in advance.

(B) Furnish project lead installer to assist the Owner and/or Owner's representative during the Final Adjustment and Equalization.

(C) Audio Systems acceptance tests shall employ an approved sound level meter, and spectrum analyzer and digital multi-meter to be provided by the contractor. Measurements shall be made at the combined output of the amplifiers and at selected locations throughout the facility.

(D) Video Systems acceptance tests shall employ and approved video test pattern generator, PC with min. XGA output and a 100MHz dual trace storage oscilloscope. Measurements shall be made at the point of signal origination and compared to signal at the display device. Minimum requirements at the display device shall be a rise time no greater then 7.5ns (5ns preferred) and amplitude of .7 volts.

(E) Record final settings on all equipment and submit with contract closeout documents.

8. CLEAN UP

(A) Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where Work has been completed on a daily basis unless designated for storage.

(B) Clean all areas around system equipment and be sure that the inside of each equipment rack is free of cut wire ends, solder splatters, and other debris.

9. DEMONSTRATIONS AND TRAINING

(A) Furnish a technician who is qualified to operate and maintain the systems specified in this Section to instruct Owner designated personnel regarding the design features and proper operation of the systems.

(B) If requested by the Owner, furnish the same technician/instructor during the first formal use of each system to further instruct and assist Owner personnel in system operation.

(C) Upon completion of the Work, the Owner and/or Owner's representative may elect to verify test data as part of the acceptance procedure. Provide personnel and equipment, at the convenience of the Owner and/or Owner's representative, to reasonably demonstrate system performance and to assist with such tests without additional cost to the Owner and/or Owner's representative.

10. FINAL PROCEDURES

(A) Perform any and all remedial work to correct inadequate performance or unacceptable conditions of, or relating to any of this work, as determined by the Owner and/or Owner's representative, at no additional expense to the Owner and/or Owner's representative.

(B) Furnish all portable and loose equipment to the Owner along with complete documentation of the materials presented. All portable equipment shall be presented in the original manufacturers packing, complete with all included instructions and miscellaneous manuals and documents.

(C) Test Reports and Certificates:

a) Document all acceptance testing, calibration and correction procedures described herein with the following information:

b) Parameters measured and their values, including values measured prior to calibration or correction, as applicable.

c) Parameters associated with calibration or corrective networks, components, or devices.

d) All software shall have certified backups and escrow provisions reviewed with the Owner and/or Owner's representative and equipment supplier.

e) Provide all operational software, configuration files, source code, and final settings and adjustment, in Compact Disc format, sleeved in the final documentation binder. The configurations, and source code become the sole property of the owner at project completion

f) A list of all equipment, indicating manufacturer, model number, serial number and equipment location (rack/room number). Update following acceptance testing if modified.

(D) Present, review and clarify all materials to the Owner and/or Owner's representative and/or operating personnel and fully demonstrate the operation and maintenance of the systems, equipment, and devices specified herein.

(E) Check, inspect, and if necessary, adjust all systems, equipment, devices and components specified, at the Owner's convenience, approximately thirty (30) days after the Owner acceptance of this work.

END OF SECTION

SECTION 16300 – LIGHTNING SUPPRESSION SYSTEM

PART 1 – GENERAL

1.01 SUMMARY

A. Provide all labor, components, equipment, and services to perform all operations required for the complete installation and related work as specified herein.

B. Any such work in any other section of these specifications that is not specifically described therein shall comply with the requirements of this section.

C. The following items of work are specifically included in, but not necessarily limited to, the work of this section without limiting the generality implied by these specifications:

1. CMCE lightning protection air terminal
2. Mast, complete with base and supports
3. Down conductors
4. Grounds
5. Transient Voltage Surge Suppression (if selected)

1.01.1 DEFINITIONS

A. Manufacturer – The term manufacturer shall refer to EMP Solutions, Inc. and its agents.

B. CMCE- CMCE shall refer to any model of the CMCE lightning suppressor.

1.02 SUBMITTALS

A. Provide shop drawings for review, showing location of CMCE air terminal, mast, conductors, grounding system, installation procedures and details.

B. Detailed manufacturer's data sheets on all components, accessories and miscellaneous equipment shall also be submitted.

1.03 DESCRIPTION OF SYSTEM

A. Provide a complete installation of equipment to comprise a complete system in accordance with CMCE Manufacturer’s Installation Standard.

B. The installing contractor shall be responsible for all components and labor to accomplish this result.

C. The system shall be installed so that completed work is unobtrusive and does not detract from the building appearance.

1.04 CODES, REGULATIONS, PERMITS

A. The completed system shall comply with CMCE Manufacturer's Installation Standard, equipment supplier drawings and specification requirements for installation of CMCE lightning protection systems.

B. The installing contractor shall accomplish any corrections required by the inspection at his own expense.

C. Noncompliance shall be reported to the equipment supplier for remedy.

1.05 STANDARDS OF QUALITY

A. The CMCE system equipment supplier, contractor, and installer shall install the CMCE system in compliance with the Manufacturer's Installation Standard.

B. Manufacturer's guarantee and warranty shall be submitted to the owner upon completion of the installation.

C. Manufacturer's Warranty of 10 Years applies to all models sold through EMP Solutions or one of their authorized dealers.

D. Manufacturer's 'No Strike' Guarantee applies to all devices sold and installed by an approved installer. This guarantee ranges from $50,000 USD to $500,000 USD and is subject to terms and conditions.

1.06 SERVICE AND INSPECTION

A. The installation of equipment shall be reviewed by the manufacturer and shall be in accordance with the manufacturer's requirements.

B. The installation shall be inspected by an agent of the manufacturer for compliance with Manufacturer's Installation Standard.

C. The lightning protection installing contractor shall provide photos of the installation, including but not limited to; mast mounting, bonding connections (waterline & structural steel), down conductors, ground rods/grids and all buried, concealed or inaccessible connections and components.
    a) This information shall be forwarded to the CMCE manufacturer for evaluation, certification, archiving and documentation.
    b) The ground resistance of the completed system shall be measured using an approved clamp meter, ideally AEMC 6417 or similar. Ground resistance shall not exceed 10 ohms.

2.02 CONDUCTORS

A. Copper down conductors shall be 19 -32 strands of 14-gauge wire rope lay, with a net weight of 200 - 375 pounds per 1,000 feet minimum.

B. The structural steel may be utilized as the main conductor provided the steel is electrically continuous or is made so via other means and with approval from the Manufacturer.

C. All conductors shall be secured every 3'-0" (900mm) maximum.

D. Fasteners and clips utilized shall be of equal corrosion resistance as the components being secured.

E. Bare copper components shall not be installed on dissimilar metals. Corrosion resistant copper equipment shall be utilized where these conditions exist.

F. Corrosion resistant copper conductors and fittings shall be utilized where corrosive atmospheres are present.

G. Conductors shall be installed so that a conductor shall always have a horizontal or downward path, free of "U" and "V" pockets, with the exception that an 8" (203mm) maximum rise, or a rise of 3" (80mm) maximum for every 12" (300mm) of conductor length shall be permitted in a main conductor run.

H. Each CMCE terminal shall have one (1) down conductors from the base of the mast to the grounding system.

I. The electrical contractor shall furnish and install all necessary PVC conduit for concealed down conductors.

J. No bend of a conductor shall be less than 90º and shall not have a radius of bend of less than 8" (203mm). Exceptions are through roof and wall assemblies and "T" connections.

2.03 MAST

A. Aluminum, galvanized, carbon or stainless-steel mast are acceptable.

B. Mast support, depending upon application, may be roof mounting base, side mounting or structural support.

2.04 GROUNDING SYSTEM

A. Ground rods shall be copperbond 1/2" x 10'-0", minimum.

B. Ground rods shall be installed, as needed, to achieve the 10 ohm or less ground resistance.

C. Ground plates of high conductivity copper sheet, 20 gauge minimum, 24 in. sq., may be used in lieu of ground rods if soil conditions make it impossible to drive ground rods. Chemical rods may also be used in lieu of plates or rods.

D. The cable attachments to the ground rods must be accomplished via an exothermic weld or mechanical clamp. A ground loop may be substituted for the ground rods or ground plates. The ground loop must be of a main size conductor and shall comply with the ten (10) ohm resistance requirement of the grounding system.

E. Ground rods, ground plates, and ground loop conductors shall be installed a minimum of 1ft. (300mm) below grade and a minimum of 2ft. (600mm) away from the foundation. Bonding of grounded systems shall be via main size conductors. The bonding shall be accomplished to achieve equal potential of all grounds.

2.05 CONNECTORS, FITTINGS, FASTENERS, AND HARDWARE

A. Provide all connectors, fittings, fasteners, hardware, clamps, guards, lugs, etc., as required to connect, and install all parts of the system.

B. All equipment shall be fabricated from copper and/or bronze components.

2.06 SURGE SUPPRESSION (recommended but optional)

A. Provide surge protection on the electrical, telephone, and antenna and TV lead wires.

B. The surge suppresser for the main electrical panel shall be industrial grade, with replaceable modules, fused, indicator lights.

C. The electrical surge suppression equipment shall be installed at the main entrance of the electrical system with a disconnecting mechanism.

D. The surge suppresser shall have the capability of being disconnected without shutting down the electrical system.

E. Telephone surge suppression shall be to the standards of the telephone system carrier.

F. The suppresser shall be industrial grade with replaceable modules, and a reaction time of less than one (1) nanosecond.

G. This surge equipment shall be installed at the main entrance of the telephone system.

H. Antenna and TV lead wire suppressers shall be industrial grade suitable for the conductor, coax or hard wire. The suppresser shall have a reaction time of less than one (1) nanosecond and shall be installed as close to the antenna or TV camera as possible.

3.01 INSTALLATION

A. Installation shall be accomplished in a professional manner by a lightning protection installing contractor or a licensed electrical contractor.

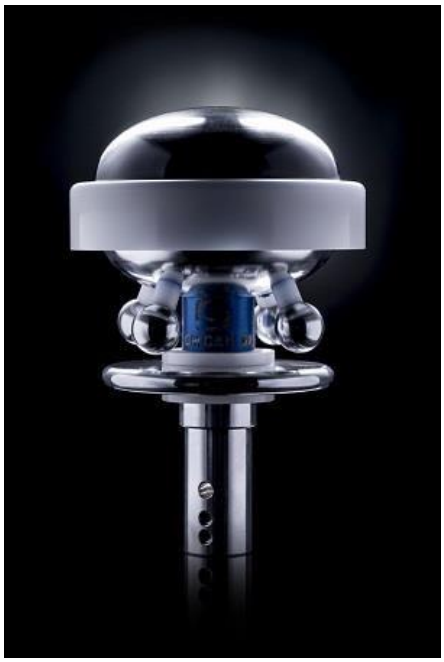
B. All work installed within the building shall be concealed.

C. All work installed in accessible locations shall be properly guarded and protected.

D. All components shall be installed in a manner to prevent electrolytic action under presence of moisture.

E. All roof, wall or other building penetrations shall be made in a manner to prevent the ingress of water or moisture.

F. Roof penetrations, flashings/pitch pans shall be furnished and installed by the contractor.



EMP SOLUTIONS

MAGNUM ENGINEERING INC
GEOTECHNICAL ENGINEERING CONSULTANTS

GEOTECHNICAL ENGINEERING REPORT

ST. ANDREW SCHOOL
PE PROJECT NO: 13095
PANAMA CITY, FLORIDA

PREPARED FOR:

PANHANDLE ENGINEERING, INC.
600 OHIO AVENUE
LYNN HAVEN, FLORIDA 32444

429 FLORIDA AVENUE
LYNN HAVEN, FLORIDA 32444
TELEPHONE (850) 258.0994

MAGNUM ENGINEERING INC
GEOTECHNICAL ENGINEERING CONSULTANTS

October 14, 2021

Mr. Chris Forehand, P.E.
Panhandle Engineering, Inc.
600 Ohio Avenue
Lynn Haven, FL. 32444

SUBJECT: St. Andrew School -Geotechnical Services
PE No: 13095
Panama City, Florida
MEI Project No. M121-107-275

Dear Mr. Forehand:

This letter forwards the results of our Geotechnical services for the subject site in Panama City, Florida. Our exploration consisted of Six (6) 5-feet deep hand auger borings at the locations shown on the attached Figure #1. The purpose of the hand auger borings were to identify the subgrade soils present and determine groundwater levels and estimated seasonal high groundwater levels across the site. Upon completion of our field testing, the samples were brought back to the office for visual inspection, classification and analysis by our engineering staff.

Soil Conditions

The hand auger borings (HA-1 through HA-6) generally encountered slightly silty fine sands from the ground surface to the boring termination depth of 5 feet below existing grade with the exception of slightly clayey fine sands encountered from the surface to 1 ½ feet below existing grade at location HA-2.

The above subsurface descriptions are of a generalized nature, provided to highlight the major soil strata encountered. The Logs of Boring should be reviewed for specific subsurface conditions at each boring location. The stratifications shown on the Logs of Boring represent the subsurface conditions at the actual boring locations only, and variations in the subsurface conditions can and may occur between boring locations and should therefore be expected. The stratifications represent the approximate boundary between subsurface materials, and the transitions between strata may be gradual.

Please refer to the attached Logs of Borings presented as Figure #2 for a more detailed description of the soils encountered.

Groundwater Conditions

Groundwater was encountered at depths ranging from approximately 3.2 feet to greater than 5.0 feet below existing grade at the time of our exploration (October 7, 2021), which was during a period of above normal seasonal rainfall. Groundwater levels will fluctuate with rainfall and could vary several feet during typical seasonal fluctuations. Larger fluctuations are possible under severe weather conditions. We recommend that the Contractor verify the actual groundwater levels at the time of construction to determine potential impacts groundwater will have on construction procedures. Please refer to the following table for existing groundwater data at each test location.

GROUNDWATER DATA

TEST LOCATION	DEPTH TO EXISTING GROUNDWATER TABLE (ft)	DEPTH TO ESTIMATED SEASONAL HIGH GROUNDWATER TABLE (ft)
HA-1	>5.0 feet	>5.0 feet
HA-2	3.2 feet	3.2 feet
HA-3	>5.0 feet	>5.0 feet
HA-4	4.8 feet	4.8 feet
HA-5	4.0 feet	4.0 feet
HA-6	4.9 feet	4.9 feet

Warranty and Limitations of Study

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied. Magnum Engineering, Inc. is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploration and laboratory test data presented in this report.

We wish to point out that a geotechnical study is inherently limited in that the engineering recommendations are developed from information obtained from test borings that only depict subsurface conditions at the specific locations, times and depth shown on the logs. Soil conditions at other locations may differ from those encountered in the test borings, and the passage of time may cause the soils conditions to change from those described in this report.

This report is intended for use by the designers of this project. While we have no objections to it being provided for review by parties to this project, it is not a specification document and is not to be used as a part of the specifications. If desired, we can assist in the development of specifications for this project based upon our exploration.

The nature and extent of variation and change in the subsurface conditions at the site may not become evident until the course of construction. Construction monitoring by the geotechnical engineer or his representative is therefore considered necessary to verify the subsurface conditions. If significant variations or changes are in evidence, it may be necessary to reevaluate the recommendations in this report.

Furthermore, if the project characteristics are altered significantly from those discussed in this report, if the project information contained in this report is incorrect or if additional information becomes available, a review must be made by this office to determine if any modifications in the recommendations will be necessary.

We hope this letter provides sufficient information for the present. If you have any questions or comments, please feel free to call.

Sincerely,
MAGNUM ENGINEERING. INC.

JAMES T. VICKERS, P.E.
Sr. Geotechnical Engineer
Florida Registration # 56813

JAMES T. VICKERS LICENSE No. 56813 STATE OF FLORIDA PROFESSIONAL ENGINEER

James T. Vickers, P.E.

Digitally signed by James T. Vickers, P.E.
Date: 2021.10.14 12:04:42 -05'00'

Attachments: Figure #1 – Boring Location Plan
Figure #2 – Logs of Borings

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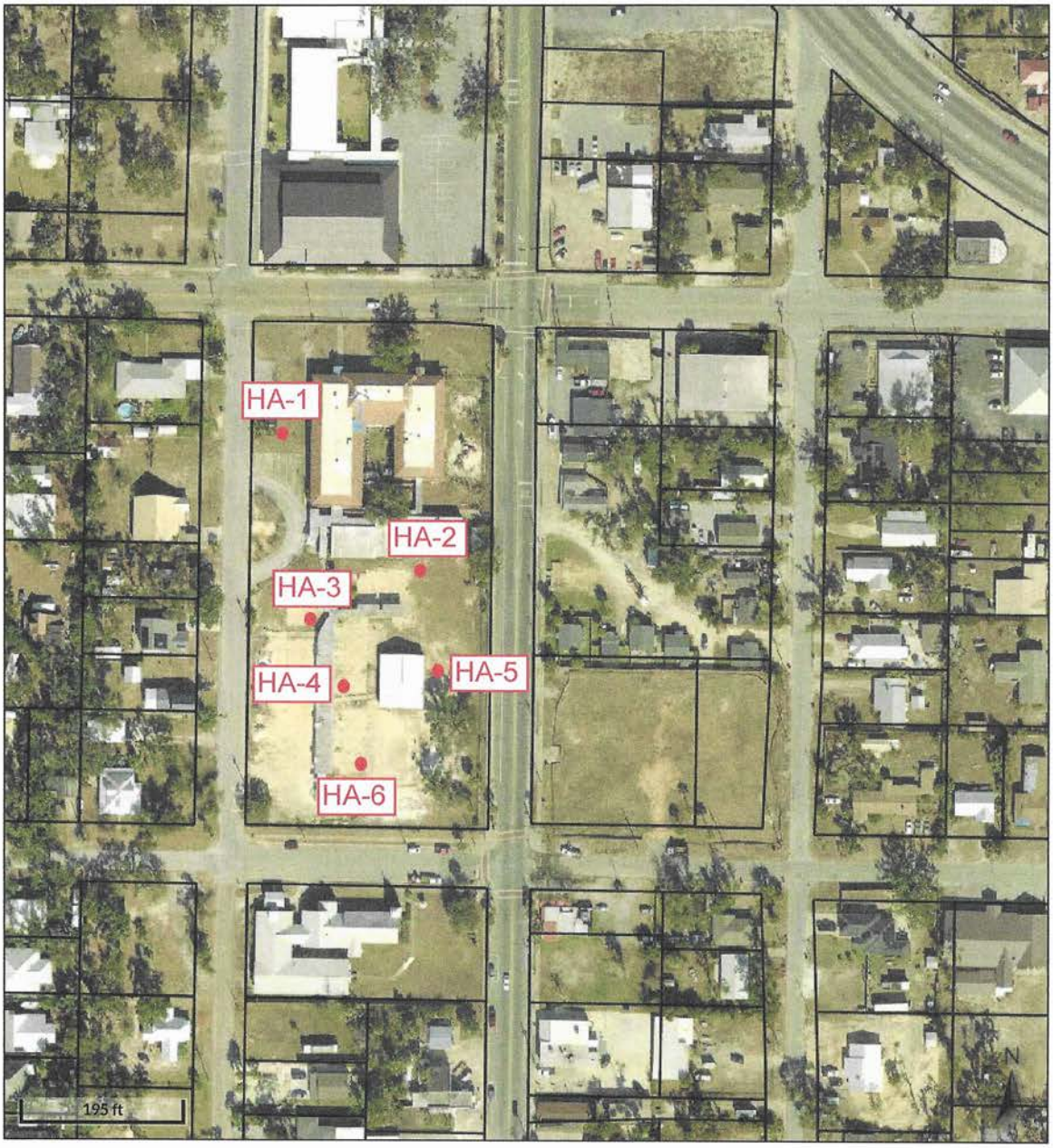
BORING LOCATION PLAN

FIGURE # 1

Bay County Property Appraiser - Dan Sowell, CFA
Main Office | 860 W. 11th St, Panama City, FL 32401 | 850-248-8401
Beach Office | 301 Richard Jackson Blvd, Panama City Beach, FL 32407 | 850-248-8470



Overview

Legend

☐ Parcels

Date created: 10/6/2021
Last Data Uploaded: 10/6/2021 7:19:05 AM

Developed by Schneider GEOSPATIAL

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LOGS OF BORINGS

FIGURE # 2

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER HA-1

CLIENT Panhandle Engineering, Inc
PROJECT NAME St. Andrew School
PROJECT NUMBER M121-107-275
PROJECT LOCATION Panama City, Florida
DATE STARTED 10/7/21 **COMPLETED** 10/7/21
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
DEPTH TO GROUNDWATER AT TIME OF DRILLING >5.0
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT >5.0
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Tan Slightly Silty Fine SAND (SP-SM)	AU									
1												
2												
3												
4												
5		Boring Termination Depth at 5.0 feet.										

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER HA-2

CLIENT Panhandle Engineering, Inc
PROJECT NAME St. Andrew School
PROJECT NUMBER M121-107-275
PROJECT LOCATION Panama City, Florida
DATE STARTED 10/7/21 **COMPLETED** 10/7/21
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 3.2 ft
LOGGED BY J. Governale **CHECKED BY** J. Vickers
▼ **ESTIMATED SEASONAL HIGH GWT** 3.2 ft
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Orange/Brown Slightly Clayey Fine SAND (SP-SC)	AU									
1												
2		Tan Slightly Silty Fine SAND (SP-SM)										
3		▼										
4												
5		Boring Termination Depth at 5.0 feet.										

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER HA-3

CLIENT Panhandle Engineering, Inc
PROJECT NAME St. Andrew School
PROJECT NUMBER M121-107-275
PROJECT LOCATION Panama City, Florida
DATE STARTED 10/7/21 **COMPLETED** 10/7/21
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
DEPTH TO GROUNDWATER AT TIME OF DRILLING >5.0
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT >5.0
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Tan Slightly Silty Fine SAND (SP-SM)	AU									
1												
2												
3												
4												
5		Boring Termination Depth at 5.0 feet.										

GEOTECH BH COLUMNS ST. ANDREW SCHOOL.GPJ GINT STD US LAB.GDT 10/14/21

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER HA-4

CLIENT Panhandle Engineering, Inc
PROJECT NAME St. Andrew School
PROJECT NUMBER M121-107-275
PROJECT LOCATION Panama City, Florida
DATE STARTED 10/7/21 **COMPLETED** 10/7/21
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 4.8 ft
LOGGED BY J. Governale **CHECKED BY** J. Vickers
▼ **ESTIMATED SEASONAL HIGH GWT** 4.8 ft
NOTES _____
AFTER DRILLING —

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Tan Slightly Silty Fine SAND (SP-SM)	AU									
1												
2												
3												
4												
5		Boring Termination Depth at 5.0 feet.										

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Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER HA-5

CLIENT Panhandle Engineering, Inc
PROJECT NAME St. Andrew School
PROJECT NUMBER M121-107-275
PROJECT LOCATION Panama City, Florida
DATE STARTED 10/7/21 **COMPLETED** 10/7/21
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 4.0 ft
LOGGED BY J. Governale **CHECKED BY** J. Vickers
▼ **ESTIMATED SEASONAL HIGH GWT** 4.0 ft
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Tan Slightly Silty Fine SAND (SP-SM)	AU									
1												
2												
3												
4		▼										
5		Boring Termination Depth at 5.0 feet.										

GEOTECH BH COLUMNS ST. ANDREW SCHOOL.GPJ GINT STD US LAB.GDT 10/14/21

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER HA-6

CLIENT Panhandle Engineering, Inc
PROJECT NAME St. Andrew School
PROJECT NUMBER M121-107-275
PROJECT LOCATION Panama City, Florida
DATE STARTED 10/7/21 **COMPLETED** 10/7/21
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 4.9 ft
LOGGED BY J. Governale **CHECKED BY** J. Vickers
▼ **ESTIMATED SEASONAL HIGH GWT** 4.9 ft
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Tan Slightly Silty Fine SAND (SP-SM)	AU									
1												
2												
3												
4												
5		▼										
		Boring Termination Depth at 5.0 feet.										

GEOTECH BH COLUMNS ST. ANDREW SCHOOL.GPJ GINT STD US LAB.GDT 10/14/21

MAGNUM ENGINEERING INC

GEOTECHNICAL ENGINEERING CONSULTANTS

GEOTECHNICAL ENGINEERING REPORT

ST. ANDREW AMPHITHEATER
PANAMA CITY, FLORIDA

PREPARED FOR:

Mr. Wiatt Lewis, P.E.
Panhandle Engineering, Inc.
600 Ohio Avenue
Lynn Haven, Florida 32444

429 FLORIDA AVENUE
LYNN HAVEN, FLORIDA 32444
TELEPHONE (850) 258.0994

MAGNUM ENGINEERING INC
GEOTECHNICAL ENGINEERING
CONSULTANTS

March 23, 2022

Mr. Wiatt Lewis, P.E.
Panhandle Engineering, Inc.
600 Ohio Avenue
Lynn Haven, Florida 32444

SUBJECT: St. Andrew Amphitheater – Geotechnical Services
Panama City, Florida
Project Number: M121-107-295

Dear Mr. Lewis:

This letter forwards the results of our Geotechnical exploration for the proposed development. Our exploration consisted of Two (2) 50-feet deep Standard Penetration (SPT) borings. The subsurface exploration was conducted to provide information needed in the design of an effective foundation system for the referenced development. The following report presents the results of our study as well as our evaluation and recommendations pertaining to the geotechnical aspects of the project. Upon completion of our field testing, the samples were brought back to the office for visual inspection, classification, and analysis by our engineering staff.

Project Information

The subject site is located west of Beck Avenue, north of West 14th Street at the existing St. Andrews Shool in Panama City, Florida. The proposed amphitheater will be located near the south property line closes to W. 14th Street. At the time of our exploration, the subject site was clear with the exception of surficial grasses and was easily accessible with our track mounted drill rig.

Structural information provided indicate maximum loads of 2.8 kips per linear feet. We understand up to 4 feet of fill will be added to achieve finished grades at the stage area.

If any of the above information is incorrect, please inform Magnum Engineering, Inc. (MEI) so that we can review and update our recommendations, as needed.

Subsurface Conditions

The soil types encountered at the specific boring locations are presented in the form of Logs of Boring, and are attached as Figure 2. The stratifications presented is based on visual examination of the recovered soil samples and the interpretation of field logs by a geotechnical engineer. Included with the profiles are the N-values for the SPT borings. The N-values have been empirically correlated with various soil properties and are considered to be indicative of the relative density of cohesionless soils and the consistency of cohesive soils. Also included with the Logs of Boring are the groundwater levels measured at the time the borings were performed.

Figure #1 show the Boring Location Plan and Figure #2 shows the Logs of Borings for Standard Penetration Test borings B-1 and B-2. The test locations were established in the field using a 100-foot tape and estimating right angles with reference to existing landmarks, thus, the test location should be considered approximate.

The Standard Penetration Test (SPT) borings were performed in accordance with ASTM D-1586. The borings were advanced using mud-rotary techniques. Split-Spoon samples were obtained using a 2-inch O.D. split spoon sampler every two feet in the top 10 feet of the borings and every 5 feet thereafter until the boring termination depth was reached. Upon completion of our field testing, the samples were brought back to the office for visual inspection, classification, and analysis by our engineering staff.

Borings

The borings (B-1 and B-2) generally encountered loose to medium dense slightly silty fine sands from the ground surface to the boring termination depth of 50 feet below existing grade.

The above subsurface descriptions are of a generalized nature, provided to highlight the major soil strata encountered. The Logs of Boring should be reviewed for specific subsurface conditions at each boring location. The stratifications shown on the Logs of Boring represent the subsurface conditions at the actual boring locations only, and variations in the subsurface conditions can and may occur between boring locations and should therefore be expected. The stratifications represent the approximate boundary between subsurface materials, and the transitions between strata may be gradual.

Please refer to the attached Logs of Boring presented as Figure #2 for a detailed description of the subsurface conditions encountered.

Groundwater Conditions

Groundwater was encountered at roughly 9.0 feet below existing grade at the time of drilling (March 1, 2022), which was during a period of normal seasonal rainfall. Groundwater levels will fluctuate with rainfall and could vary several feet during typical seasonal fluctuations. Larger fluctuations are possible under severe weather conditions.

We recommend that the Contractor verify the actual groundwater levels at the time of construction to determine potential impacts groundwater will have on construction procedures.

CONCLUSIONS AND RECOMMENDATIONS

General

The following geotechnical related design recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions encountered. If there are any changes in these project criteria, including project location on the site, a review should be made by MEI to determine if modifications to the recommendations are warranted.

Once final design plans and specifications are available, a general review by MEI is required as a means to confirm the evaluations and recommendations made in preparation of this report are correct and that the earthwork, stormwater and foundation recommendations are properly interpreted and implemented.

Site Preparation

The site should be cleared and grubbed of surface vegetation. As a minimum, it is recommended the clearing operations extend at least five feet beyond the development perimeters.

The subgrade soils should be compacted to at least 95 percent of the Modified Proctor (ASTM D-1557) maximum dry density to a depth of 12 inches below footing and floor slab bottoms.

Fill required to elevate existing grades to building subgrade level should consist of clean fine sands, as described below, placed in level lifts not exceeding 12 inches loose, with each lift compacted to a firm and unyielding condition and a minimum of 95 percent of the soils Modified Proctor value, prior to placement of successive lifts.

Engineered Fill

All fill used to raise the building area to final grades should consist of sandy soils with less than 15 percent passing the No. 200 sieve. These soils should be free of rubble, organics, clay, debris and other unsuitable material. Fill should be placed in lifts on the order of 12 inches or less (in loose thickness) and compacted to 95 percent of the soil's Modified Proctor maximum dry density, per ASTM D-1557.

Foundations

With proper subgrade preparation and compaction/densification as described herein, the site soils should be capable of supporting the proposed structure on shallow foundations. The existing near surface soils and fill soils should be prepared as previously recommended to improve foundation support and reduce total and differential settlements.

Based on the anticipated construction and site preparation requirements recommended herein, it is our opinion that the building can be supported on shallow foundations designed for a net maximum allowable bearing pressure of 2,000 pounds per square foot (psf). The following geotechnical related recommendations should be used for design and construction of the foundations.

- The foundation and floor slab should bear on properly improved existing subgrade or on properly placed and compacted cohesionless (sand) fill.
- The soils to a depth of one foot below the footings and floor slabs and all new fill should be compacted to 95 percent of the soil's Modified Proctor (ASTM D-1557) density.
- Exterior footings should be embedded so that the bottom of the foundation is a minimum of 18 inches below the adjacent compacted grades.
- Strip or wall footings should be a minimum of 18 inches wide and pad or column footings should be a minimum of three feet wide. The minimum footing sizes should be used regardless of whether or not the foundation loads and allowable bearing pressures dictate a smaller size.
- All footings should be constructed in a "dry" fashion.
- Structural elements should be centered on the footings such that the load is transferred evenly unless the footings are proportioned for eccentric loads.

Settlement

The settlement of shallow foundations supported on sandy soils should occur rapidly after loading. The majority of expected settlement should occur during construction as dead loads are imposed. Total settlements of footings are estimated to be less than 1 inch, with differential settlement on the order of 50 percent of the total settlements. Total and differential settlements of these magnitudes are usually considered tolerable for the anticipated construction; however, the tolerance of the proposed structures to the predicted total and differential settlements should be confirmed by the structural engineer.

Warranty and Limitations of Study

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied. MEI is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploration and laboratory test data presented in this report.

Soil conditions at other locations may differ from those encountered in the test borings, and the passage of time may cause the soils conditions to change from those described in this report.

This report is intended for use by the designers of this project. While we have no objections to it being provided for review by parties to this project, it is not a specification document and is not to be used as a part of the specifications. If desired, we can assist in the development of specifications for this project based upon our exploration.

The nature and extent of variation and change in the subsurface conditions at the site may not become evident until the course of construction. Construction monitoring by the geotechnical engineer or his representative is therefore considered necessary to verify the subsurface conditions at the time of construction and to verify the recommendations made in the preparation of this report are properly carried out. If significant variations or changes are in evidence, it may be necessary to reevaluate the recommendations in this report.

Furthermore, if the project characteristics are altered significantly from those discussed in this report, if the project information contained in this report is incorrect or if additional information becomes available, a review must be made by this office to determine if any modifications in the recommendations will be necessary.

We hope this letter provides sufficient information for the present. If you have any questions or comments, please feel free to call.

Sincerely,
MAGNUM ENGINEERING. INC.

JAMES T. VICKERS, P.E.
Sr. Geotechnical Engineer
Florida Registration # 56813

JAMES T. VICKERS LICENSE No. 56813 STATE OF FLORIDA PROFESSIONAL ENGINEER

James T. Vickers, P.E.

Digitally signed by James T. Vickers, P.E.
Date: 2022.03.23 14:32:43 -05'00'

Attachments: Figure #1 – Boring Location Plan
Figure #2 – Logs of Borings

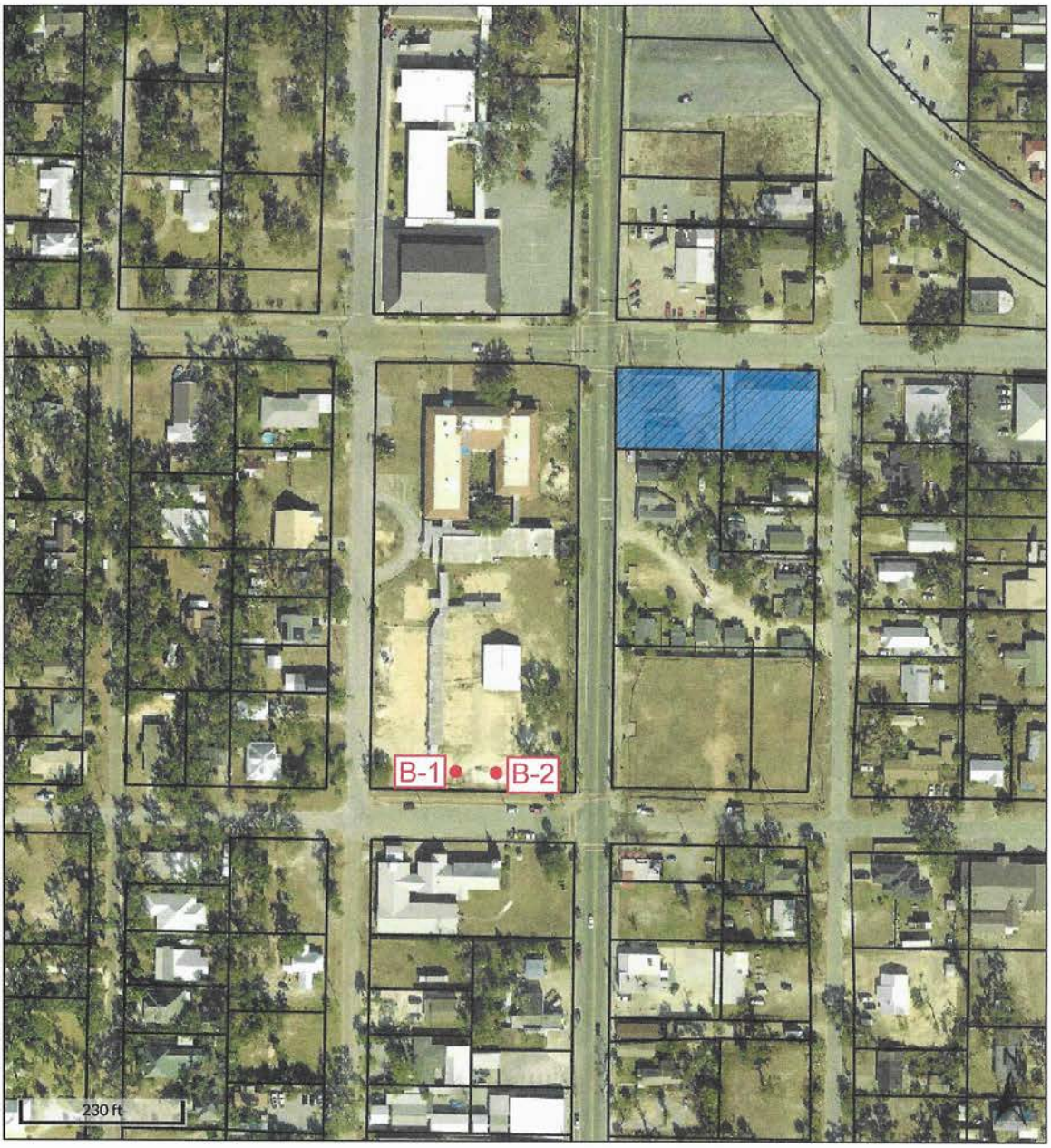
MAGNUM ENGINEERING INC

GEOTECHNICAL ENGINEERING CONSULTANTS

BORING LOCATION PLAN

FIGURE # 1

Bay County Property Appraiser - Dan Sowell, CFA
Main Office | 860 W. 11th St, Panama City, FL 32401 | 850-248-8401
Beach Office | 301 Richard Jackson Blvd, Panama City Beach, FL 32407 | 850-248-8470



Overview

Legend

- Parcels
- 2022 Improved Sal
- 2022 Vacant Sales

Date created: 3/1/2022
Last Data Uploaded: 3/1/2022 7:27:38 AM

Developed by Schneider GEOSPATIAL

MAGNUM ENGINEERING INC

GEOTECHNICAL ENGINEERING CONSULTANTS

LOGS OF BORINGS

FIGURE # 2

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER B-1

CLIENT Panhandle Engineering, Inc.
PROJECT NAME St. Andrews Cultural Center
PROJECT NUMBER M122-107-295
PROJECT LOCATION Panama City, Florida
DATE STARTED 3/1/22 **COMPLETED** 3/1/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Standard Penetration Test (SPT)
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 9.0 ft
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Tan Slightly Silty Fine SAND (SP-SM)	SS 1		1-2-3-2 (5)							
			SS 2		3-3-4-3 (7)							
			SS 3		3-3-3-3 (6)							
		Tan/Gray Slightly Silty Fine SAND (SP-SM)	SS 4		3-4-4-3 (8)							
10		▽	SS 5		3-4-6-6 (10)							
		Brown/Gray Slightly Silty Fine SAND (SP-SM)	SS 6		5-8-11 (19)							
20		Brown Slightly Silty Fine SAND (SP-SM)	SS 7		2-3-4 (7)							
		Gray/Tan Slightly Silty Fine SAND (SP-SM)	SS 8		4-5-7 (12)							
30		Gray Slightly Silty Fine SAND (SP-SM)	SS 9		2-2-3 (5)							
			SS 10		5-6-6 (12)							
40		Dark Gray Slightly Silty Fine SAND (SP-SM)	SS 11		6-6-8 (14)							
			SS 12		5-5-5 (10)							
50			SS 13		4-5-7 (12)							
		Boring Termination Depth at 50.0 feet.										

GEOTECH BH COLUMNS ST. ANDREWS AMPHITHEATER.GPJ GINT STD US LAB.GDT 3/13/22

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER B-2

CLIENT Panhandle Engineering, Inc. **PROJECT NAME** St. Andrews Cultural Center

PROJECT NUMBER M122-107-295 **PROJECT LOCATION** Panama City, Florida

DATE STARTED 3/1/22 **COMPLETED** 3/1/22 **GROUND ELEVATION** _____ **HOLE SIZE** _____

DRILLING CONTRACTOR GeoDrill Tech, LLC **GROUND WATER LEVELS:**

DRILLING METHOD Standard Penetration Test (SPT) ▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 9.0 ft

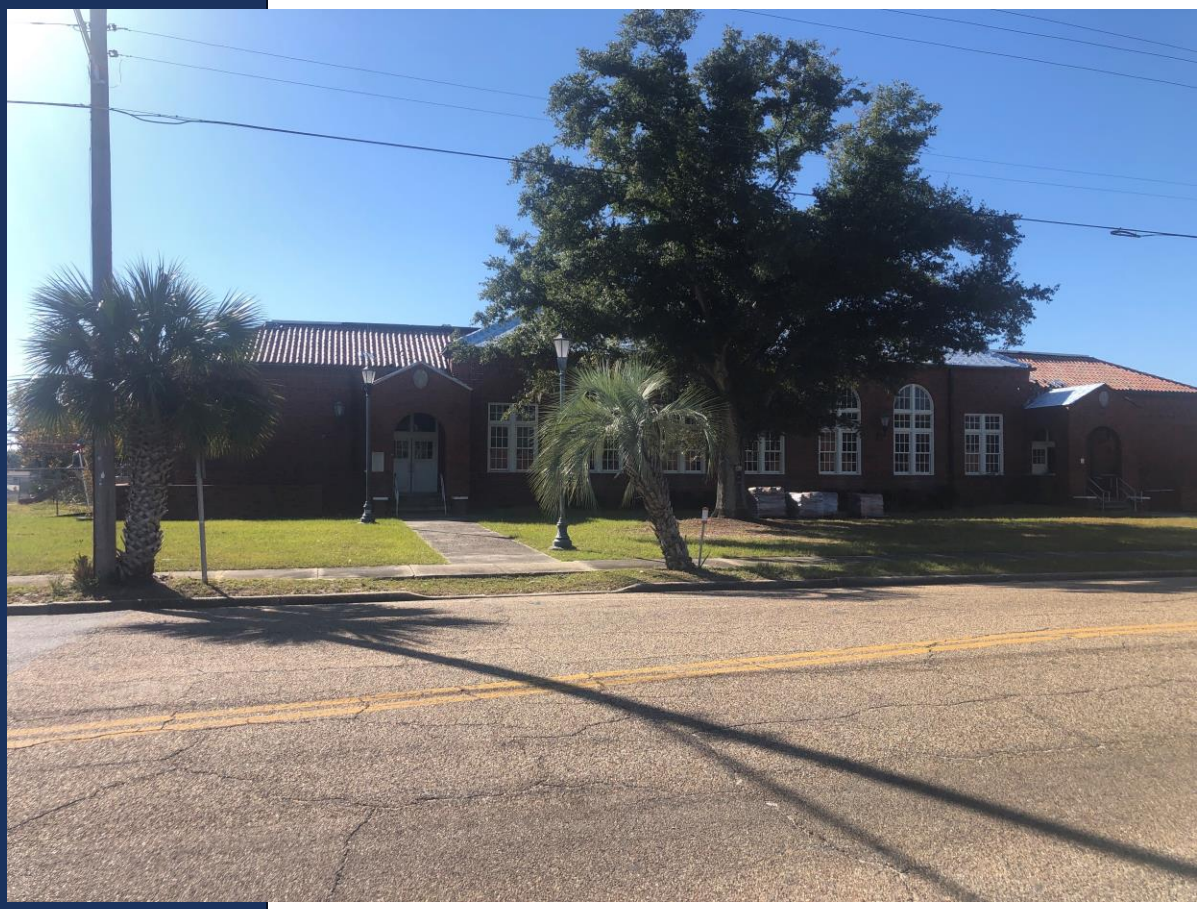
LOGGED BY J. Governale **CHECKED BY** J. Vickers **ESTIMATED SEASONAL HIGH GWT** ---

NOTES _____ **AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Tan Slightly Silty Fine SAND (SP-SM)	SS 1		1-3-5-7 (8)							
			SS 2		3-4-2-2 (6)							
			SS 3		3-4-3-4 (7)							
		Tan/Gray Slightly Silty Fine SAND (SP-SM)	SS 4		3-4-5-5 (9)							
		▽	SS 5		4-5-4-6 (9)							
10			SS 6		4-4-5 (9)							
20			SS 7		5-5-8 (13)							
		Dark Brown Slightly Silty Fine SAND with Trace of Wood (SP-SM)	SS 8		2-3-3 (6)							
30		Gray/Tan Slightly Silty Fine SAND (SP-SM)	SS 9		7-8-8 (16)							
		Brown Slightly Silty Fine SAND (SP-SM)	SS 10		5-7-8 (15)							
40		Dark Gray Slightly Silty Fine SAND (SP-SM)	SS 11		4-3-4 (7)							
		Gray/Green Slightly Silty Fine SAND (SP-SM)	SS 12		3-5-6 (11)							
50			SS 13		4-6-7 (13)							
		Boring Termination Depth at 50.0 feet.										

GEOTECH BH COLUMNS ST. ANDREWS AMPHITHEATER.GPJ GINT STD US LAB.GDT 3/13/22

PRE-RENOVATION ASBESTOS CONTAINING MATERIALS AND LEAD BASED PAINT SURVEY



St. Andrews School Revitalization
3001 15th Street
Panama City, Bay County, Florida

PREPARED FOR:
Mr. Carter Quina, AIA
Quina Grundhoefer Architects
400 West Romana Street
Pensacola, Florida 32502

NOVA Project Number: 10111-3021065

November 29, 2021

NOVA
PROFESSIONAL | PRACTICAL | PROVEN

November 29, 2021

Quina Grundhoefer Architects
400 West Romana Street
Pensacola, Florida 32502

Attention: Mr. Carter Quina AIA

Subject: Pre-Renovation Asbestos Containing Materials and Lead Based Paint Survey Report
ST. ANDREWS SCHOOL REVITALIZATION
3001 15th Street
Panama City, Bay County, Florida
NOVA Project Number 10111-3021065

Dear Mr. Quina:

NOVA Engineering and Environmental LLC (NOVA) has completed the Asbestos Containing Materials (ACMs) and Lead-Based Paint Survey for St. Andrews School Revitalization project located at 3001 15th Street in Panama City, Bay County, Florida (Subject Property). We appreciate your selection of NOVA and for the opportunity to be of service on this project. Please feel free to contact us if you have any questions or if we may be of further assistance.

Sincerely,
NOVA Engineering and Environmental LLC

Daniel T. McGimsey, BSG
Environmental Staff Professional
Accredited Asbestos Inspector
USEPA Licensed Lead Inspector

Larry G. Schmaltz, P.E., G.C.
Florida Licensed Asbestos Consultant (#AX009)
USEPA Licensed Lead Inspector
USEPA Licensed Lead Risk Assessor

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 SUMMARY

A summary of our findings is presented below. This summary is provided for convenience and should not be substituted for review of the full report, including all attachments as provided herein. This site is located at 3001 15th Street in Panama City, Bay County, Florida.

1.1 ASBESTOS

During this study, eighty-one (81) samples of building materials, including but not limited to, ceiling materials, flooring materials, drywall and caulking materials were collected by NOVA and analyzed using Polarized Light Microscopy (PLM), with **one (1)** of the analyzed homogeneous sample layers indicating asbestos containing materials (ACM).

- **HA-3: Residual black mastic under red linoleum type flooring**

Following is a table containing a summary of the samples that were collected during the survey:

St. Andrews Main School Building – Pre-Renovation ACM Survey

HSA	Sample Number	Material Type & Location	PLM Analysis	Estimated Quantity	*EPA Cat.
1	(1-7)	Gypsum board w/ joint material	ND	15,000 SF	N/A
2	(1-3)	Black and Gray floor tile w/ mastic	ND	600 SF	N/A
3	(1-7)	Red linoleum type flooring under wood vinyl flooring w/ residual black mastic	5% Chr. Residual black mastic	15,000 SF	NF-I
4	(1-3)	CMU black wall and mortar	ND	900 SF	N/A
5	(1-7)	Wood patterned vinyl floor tile	ND	15,000 SF	N/A
6	(1-3)	Ceramic bathroom tile	ND	800 SF	N/A
7	(1-3)	Red ceramic floor tile found in mechanical rooms	ND	400 SF	N/A
8	(1-3)	White floor tile	ND	400 SF	N/A
9	(1-3)	White silver ducted and wrap	ND	800 SF	N/A
10	(1-3)	Green carpet glue	ND	600 SF	N/A

Cafeteria – Pre-Renovation ACM Survey

HSA	Sample Number	Material Type & Location	PLM Analysis	Estimated Quantity	*EPA Cat.
1	(1-3)	White drop-down ceiling	ND	800 SF	N/A
2	(1-3)	Gypsum board w/ joint compound	ND	500 SF	N/A
3	(1-3)	Brown ceramic floor tile in kitchen	ND	400 SF	N/A
4	(1-3)	White and brown ceramic wall tile in kitchen	ND	300 SF	N/A
5	(1-3)	White floor tile in cooler	ND	300 SF	N/A

Building 2 – Pre-Demolition ACM Survey

HSA	Sample Number	Material Type & Location	PLM Analysis	Estimated Quantity	*EPA Cat.
1	(1-3)	Brick and Mortar	ND	900 SF	N/A
2	(1-3)	White floor tile w/ black mastic	ND	600 SF	N/A
3	(1-3)	Gypsum board w/ joint compound	ND	400 SF	N/A
4	(1-3)	White drop-down ceiling	ND	800 SF	N/A
5	(1-3)	Concrete walkway to metal canopy	ND	900 SF	N/A
6	(1-3)	Building 2 roofing core	ND	800 SF	N/A

Building 5 and Basketball Court – Pre-Demolition ACM Survey

HSA	Sample Number	Material Type & Location	PLM Analysis	Estimated Quantity	*EPA Cat.
1	(1-3)	Building 5 and basketball court slab	ND	800 SF	N/A
2	(1-3)	Building 5 brick and mortar	ND	200 SF	N/A

Note: Neither NOVA nor the client will be held responsible for anyone's use of the estimated quantity. It is suggested that anyone responsible for the project prepare their own quantity estimates.

TABLE LEGEND:

HSA: Homogenous Sampling Area

QUANTITY ESTIMATE: Estimated Quantity of HSA

PLM ANALYSIS:
Chr. = Chrysotile Asbestos
Ams. = Amosite Asbestos
ND = No Asbestos Detected

EPA CATEGORY:
F = Friable
NF-I = Category I Non-Friable
NF-II = Category II Non-Friable
N/A = Not Applicable

Polarized Light Microscopy (PLM) is commonly used for bulk asbestos identification, but it can identify non-asbestos fibers as asbestos. In an effort to eliminate false positives (and costly unnecessary abatement), samples reported as containing between 1% and 10% asbestos can be analyzed/verified by point count. The alternative is to assume the subject material to be asbestos containing. The Occupational Safety and Health Administration (OSHA) Asbestos Standard for Construction Industry 29 CFR 1926.1101 regulates workplace exposure to asbestos. OSHA does not define Asbestos Containing Material on asbestos content. The OSHA standard requires that employee exposure to airborne asbestos fibers be maintained below 0.1 asbestos fibers per cubic centimeter of air (0.1 f/cc). The OSHA standard classifies construction and maintenance activities, which could disturb ACM, and specifies work practices and precautions which employers must follow when engaging in each class of regulated work. In addition to worker protection, the means and methods necessary for ACM abatement are the sole responsibility of the abatement contractor.

A complete list of suspected ACM samples obtained is also shown in the laboratory report (included in **Appendix B**).

1.2 LEAD-BASED PAINT

During this study, three hundred and thirty-three (333) samples of building materials, including but not limited to walls, door frames and trim were evaluated by NOVA using a portable X-Ray Fluorescence (XRF) Analyzer, with **four (4)** of the surfaces identifying positive as containing lead-based paint at or in excess of the Federal Standard (1.0 mg/cm^2). The positive samples are identified in the table below (**Table 1.1**). All readings are provided in **Appendix B**.

Sample Number	Material Type & Location*	XRF Reading (mg/cm^2)	Comment	Classification
21	Cafeteria Kitchen Ceramic tile – western wall	2.97	Intact	Positive**
43	Cafeteria Kitchen Ceramic tile – northern wall	3.01	Intact	Positive**
44	Cafeteria Kitchen Ceramic tile – eastern wall	2.95	Intact	Positive**
45	Cafeteria Kitchen Ceramic tile – southern wall	2.96	Intact	Positive**

** Ceramic tiles and porcelain bathtubs are not classified as lead-based paint according to HUD reporting guidelines. These items are not considered lead-based paint; their presence does not need to be included in disclosure under the Lead Disclosure Rule (HUD). However, surface abrading and demolition activities such as breaking and crushing may release lead. The OSHA construction (lead) standard (29 CFR 1926.62) applies to all construction work where an employee may be occupationally exposed to lead.
* All similar materials throughout the Subject Property with matching paint schemes are designated Homogenous Areas.
** Lead exposure is regulated by OSHA (29 CFR 1910.1025, Toxic and Hazardous Substances, Lead) and OSHA (29 CFR 1926.62, Occupational Health and Environmental Controls, Lead).

2.0 INTRODUCTION

2.1 DESCRIPTION OF SUBJECT PROPERTY

The Subject Property comprises of an unoccupied school building, cafeteria building, a library building connected to the cafeteria building, a metal canopy and walkway, a pavilion building and basketball court located at 3001 15th Street, Panama City, Bay County, Florida. The main school building is a one-story masonry structure with an area of approximately 17,350 SF, built in 1926. The cafeteria structure is located just southeast of the main school building. Both these structures were pre renovation ACM Surveys. Building 2 is located just south of the main school building. This structure has a built-up roof. The metal canopy was reportedly built in 2000. The pavilion and basketball court are located on the south side of the Subject Property. These four (4) structures are to be demolished.

2.2 PURPOSE

As requested by Mr. Carter Quina of Quina Grundhoefer Architects (CLIENT), the Asbestos Containing Materials (ACMs) Survey and Lead Based Paint (LBP) Inspection was performed in an effort to identify ACMs and LBP at the Subject Property. This work has been performed in general accordance with NOVA Proposal Number 011-30216172 dated September 24, 2021, applicable state and federal regulations, and routine industry practice.

ACM sampling was performed in general accordance with the Asbestos Hazard Emergency Response Act (AHERA) guidelines and ASTM E2356-18,"*Standard Practice for Comprehensive Building Asbestos Survey*" as a Baseline Survey.

LBP testing was performed in general accordance with methodology detailed in the 2012 Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards, Chapter 7, Lead-Based Paint Inspection, as amended in July of 2012.

2.3 LIMITATIONS

NOVA has performed the Pre-Renovation Asbestos Containing Materials Survey and Lead Based Paint Inspection, which is a limited inquiry into a property's environmental status, with respect to asbestos containing materials and lead based paint containing materials, and is not sufficient to discover every potential source of ACMs and LBPs at the property to be evaluated. No survey can wholly eliminate uncertainty regarding the potential ACMs and LBPs in connection with a property. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for ACMs and LBPs in connection with a property. The level of inquiry is variable. Not every property will warrant the same level of assessment for ACMs and LBPs. Consistent with good commercial or customary practices, the appropriate level of assessment is guided by the type of property subject to assessment, the intended use of the property, the expertise and risk tolerance of the CLIENT, and the information developed over the course of the assessment.

NOVA's findings, opinions, conclusions and recommendations are based on information obtained through visual assessment of surficial conditions in readily accessible areas. It is possible that additional ACMs and LBPs exist or may subsequently become known that may impact or change the assessment after NOVA's services are complete.

NOVA's assessment represents our professional opinion, only. Therefore, NOVA cannot, under any circumstances, make a statement of warranty or guarantee,

expressed or implied, that ACMs and LBPs are limited to those that are discovered while we were performing the survey.

2.4 USER RELIANCE

NOVA's Pre-Renovation Asbestos Containing Materials Survey and Lead Based Paint Inspection, along with the findings and conclusions contained in the report, either in completed form, summary form, or by extraction, is prepared, and intended, for the sole use of **Quina Grundhoefer Architects** (CLIENT) and therefore may not contain sufficient information for other purposes or parties. The CLIENT is the only intended beneficiary of this report. The contents of NOVA's report will continue to be the property of NOVA. NOVA's report may not be disclosed to, used by, or relied upon by, any person or entity other than the CLIENT without the express written consent of NOVA.

Authorization for disclosure to a third party or authorization for third-party reliance on a final report of any report will be considered by NOVA upon the written request of the CLIENT. NOVA reserves the right to deny authorization to allow disclosure or reliance of NOVA's report to third parties.

3.0 ASBESTOS CONTAINING MATERIALS and LEAD BASED PAINT

3.1 FIELD AND LABORATORY SERVICES

Mr. Daniel McGimsey, a NOVA professional and federal and state certified asbestos inspector/ United States Environmental Protection Agency (USEPA) certified Lead-Based Paint Inspector, performed the field work for the Pre-Renovation Asbestos Containing Materials and Lead-Based Paint Survey for the Subject Property on November 17, 2021.

3.1.1 ASBESTOS CONTAINING MATERIALS SAMPLING

The building areas were visually assessed by NOVA to identify suspect ACMs, which were then grouped into three categories according to their intended use:

- Surfacing Materials such as sprayed-on or troweled fireproofing, acoustical and decorative insulation, textured "popcorn" finishes, paint, stucco, etc.

- Thermal System Insulation (TSI), such as pipe, boiler and storage tank insulation, and insulation on ducts, pumps, heat exchangers, and other equipment.

- Miscellaneous Materials, such as floor and ceiling tiles, wallboard, asbestos-cement board, siding and other building materials that did not fall into one of the previously mentioned categories.

Where applicable, materials with similar texture, color and general appearance were considered homogeneous for sampling purposes, including visually similar materials on different floors. NOVA's assessment also included touching representative samples to determine friability, a mechanical classification defined as whether a material can be crumbled, pulverized, or reduced to powder by hand pressure.

Bulk samples were subsequently obtained in general accordance with the AHERA (40 CFR 763.86, Sampling) and ASTM E2356-18 procedures. The samples were placed in appropriate containers, and the containers sealed and labeled with a unique identification number. The samples were subsequently transported (following routine industry practices and chain-of-custody procedures) to Arrowhead Technologies, LLC for analysis.

The ACM samples were analyzed for asbestos using Polarized Light Microscopy (PLM) methods in accordance with EPA Method 600/R-93/116. Copies of the complete asbestos laboratory report and chain-of custody are included in Appendix B.

Using the results of the laboratory analysis and NOVA's visual assessment, the asbestos containing building materials can be further categorized into three groups:

- **Friable ACM** – Any material containing more than one percent (1%) asbestos as determined using the method specified in Appendix C, Subpart F, 40 CFR part 763 Section 1, Polarized Light Microscopy, that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

- **Category I Nonfriable ACM** - Asbestos-containing packing, gaskets, resilient floor covering, and asphalt roofing products containing more than one percent (1%) asbestos as determined using the method specified in Appendix C, Subpart F, 40 CFR part 763, Section 1, Polarized Light Microscopy.

- **Category II Nonfriable ACM** - Any material, excluding Category I Nonfriable ACM, containing more than one percent (1%) asbestos as determined using the methods specified in Appendix C, Subpart F, 40 CFR part 763, Section 1, Polarized Light Microscopy that, when dry, *cannot* be crumbled, pulverized, or reduced to powder by hand pressure.

A complete list of suspected ACM samples obtained is shown in the laboratory report (included in **Appendix B**).

3.1.2 LEAD-BASED PAINT TESTING METHODOLOGY

Lead, in paint and coatings, was measured using a portable X-Ray Fluorescence (XRF) Analyzer. During the testing process, all surfaces of the same painting scheme are to be considered homogenous areas. Homogenous areas of the same painting scheme are assumed to contain the same amount of lead in the paint. XRF Sampling measures the lead content of the paint in place. Testing is non-destructive, and is read directly by the XRF, which measures the total amount of lead in the paint and reports the measured value as milligrams of lead per square centimeter of surface area (mg/cm^2). Measurements of 1.0 mg/cm^2 or more of lead are considered to be a positive result indicating the presence of LBP. XRF calibration check readings were collected and evaluated before and after conducting the survey.

This lead inspection methodology is based on *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* (Department of Housing and Urban Development [HUD], second edition, July 2012).

A complete list of LBP samples taken is shown in the field report (included in **Appendix B**).

3.2 ASBESTOS

During this study, eighty-one (81) samples of building materials, including but not limited to, ceiling materials, flooring materials, drywall, gaskets, insulation, chalkboard, and mastic materials were collected by NOVA and analyzed using Polarized Light Microscopy (PLM), with **one (1)** of the analyzed homogeneous sample layers indicating asbestos containing materials (ACM). The residual black mastic located underneath the wood patterned vinyl and linoleum type flooring is considered a category I non friable ACM. This material is unlikely to become friable during renovation.

3.3 ASBESTOS ABATEMENT

If the residual mastic is to be removed it is recommended to utilize the Resilient Floor Coverings Guide to Removing Resilient Floor Coverings. This procedure requires only a general contractors license to remove this material. Another option is to encapsulate the material with another floor covering.

The metal canopy structure did not appear to contain any suspect asbestos containing materials.

Any ACMs identified during the renovation or demolition process must be handled in accordance with the applicable OSHA and FDEP requirements. Prior to demolition and renovation activities a written ten (10) working day notification must be submitted to the Florida Department of Environmental Protection, Northwest District. Notifications that do not meet the ten (10) day requirement or are incomplete are considered "improper" and may result in enforcement proceedings. Please be advised that a copy of this report must be onsite during the renovation or demolition of the building, in the event of a regulatory inspection.

3.4 Lead-Based Paint

During this study, **three hundred and thirty-three (331)** samples of building materials, including but not limited to walls, door frames and trim were evaluated by NOVA using a portable X-Ray Fluorescence (XRF) Analyzer, with **four (4)** of the surfaces identifying positive as containing lead-based paint at or in excess of the Federal Standard (1.0 mg/cm^2) as seen in **Table 1.1.**

Only the ceramic tile on all walls within the cafeteria yielded readings exceeded the regulatory standard of 1.0 mg/cm^2.

3.5 Lead Based Paint Abatement

Lead exposure is regulated by OSHA (29 CFR 1910.1025, Toxic and Hazardous Substances, Lead) and OSHA (29 CFR 1926.62, Occupational Health and Environmental Controls, Lead).

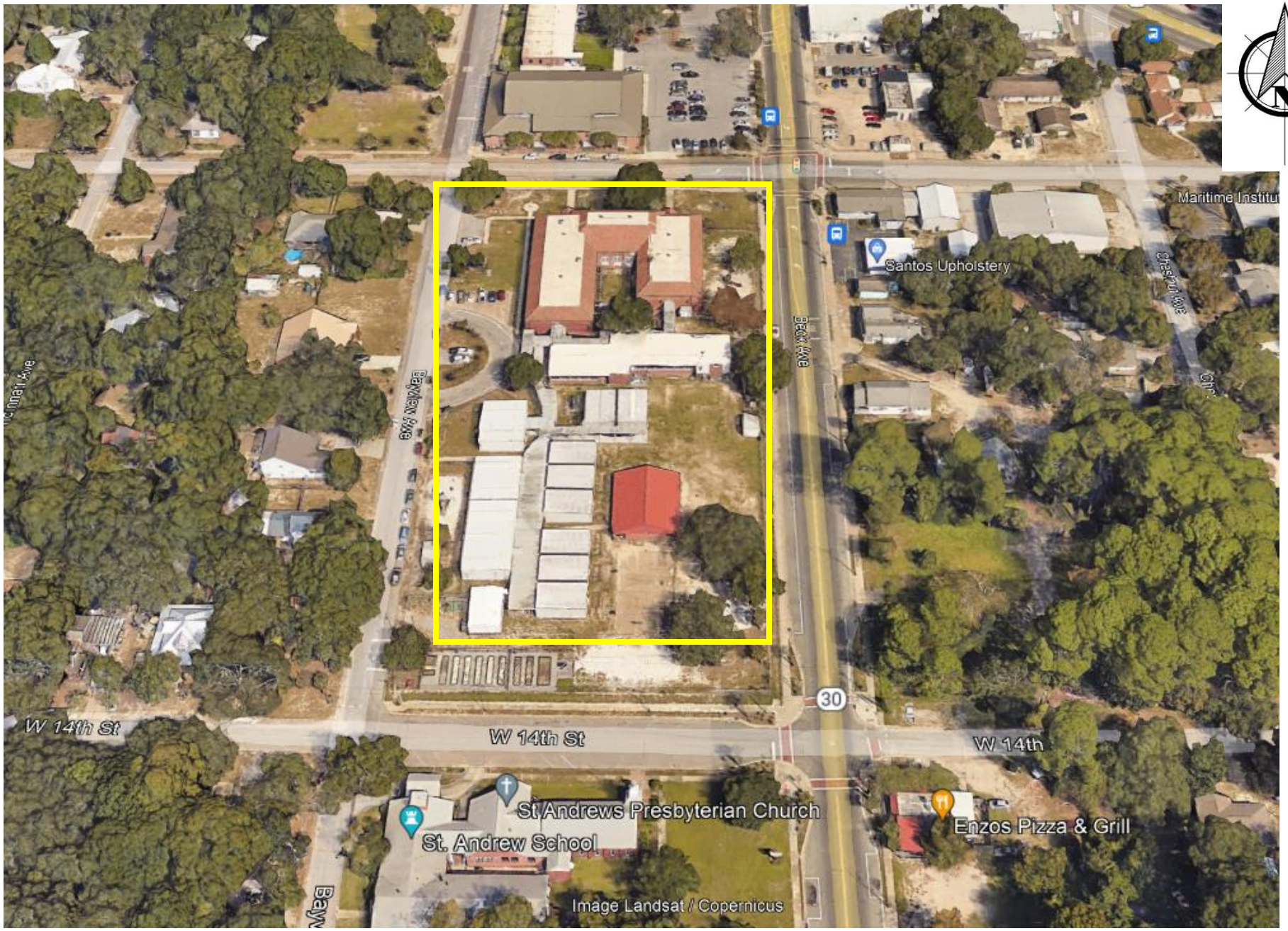
Lead, in paint, dust, and soil, is regulated by the USEPA (40 CFR 745, Identification of Dangerous Levels of Lead) and HUD (29 CFR Part 35, Subpart B-M, Lead Safe Housing Rule). There are no state or local regulations in Florida for LBP management.

The results of this inspection indicate that there is lead in amounts greater than or equal to 1.0 mg/cm^2 in ceramic tile walls found in the cafeteria building, using the inspection protocol in Chapter 7 of the 'Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing' (second edition, July 2012). Ceramic tiles and porcelain bathtubs are not classified as lead-based paint according to HUD reporting guidelines. These items are not considered lead-based paint; their presence does not need to be included in disclosure under the Lead Disclosure Rule (HUD). However, surface abrading and demolition activities such as breaking and crushing may release lead. The OSHA construction (lead) standard (29 CFR 1926.62) applies to all construction work where an employee may be occupationally exposed to lead.

(See section IV of chapter 7 of the HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* for further details; see www.hud.gov/lead.)

(2012 HUD Guidelines, Second Edition, July)

APPENDIX A
Location Map



Scale: Not To Scale	
Date Drawn: November 29, 2021	
Drawn By: D. McGimsey	
Checked By: L. Schmaltz	

NOVA

17612 Ashley Drive
Panama City Beach, FL 32413
850-249-6682

LOCATION MAP

St. Andrews School ACM & LBP Survey

Panama City, Bay County, Florida

NOVA Project Number 10111-3021065

APPENDIX B

Laboratory Data and Lead-Based Paint Inspection Data

ARROWHEAD TECHNOLOGIES, LLC
3151 San Bernadino St.
Clearwater, Florida 33759
813-679-0720 / mhall005@tampabay.rr.com

PLM REPORT SUMMARY

NVLAP Lab Code 200703-0

Client :	Nova	Lab Set No. :	009671
Project :	Bldg 2	AT Job No. :	21-9671
Client Project No.:	10111-3021065	Report Date :	11/23/2021
Identification :	Asbestos, Bulk Sample Analysis	Sample Date :	11/17/2021
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600/R-93/116 / EPA Method 600/M4-82-020		

On 11/19/2021, twenty-four (24) bulk material samples were submitted by Daniel McGimsey for asbestos analysis by PLM/DS.
Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009671-001	Brick & Mortar HA1-1	None Detected-Red Brick None Detected-Gray Mortar
009671-002	Brick & Mortar HA1-2	None Detected-Red Brick None Detected-Gray Mortar
009671-003	Brick & Mortar HA1-3	None Detected-Red Brick None Detected-Gray Mortar
009671-004	White Floor Tile w/ Black Mastic HA2-1	None Detected-White Floor Tile None Detected-Yellow Adhesive None Detected-Gray Leveling Comp.
009671-005	White Floor Tile w/ Black Mastic HA2-2	None Detected-White Floor Tile None Detected-Yellow Adhesive None Detected-Gray Leveling Comp.
009671-006	White Floor Tile w/ Black Mastic HA2-3	None Detected-White Floor Tile None Detected-Yellow Adhesive None Detected-Gray Leveling Comp.
009671-007	Gypsum Board w/ Joint Compound HA3-1	None Detected-Joint Compound w/ Paint None Detected-Tan DW Paper Backing None Detected-White Drywall Material

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
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Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009671-008	Gypsum Board w/ Joint Compound HA3-2	None Detected-Joint Compound w/ Paint None Detected-Tan DW Paper Backing None Detected-White Drywall Material
009671-009	Gypsum Board w/ Joint Compound HA3-3	None Detected-Joint Compound w/ Paint None Detected-Tan DW Paper Backing None Detected-White Drywall Material
009671-010	Drop Down Ceiling HA4-1	None Detected-White Ceiling Tile
009671-011	Drop Down Ceiling HA4-2	None Detected-White Ceiling Tile
009671-012	Drop Down Ceiling HA4-3	None Detected-White Ceiling Tile
009671-013	Concrete Walkway HA5-1	None Detected-Concrete
009671-014	Concrete Walkway HA5-2	None Detected-Concrete
009671-015	Concrete Walkway HA5-3	None Detected-Concrete
009671-016	Bldg 5 Slab & BB Court HA6-1	None Detected-Concrete
009671-017	Bldg 5 Slab & BB Court HA6-2	None Detected-Concrete

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
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On 11/19/2021, twenty-four (24) bulk material samples were submitted by Daniel McGimsey for asbestos analysis by PLM/DS.
Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009671-018	Bldg 5 Slab & BB Court HA6-3	None Detected-Concrete
009671-019	Bldg 5 Brick HA7-1	None Detected-Red Brick None Detected-Gray Mortar
009671-020	Bldg 5 Brick HA7-2	None Detected-Red Brick None Detected-Gray Mortar
009671-021	Bldg 5 Brick HA7-3	None Detected-Red Brick None Detected-Gray Mortar
009671-022	Bldg 2 Roofing Material HA8-1	None Detected-Black Roof Membrane None Detected-Black Tar None Detected-Black Roofing Felt None Detected-Brown Insulation
009671-023	Bldg 2 Roofing Material HA8-2	None Detected-White Roof Coating None Detected-White Wrap None Detected-Yellow Adhesive None Detected-Brown Insulation

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
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Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600/R-93/116 / EPA Method 600/M4-82-020		

On 11/19/2021, twenty-four (24) bulk material samples were submitted by Daniel McGimsey for asbestos analysis by PLM/DS.
Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009671-024	Bldg 2 Roofing Material HA8-3	None Detected-Black Roof Membrane None Detected-Black Tar None Detected-Black Roofing Felt None Detected-Brown Insulation

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
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Client Project No.:	10111-3021065	Report Date :	11/23/2021
Identification :	Asbestos, Bulk Sample Analysis	Sample Date :	11/17/2021
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600/R-93/116 / EPA Method 600/M4-82-020		

SCOPE OF THIS REPORT

These samples were obtained as a part of a building survey; this report is only intended to be used as a part of the survey report issued by the surveyor. This report explains the laboratory analysis and results. The surveyor's report explains the sampling protocol used, when the samples were obtained, the location(s) of the samples, where the materials were observed in the building, quantities of materials observed, condition of the materials and the extent of his/her survey. Sample locations and material descriptions are given by the surveyor on the chain of custody but included here (possibly abbreviated) only as a convenience for the reader.

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STATEMENT OF LABORATORY ACCREDITATION

The samples were analyzed in general accordance with the procedures outlined in the Method for the Determination of Asbestos in Bulk Building Materials, EPA/600/R-93/116, and the Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA 600/M4-82-020. The results of each bulk sample relate only to the material tested and the results shall not be used to claim product endorsement by NVLAP or any agency of the U.S. Government.

Floor tile and other resinously bound materials, when analyzed by the EPA method, may yield false negative results because of limitations in separating closely bound fibers and in detecting fibers of small length and diameter. When a definitive result is required, Arrowhead recommends utilizing alternative methods of identification, including Transmission Electron Microscopy.

Specific questions concerning bulk sample results shall be directed to the Laboratory Director.

Analyst : Monte Hall, P.G.

Laboratory Director : Monte Hall, P.G.
Florida Registration No. 1658

Approved Signatory :

9671

Asbestos Chain of Custody Record

Company NOVA Engineering and Environmental
Address 17612 Ashely Drive
City / State / Zip Panama City Beach / Florida / 32413
Phone 850-381-9565 FAX 850-249-6683 Email dmcgimsey@usanova.com

Normal 3 Day [X] Next Day [ ] Same Day [ ] Immediate [ ]
Stop First Positive: Yes [X] No [ ] *(Receive Cut Off Time: 2pm)*

Client / Owner:
Project and/or Job Number: 10111-302065
Project Address: Bldg. 2, Pavilion, BB-court

Date: 11-17-21 Contact:
Phone: FAX:
Email: dmcgimsey@usanova.com & LABREPORTSENV@USANOVA.COM

HSA	Sample No.	Material Description (include size/color)	Sample Location	Homogeneous Area Locations	Quantity Sq. Ft.	Cond.	Pot. Disturb.	Friable Yes/No
1	3	Brick & Mortar	F, B, R		900			
2	3	white floor tile w/ Black mastic			600			
3	3	Gypsum Board w/ joint compound			400			
4	3	Drop down ceiling			800			
5	3	Concrete walkway for Metal Awning			900			
6	3	Bldg. 5 slab & BB Court			800			
7	3	Bldg. 5 Brick			200			
8	3	Bldg. 2 roofing material			800			

G=Good, D=Damaged, SD=Significantly Damaged

Sampled By: Daniel McGimsey Date:
Transported By: UPS Date:
Special Instructions:

Received By / Date:
Ryan Sleeper 11/19/2021

ARROWHEAD TECHNOLOGIES, LLC
3151 San Bernadino St.
Clearwater, Florida 33759
813-679-0720 / mhall005@tampabay.rr.com

PLM REPORT SUMMARY

NVLAP Lab Code 200703-0

Client :	Nova	Lab Set No. :	009672
Project :	Cafeteria	AT Job No. :	21-9672
Client Project No.:	10111-3021065	Report Date :	11/23/2021
Identification :	Asbestos, Bulk Sample Analysis	Sample Date :	11/17/2021
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600/R-93/116 / EPA Method 600/M4-82-020		

On 11/19/2021, fifteen (15) bulk material samples were submitted by Daniel McGimsey for asbestos analysis by PLM/DS.
Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009672-001	Drop Down Ceiling HA1-1	None Detected-White Ceiling Tile
009672-002	Drop Down Ceiling HA1-2	None Detected-White Ceiling Tile
009672-003	Drop Down Ceiling HA1-3	None Detected-White Ceiling Tile
009672-004	Gypsum Board w/ Joint Compound HA2-1	None Detected-White Joint Compound None Detected-White Paper Tape None Detected-White Drywall Material
009672-005	Gypsum Board w/ Joint Compound HA2-2	None Detected-White Joint Compound None Detected-White Paper Tape None Detected-White Drywall Material
009672-006	Gypsum Board w/ Joint Compound HA2-3	None Detected-White Joint Compound None Detected-White Paper Tape None Detected-White Drywall Material
009672-007	Brown Ceramic Floor Tile HA3-1	None Detected-Brown Ceramic Tile None Detected-Gray Ceramic Tile Grout
009672-008	Brown Ceramic Floor Tile HA3-2	None Detected-Brown Ceramic Tile None Detected-Gray Ceramic Tile Grout

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
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PLM REPORT SUMMARY

NVLAP Lab Code 200703-0

Client :	Nova	Lab Set No. :	009672
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Client Project No.:	10111-3021065	Report Date :	11/23/2021
Identification :	Asbestos, Bulk Sample Analysis	Sample Date :	11/17/2021
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Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009672-009	Brown Ceramic Floor Tile HA3-3	None Detected-Brown Ceramic Tile None Detected-Gray Ceramic Tile Grout
009672-010	White & Brown Ceramic Wall Tile HA4-1	None Detected-White/Tan Ceramic Tile
009672-011	White & Brown Ceramic Wall Tile HA4-2	None Detected-White/Tan Ceramic Tile
009672-012	White & Brown Ceramic Wall Tile HA4-3	None Detected-White/Tan Ceramic Tile
009672-013	White Floor Tile HA5-1	None Detected-White Floor Tile
009672-014	White Floor Tile HA5-2	None Detected-White Floor Tile
009672-015	White Floor Tile HA5-3	None Detected-White Floor Tile

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
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SCOPE OF THIS REPORT

These samples were obtained as a part of a building survey; this report is only intended to be used as a part of the survey report issued by the surveyor. This report explains the laboratory analysis and results. The surveyor's report explains the sampling protocol used, when the samples were obtained, the location(s) of the samples, where the materials were observed in the building, quantities of materials observed, condition of the materials and the extent of his/her survey. Sample locations and material descriptions are given by the surveyor on the chain of custody but included here (possibly abbreviated) only as a convenience for the reader.

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STATEMENT OF LABORATORY ACCREDITATION

The samples were analyzed in general accordance with the procedures outlined in the Method for the Determination of Asbestos in Bulk Building Materials, EPA/600/R-93/116, and the Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA 600/M4-82-020. The results of each bulk sample relate only to the material tested and the results shall not be used to claim product endorsement by NVLAP or any agency of the U.S. Government.

Floor tile and other resinously bound materials, when analyzed by the EPA method, may yield false negative results because of limitations in separating closely bound fibers and in detecting fibers of small length and diameter. When a definitive result is required, Arrowhead recommends utilizing alternative methods of identification, including Transmission Electron Microscopy.

Specific questions concerning bulk sample results shall be directed to the Laboratory Director.

Analyst : Monte Hall, P.G.

Laboratory Director : Monte Hall, P.G.
Florida Registration No. 1658

Approved Signatory :

9672

Asbestos Chain of Custody Record

Company NOVA Engineering and Environmental
Address 17612 Ashely Drive
City / State / Zip Panama City Beach / Florida / 32413
Phone 850-381-9565 FAX 850-249-6683 Email dmcgimsey@usanova.com

Normal 3 Day [X] Next Day [ ] Same Day [ ] Immediate [ ]
Stop First Positive: Yes [X] No [ ] *(Receive Cut Off Time: 2pm)*

Client / Owner:
Project and/or Job Number: 10111-3021065
Project Address: Cafeteria

Date: 11-17-21 Contact:
Phone: FAX:
Email: dmcgimsey@usanova.com & LABREPORTSENV@USANOVA.COM

HSA	Sample No.	Material Description (include size/color)	Sample Location	Homogeneous Area Locations	Quantity Sq. Ft.	Cond.	Pot. Disturb.	Friable Yes/No
1	3	Drop Down ceiling	F B M		800			
2	3	Gypsum board w/ joint compound			500			
3	3	Brown ceramic floortile in Kitchen			400			
4	3	white & Brown Ceramic wall tile in Kitchen			300			
5	3	White floortile in Cooling area			300			

G=Good, D=Damaged, SD=Significantly Damaged

Sampled By: Daniel McGimsey Date:
Transported By: UPS Date:
Special Instructions:

Received By / Date:
Ryan Schepers 11/19/2021

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3151 San Bernadino St.
Clearwater, Florida 33759
813-679-0720 / mhall005@tampabay.rr.com

PLM REPORT SUMMARY

NVLAP Lab Code 200703-0

Client :	Nova	Lab Set No. :	009673
Project :	St Andrews School Revitalizing - Main Structure	AT Job No. :	21-9673
Client Project No.:	10111-3021065	Report Date :	11/23/2021
Identification :	Asbestos, Bulk Sample Analysis	Sample Date :	11/17/2021
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600/R-93/116 / EPA Method 600/M4-82-020		

On 11/19/2021, forty-two (42) bulk material samples were submitted by Daniel McGimsey for asbestos analysis by PLM/DS.
Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009673-001	Gypsum Board w/ Joint Material HA1-1	None Detected-White Joint Compound None Detected-White Paper Tape None Detected-White Drywall Material
009673-002	Gypsum Board w/ Joint Material HA1-2	None Detected-White Joint Compound None Detected-White Paper Tape None Detected-White Drywall Material
009673-003	Gypsum Board w/ Joint Material HA1-3	None Detected-White Joint Compound None Detected-White Paper Tape None Detected-White Drywall Material
009673-004	Gypsum Board w/ Joint Material HA1-4	None Detected-White Joint Compound None Detected-White Paper Tape None Detected-White Drywall Material
009673-005	Gypsum Board w/ Joint Material HA1-5	None Detected-White Joint Compound None Detected-White Paper Tape None Detected-White Drywall Material
009673-006	Gypsum Board w/ Joint Material HA1-6	None Detected-White Joint Compound None Detected-White Paper Tape None Detected-White Drywall Material

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
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Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009673-007	Gypsum Board w/ Joint Material HA1-7	None Detected-White Joint Compound None Detected-White Paper Tape None Detected-White Drywall Material
009673-008	Black & Gray Floor Tile HA2-1	None Detected-Gray Floor Tile None Detected-Tan Mastic
009673-009	Black & Gray Floor Tile HA2-2	None Detected-Gray Floor Tile None Detected-Tan Mastic
009673-010	Black & Gray Floor Tile HA2-3	None Detected-Gray Floor Tile None Detected-Tan Mastic
009673-011	Red Lin-T-Flooring HA3-1	None Detected-Red Vinyl Flooring None Detected-Black Backing 5% Chrysotile-Residual Black Mastic
009673-012	Red Lin-T-Flooring HA3-2	None Detected-Red Vinyl Flooring None Detected-Black Backing 5% Chrysotile-Residual Black Mastic
009673-013	Red Lin-T-Flooring HA3-3	None Detected-Red Vinyl Flooring None Detected-Black Backing 5% Chrysotile-Residual Black Mastic

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
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Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009673-014	Red Lin-T-Flooring HA3-4	None Detected-Red Vinyl Flooring None Detected-Black Backing 5% Chrysotile-Residual Black Mastic
009673-015	Red Lin-T-Flooring HA3-5	None Detected-Red Vinyl Flooring None Detected-Black Backing 5% Chrysotile-Residual Black Mastic
009673-016	Red Lin-T-Flooring HA3-6	None Detected-Gray Vinyl Flooring None Detected-Brown Backing None Detected-Tan Mastic
009673-017	Red Lin-T-Flooring HA3-7	None Detected-Gray Vinyl Flooring None Detected-Brown Backing None Detected-Tan Mastic
009673-018	Brick Wall HA4-1	None Detected-Gray Plaster
009673-019	Brick Wall HA4-2	None Detected-Gray Plaster
009673-020	Brick Wall HA4-3	None Detected-Gray Plaster
009673-021	Wood Like Vinyl Tile HA5-1	None Detected-Brown Vinyl Flooring

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
The results may not be reproduced except in full.

ARROWHEAD TECHNOLOGIES, LLC
3151 San Bernadino St.
Clearwater, Florida 33759
813-679-0720 / mhall005@tampabay.rr.com

PLM REPORT SUMMARY

NVLAP Lab Code 200703-0

Client :	Nova	Lab Set No. :	009673
Project :	St Andrews School Revitalizing - Main Structure	AT Job No. :	21-9673
Client Project No.:	10111-3021065	Report Date :	11/23/2021
Identification :	Asbestos, Bulk Sample Analysis	Sample Date :	11/17/2021
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600/R-93/116 / EPA Method 600/M4-82-020		

On 11/19/2021, forty-two (42) bulk material samples were submitted by Daniel McGimsey for asbestos analysis by PLM/DS.
Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009673-022	Wood Like Vinyl Tile HA5-2	None Detected-Brown Vinyl Flooring
009673-023	Wood Like Vinyl Tile HA5-3	None Detected-Brown Vinyl Flooring
009673-024	Wood Like Vinyl Tile HA5-4	None Detected-Brown Vinyl Flooring
009673-025	Wood Like Vinyl Tile HA5-5	None Detected-Brown Vinyl Flooring
009673-026	Wood Like Vinyl Tile HA5-6	None Detected-Brown Vinyl Flooring
009673-027	Wood Like Vinyl Tile HA5-7	None Detected-Brown Vinyl Flooring
009673-028	Ceramic Bathroom Tile HA6-1	None Detected-White Ceramic Tile
009673-029	Ceramic Bathroom Tile HA6-2	None Detected-White Ceramic Tile
009673-030	Ceramic Bathroom Tile HA6-3	None Detected-White Ceramic Tile
009673-031	Red Ceramic Tile HA7-1	None Detected-Red Ceramic Tile None Detected-Gray Ceramic Tile Grout None Detected-Gray Tile Mortar

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
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PLM REPORT SUMMARY

NVLAP Lab Code 200703-0

Client :	Nova	Lab Set No. :	009673
Project :	St Andrews School Revitalizing - Main Structure	AT Job No. :	21-9673
Client Project No.:	10111-3021065	Report Date :	11/23/2021
Identification :	Asbestos, Bulk Sample Analysis	Sample Date :	11/17/2021
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600/R-93/116 / EPA Method 600/M4-82-020		

On 11/19/2021, forty-two (42) bulk material samples were submitted by Daniel McGimsey for asbestos analysis by PLM/DS.
Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009673-032	Red Ceramic Tile HA7-2	None Detected-Red Ceramic Tile None Detected-Gray Ceramic Tile Grout None Detected-Gray Tile Mortar
009673-033	Red Ceramic Tile HA7-3	None Detected-Red Ceramic Tile None Detected-Gray Ceramic Tile Grout None Detected-Gray Tile Mortar
009673-034	White Floor Tile HA8-1	None Detected-White Floor Tile None Detected-Tan Mastic
009673-035	White Floor Tile HA8-2	None Detected-White Floor Tile None Detected-Tan Mastic
009673-036	White Floor Tile HA8-3	None Detected-White Floor Tile None Detected-Tan Mastic
009673-037	White/Silver Ducting Wrap HA9-1	None Detected-White Surfacing None Detected-Tan/Silver Wrap None Detected-Yellow Glass Insulation
009673-038	White/Silver Ducting Wrap HA9-2	None Detected-White Surfacing None Detected-Tan/Silver Wrap None Detected-Yellow Glass Insulation

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
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PLM REPORT SUMMARY

NVLAP Lab Code 200703-0

Client :	Nova	Lab Set No. :	009673
Project :	St Andrews School Revitalizing - Main Structure	AT Job No. :	21-9673
Client Project No.:	10111-3021065	Report Date :	11/23/2021
Identification :	Asbestos, Bulk Sample Analysis	Sample Date :	11/17/2021
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600/R-93/116 / EPA Method 600/M4-82-020		

On 11/19/2021, forty-two (42) bulk material samples were submitted by Daniel McGimsey for asbestos analysis by PLM/DS.
Copies of Bulk Sample Analysis sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Sample Description / Location	Asbestos Content
009673-039	White/Silver Ducting Wrap HA9-3	None Detected-White Surfacing None Detected-Tan/Silver Wrap None Detected-Yellow Glass Insulation
009673-040	Green Carpet Glue HA10-1	None Detected-Yellow Glue None Detected-Gray Leveling Comp.
009673-041	Green Carpet Glue HA10-2	None Detected-Yellow Glue None Detected-Gray Leveling Comp.
009673-042	Green Carpet Glue HA10-3	None Detected-Yellow Glue None Detected-Gray Leveling Comp.

These samples were analyzed by layers. Specific layer or component asbestos content is indicated when relevant. The EPA considers a material to be asbestos containing only if it contains more than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) -- materials which are friable or may become friable -- be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. Arrowhead utilizes CVAE on a routine basis and does not include point counting unless specifically requested.
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PLM REPORT SUMMARY

NVLAP Lab Code 200703-0

Client :	Nova	Lab Set No. :	009673
Project :	St Andrews School Revitalizing - Main Structure	AT Job No. :	21-9673
Client Project No.:	10111-3021065	Report Date :	11/23/2021
Identification :	Asbestos, Bulk Sample Analysis	Sample Date :	11/17/2021
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600/R-93/116 / EPA Method 600/M4-82-020		

SCOPE OF THIS REPORT

These samples were obtained as a part of a building survey; this report is only intended to be used as a part of the survey report issued by the surveyor. This report explains the laboratory analysis and results. The surveyor's report explains the sampling protocol used, when the samples were obtained, the location(s) of the samples, where the materials were observed in the building, quantities of materials observed, condition of the materials and the extent of his/her survey. Sample locations and material descriptions are given by the surveyor on the chain of custody but included here (possibly abbreviated) only as a convenience for the reader.

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STATEMENT OF LABORATORY ACCREDITATION

The samples were analyzed in general accordance with the procedures outlined in the Method for the Determination of Asbestos in Bulk Building Materials, EPA/600/R-93/116, and the Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA 600/M4-82-020. The results of each bulk sample relate only to the material tested and the results shall not be used to claim product endorsement by NVLAP or any agency of the U.S. Government.

Floor tile and other resinously bound materials, when analyzed by the EPA method, may yield false negative results because of limitations in separating closely bound fibers and in detecting fibers of small length and diameter. When a definitive result is required, Arrowhead recommends utilizing alternative methods of identification, including Transmission Electron Microscopy.

Specific questions concerning bulk sample results shall be directed to the Laboratory Director.

Analyst : Ryan Schwegman

Laboratory Director : Monte Hall, P.G.
Florida Registration No. 1658

Approved Signatory : Monte Hall

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9673

Asbestos Chain of Custody Record

Company NOVA Engineering and Environmental
Address 17612 Ashely Drive
City / State / Zip Panama City Beach / Florida / 32413
Phone 850-381-9565 FAX 850-249-6683 Email dmcgimsey@usanova.com
Client / Owner: Quina Gaudhoefer Architects
Project and/or Job Number: 10111-3021065
Project Address: St. Andrews School Revitalization - Main Structure

Normal 3 Day [X] Next Day [ ] Same Day [ ] Immediate [ ]
Stop First Positive: Yes [X] No [ ] (*Receive Cut Off Time: 2pm)
Date: 11-17-21 Contact:
Phone: FAX:
Email: dmcgimsey@usanova.com & LABREPORTSENV@USANOVA.COM

HSA	Sample No.	Material Description (include size/color)	Sample Location	Homogeneous Area Locations	Quantity Sq. Ft.	Cond.	Pot. Disturb.	Friable Yes/No
1	1	Gypsum board w/ joint materia	1E 1W	1C including ceiling	15,000	Pre-Reno		
2	3	Black & Grey floor tile	15C 21C	12A	600			
3	1	Red linoleum flooring near the ~~west~~ entrance	Ent	water wood vinyl floors	15,000			
4	3	Brick wall			900			
5	1	wood tile vinyle tile	F B M		15,000			
6	3	Ceramic Bathroom tile	023		800			
7	3	~~Ceiling sample~~ Red ceramic tile	10B Mechanical		400			
8	3	White floor tile	11B Mech. 14B		400			

G=Good, D=Damaged, SD=Significantly Damaged

Sampled By: Daniel McGimsey Date:
Transported By: UPS Date:
Special Instructions:

Received By / Date:
Ryan Schepers 11/19/2021

Pg. 2

9673

Asbestos Chain of Custody Record

Company NOVA Engineering and Environmental
Address 17612 Ashely Drive
City / State / Zip Panama City Beach / Florida / 32413
Phone 850-381-9565 FAX 850-249-6683 Email dmcgimsey@usanova.com

Normal 3 Day [X] Next Day [ ] Same Day [ ] Immediate [ ]
Stop First Positive: Yes [X] No [ ] *(*Receive Cut Off Time: 2pm)*

Client / Owner:
Project and/or Job Number: 10111-3021065
Project Address: Main Bldg.

Date: 11-17-21 Contact:
Phone: FAX:
Email: dmcgimsey@usanova.com & LABREPORTSENV@USANOVA.COM

HSA	Sample No.	Material Description (include size/color)	Sample Location	Homogeneous Area Locations	Quantity Sq. Ft.	Cond.	Pot. Disturb.	Friable Yes/No
9	(3)	white/silver dusting wrap	Mech.		800			
10	(3)	Green carpet glue	2IH		600			

G=Good, D=Damaged, SD=Significantly Damaged

Sampled By: Daniel McGimsey Date:
Transported By: UPS Date:
Special Instructions:

Received By / Date:

NOVA

LEAD-BASED PAINT TESTING DATA SHEET

Test Site (Address): St. Andrews School Revitilization

Page: 1 of ____

RMD Serial Number: 512345

Date: 11-16-21

Inspector Comments:

Inspector: Daniel T. McGimsey

Sample No.	RM. Eqv. ID	Component	Substrate	XRF Reading	Classification	Comment
1	Auditorium	W	D	0	N I	A
2	"	"	B	0	N I	B
3	"	"	D	0.03	N I	C
4	"	"	B	0	N I	D
5	Stage	"	D	0	N I	A B
6	"	"	B	0	N I	C
7	"	"	D	0	N I	D
8	Auditorium Door	D	W	0	N I	
9	Door from	DF	W	0	N I	
10	Window seal	WF	B	0.01	N I	Auditorium E
11	"	"	"	0	N I	"
12	"	"	"	0	N I	"
13	"	"	"	0	N I	" W
14	"	"	"	0	N I	"
15	White molding	Pt. W	W	0.03	N I	
16	White molding	Paint BB	B	0.03	N I	
17	Western ent. Door	D	W	0		
18	" From	DF	"	0		
19	Hallway L	W	W	0		
20	" R	"	"	0		
21	" F	"	"	0		
22	W Aud. Door	D	W	0		
23	Frame	DF	W	0		
24	Room 005	W	D	0		A
25	"	"	"	0		B
26	"	"	"	0		C
27	"	"	"	0		D
28	Room 005 window seal	WF	B	0		A
29	Room 005 door	D	W	0		B
30	door from	DF	W	0		

NOTES:

1) XRF Reading: Measured in milligrams per square centimeter (mg/cm2)

2) Substrate: B = Brick, C = Concrete, D = Drywall, M = Metal, P = Plaster, W = Wood, CT = Ceramic Tile, ST = Stucco

3) Classificatio: P = Positive, N = Negative, I = Intact, NI = Non-Intact

4) Component: W = Wall, C = Ceiling, D = Door, DF = Door Frame, DJ = Door Jamb, CB = Cabinet, SL = Sill, SA = Sash, APR = Apror WF = Window Frame, TR = Trough, S = Shelf, SS = Shelf Support, FL = Floor, BB = Baseboard, F = Frame

NOVA

LEAD-BASED PAINT TESTING DATA SHEET

Test Site (Address): St. Andrews School Revitalization 3021065 **Page:** 2 of ____

RMD Serial Number: 512345 **Date:** 11-16-21

Inspector Comments: ____ **Inspector:** Daniel T. McGimsey

Sample No.	RM. Eqv. ID	Component	Substrate	XRF Reading	Classification	Comment
31	Small Room to	W	D	0	NI	Right of Rm 004
32	"	"	"	0	"	
33	"	"	"	0	"	
34	"	"	"	0	"	
35	Door	D	W	0	"	
36	Door fram	DF	W	0	"	
37	Room 004	W	D	0	"	A
38	"	"	"	0	"	B
39	"	"	"	0	"	C
40	"	"	"	0	"	D
41	Window seal R	WF	R	0	"	R
42	C	"	"	0	"	C
43	L	"	"	0	"	L
44	White molding 004	BB	W	0	"	
45	Door	D	W	0	"	
46	Doorframe	DF	W	0	"	
47	Rm 3 Door	D	W	0	"	
48	Doorfram	DF	W	0	"	A
49	Rm 3	W	D	0	"	B A
50	"	"	"	0	"	C B
51	"	"	"	0	"	D C
52	"	"	"	0	"	D
53	white molding	BB	W	0	"	
54	Rm 3A Door	D	W	0	"	
55	Rm 3A Doorfram	DF	W	0	"	
56	Rm 3 window sil	WF	B	0	"	
57	"	WF	"	0	"	
58	Rm 3a window sil	WF	"	0	"	
59	"	WF	"	0	"	
60	Rm 3 A Bathroom tile	FL	CT	0	"	

NOTES:

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4) Component: W = Wall, C = Ceiling, D = Door, DF = Door Frame, DJ = Door Jamb, CB = Cabinet, SL = Sill, SA = Sash, APR = Apror
WF = Window Frame, TR = Trough, S = Shelf, SS = Shelf Support, FL = Floor, BB = Baseboard, F = Frame

NOVA

LEAD-BASED PAINT TESTING DATA SHEET

Test Site (Address): St. Andrews School Revitalization 3021065

Page: 3 of ____

RMD Serial Number: 512345

Date: 11-16-21

Inspector Comments: ____

Inspector: Daniel T. McGimsey

Sample No.	RM. Eqv. ID	Component	Substrate	XRF Reading	Classification	Comment
61	Rm 3A Bathroom	W	D	0	NI	A
62	"	"	"	0	"	B
63	"	"	"	0	"	C
64	"	"	"	0	"	D
65	021J Mech.	W	"	0	"	A
66	"	"	"	0	"	B
67	"	"	"	0	"	C
68	"	"	"	0	"	D
69	Door	D	W	0	"	
70	Door Fram	DF	W	0	"	
71	Red ceramic tile	FL	CT	0	"	
72	21K Door	D	W	0	"	
73	Door frame	DF	W	0	"	
74	21K	W	D	0	"	A
75	"	"	"	0	"	B
76	"	"	"	0	"	C
77	"	"	"	0	"	D
78	21K window chas	W	D	0	"	A
79	"	"	"	0	"	B
80	"	"	"	0	"	C
81	"	"	"	0	"	D
82	1 sill	SL	B	0	"	
83	"	"	B	0	"	
84	"	"	B	0	"	
85	White Molding	BB	W	0	"	
86	1 Door	D	W	0	"	
87	Door frame	DF	W	0	"	
88	S. Hallway door	D	W	0	"	
89	Door frame	DF	W	0	"	
90	02 classroom with	BB	W	0	"	

NOTES: Molding

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3) Classificatio: P = Positive, N = Negative, I = Intact, NI = Non-Intact

4) Component: W = Wall, C = Ceiling, D = Door, DF = Door Frame, DJ = Door Jamb, CB = Cabinet, SL = Sill, SA = Sash, APR = Apror WF = Window Frame, TR = Trough, S = Shelf, SS = Shelf Support, FL = Floor, BB = Baseboard, F = Frame

NOVA

LEAD-BASED PAINT TESTING DATA SHEET

Test Site (Address): St. Andrews School Revitalization 3021065

Page: 4 of ____

RMD Serial Number: ____

Date: 11-16-21

Inspector Comments: ____

Inspector: Daniel T. McGimsey

Sample No.	RM. Eqv. ID	Component	Substrate	XRF Reading	Classification	Comment
91	Classroom 2	W	D	0	NI	A
92	"	"	"	0	"	B
93	"	"	"	0	"	C
94	"	"	"	"	"	D
95	2 sill	DJL	B	"	"	B
96	"	"	"	"	"	L
97	"	"	"	"	"	C
98	024 Door	D		"	"	
99	DF	DF		"	"	
100	2 Door	D		"	"	
101	2 Door Frame	DF		"	"	
102	024	W	CT	"	"	A
103	"	"	"	"	"	B
104	"	"	"	"	"	C
105	"	"	"	"	"	D
106	024	FL	CT	"	"	
107	13B Door	D	W	"	"	
108	Doorfram	DF	W	"	"	
109	13B	W	D	"	"	A
110	"	"	"	"	"	B
111	"	"	"	"	"	C
112	"	"	"	"	"	D
113	13A D.	D	W	"	"	
114	13A	DF	W	"	"	
115	13A	W	D	"	"	A
116	"	"	"	"	"	B
117	"	"	"	"	"	C
118	"	"	"	"	"	D
119	021H	D	W	"	"	
120	"	DF	W	"	L	

NOTES:

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4) Component: W = Wall, C = Ceiling, D = Door, DF = Door Frame, DJ = Door Jamb, CB = Cabinet, SL = Sill, SA = Sash, APR = Apror WF = Window Frame, TR = Trough, S = Shelf, SS = Shelf Support, FL = Floor, BB = Baseboard, F = Frame

NOVA

LEAD-BASED PAINT TESTING DATA SHEET

Test Site (Address): St. Andrews School Revitalization 3021065

Page: 5 of ____

RMD Serial Number: ____

Date: 11/6-21

Inspector Comments: ____

Inspector: Daniel T. McGimsey

Sample No.	RM. Eqv. ID	Component	Substrate	XRF Reading	Classification	Comment
121	02H	W	D	0	NI	
122	"	"	D	"	"	
123	"	"	"	"	"	
124	"	"	"	"	"	
125	02H	SL	B	"	"	
126	"	"	B	"	"	
127	Hallway S. of	W	W	"	"	
128	"	"	B	"	"	
129	Hallway threshold	DF	W	"	"	
130	02H A"	D	"	"	"	
131	"	DF	"	"	"	
132	"	W	D	"	"	A
133	"	W	"	"	"	B
134	"	W B	B	"	"	C
135	"	W	"	"	"	D
136	"	SL	R	"	"	
137	01HC	D	W	"	"	
138	"	DF	"	"	"	
139	"	W	D	"	"	A
140	"	"	"	"	"	B
141	"	"	D	"	"	C
142	"	"	"	"	"	D
143	"	BB	W	"	"	
144	"	SL	B	"	"	
145	1HB	D	W	"	"	
146	"	DF	"	"	"	
147	"	W	D	"	"	A
148	"	"	"	"	"	B
149	"	"	"	"	"	C
150	"	"	"	"	"	D

NOTES:

1) XRF Reading: Measured in milligrams per square centimeter (mg/cm2)
2) Substrate: B = Brick, C = Concrete, D = Drywall, M = Metal, P = Plaster, W = Wood, CT = Ceramic Tile, ST = Stucco
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NOVA

LEAD-BASED PAINT TESTING DATA SHEET

Test Site (Address): St. Andrews School Revitalization 3021065 **Page:** 6 of ____

RMD Serial Number: ____ **Date:** 11-16-21

Inspector Comments: ____ **Inspector:** Daniel T. McGimsey

Sample No.	RM. Eqv. ID	Component	Substrate	XRF Reading	Classification	Comment
151	21G	D	W	0	NI	
152		DF	W			
153		W	D			A
154						B
155						C
156						D
157	023	D	W			
158		DF	W			
159		W	CT			A
160			CT			B
161						C
162						D
163		FL	CT			
164	Classroom 10	D	W			
165		DF	W			
166		W	D			A
167						B
168			B			C
169			D			D
170		SL	B			E
171						R
172						C
173	10B	FL	CT			
174		D	W			
175		DF	W			
176		W	D			B
177			D			D
178	12 Classroom	D	W			
179		DF	W			
180		BB	W			

NOTES:

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3) Classificatio: P = Positive, N = Negative, I = Intact, NI = Non-Intact

4) Component: W = Wall, C = Ceiling, D = Door, DF = Door Frame, DJ = Door Jamb, CB = Cabinet, SL = Sill, SA = Sash, APR = Apror
WF = Window Frame, TR = Trough, S = Shelf, SS = Shelf Support, FL = Floor, BB = Baseboard, F = Frame

NOVA

LEAD-BASED PAINT TESTING DATA SHEET

Test Site (Address): St. Andrews School Revitalization 3021065 **Page:** 7 of ____

RMD Serial Number: ____ **Date:** 11-16-21

Inspector Comments: ____ **Inspector:** Daniel T. McGimsey

Sample No.	RM. Eqv. ID	Component	Substrate	XRF Reading	Classification	Comment
1	12 Classroom	W	D	0	NI	A
2	"	"	D	"	"	B
3	"	"	B	"	"	C
4	"	"	D	"	"	D
5	11 Classroom	D	W			
6	"	DF	W			
7	"	BB	W			
8	"	W	D			A
9	"	"	"			B
10	"	"	B			C
11	"	"	D			D
12	"	SL	B			L
13	"	"	"			R
14	"	"	"			L
15	E Hall way	W	D			
16	"	"	D			
17	"	BB	W			
18	9	D	W			
19	"	DF	W			
20	"	W	D			A
21	"	"	D			B
22	"	"	B			C
23	"	"	D			D
24	"	D				
25	"	DF				
26	"	W	D			
27	"	"	D			
28	"	"	B			
29	"	"	D			
30	"	SL				

NOTES:

1) XRF Reading: Measured in milligrams per square centimeter (mg/cm2)

2) Substrate: B = Brick, C = Concrete, D = Drywall, M = Metal, P = Plaster, W = Wood, CT = Ceramic Tile, ST = Stucco

3) Classificatio: P = Positive, N = Negative, I = Intact, NI = Non-Intact

4) Component: W = Wall, C = Ceiling, D = Door, DF = Door Frame, DJ = Door Jamb, CB = Cabinet, SL = Sill, SA = Sash, APR = Apror WF = Window Frame, TR = Trough, S = Shelf, SS = Shelf Support, FL = Floor, BB = Baseboard, F = Frame

NOVA

LEAD-BASED PAINT TESTING DATA SHEET

Test Site (Address): St. Andrews School Revitalization 3021065 Page: 8 of ____

RMD Serial Number: ____ Date: ____

Inspector Comments: ____ Inspector: Daniel T. McGimsey

Sample No.	RM. Eqv. ID	Component	Substrate	XRF Reading	Classification	Comment
31	211	SL	B	0	NI	
32	"	"	B	"	"	
33	"	BB	W	"	"	
34	27	D	W	"	"	
35	"	DP	W	"	"	
36	"	W	D	"	"	A
37	"	"	"	"	"	B
38	"	"	"	"	"	C
39	"	"	"	"	"	D
40	"	"	"	"	"	C Red paint
41	26	D	W	"	"	
42	"	DF	W	"	"	
43	27E	D	W	"	"	
44	"	DF	W	"	"	
45	"	W	D	"	"	A
46	"	"	"	"	"	B
47	"	"	"	"	"	C
48	"	"	"	"	"	D
49	27D	D	W	"	"	
50	"	DF	W	"	"	
51	"	W	D	"	"	A
52	"	"	"	"	"	B
53	"	"	"	"	"	C
54	"	"	"	"	"	D
55	"	BB	W	"	"	
56	27C	D	W	"	"	
57	"	DF	"	"	"	
58	"	W	D	"	"	
59	"	"	"	"	"	
60	240	"	"	"	"	

NOTES:

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2) Substrate: B = Brick, C = Concrete, D = Drywall, M = Metal, P = Plaster, W = Wood, CT = Ceramic Tile, ST = Stucco

3) Classificatio: P = Positive, N = Negative, I = Intact, NI = Non-Intact

4) Component: W = Wall, C = Ceiling, D = Door, DF = Door Frame, DJ = Door Jamb, CB = Cabinet, SL = Sill, SA = Sash, APR = Apror WF = Window Frame, TR = Trough, S = Shelf, SS = Shelf Support, FL = Floor, BB = Baseboard, F = Frame

NOVA

LEAD-BASED PAINT TESTING DATA SHEET

Test Site (Address): St. Andrews School Revitalization **Page:** 9 of _____

RMD Serial Number: _____ **Date:** _____

Inspector Comments: _____ **Inspector:** Daniel T. McGimsey

Sample No.	RM. Eqv. ID	Component	Substrate	XRF Reading	Classification	Comment
61	241 27C	W	D	0	NI	
62	27B	W	D	0		A
63						B
64			R			C
65			D			D
66		D	W			
67		DF	W			
68	Front Door	D	W			
69		DF	W			
70	21 @ A	D	W			
71		DF	W			
72		W	D			A
73						B
74						C
75						D End of school Building calibration taken
76	Building 2 Medical	W	B			A
77			D			B
78			B			@ C
79						D
80		D	M			
81		DF	M			
82	OIT	D	M			
83		DF	M			
84		W	B			
85			B			
86			D			
87			D			
88		FL	CT			
89		D				
90	270	DL				

NOTES:

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4) Component: W = Wall, C = Ceiling, D = Door, DF = Door Frame, DJ = Door Jamb, CB = Cabinet, SL = Sill, SA = Sash, APR = Apror WF = Window Frame, TR = Trough, S = Shelf, SS = Shelf Support, FL = Floor, BB = Baseboard, F = Frame

NOVA

LEAD-BASED PAINT TESTING DATA SHEET

Test Site (Address): _____ **Page:** 10 of _____

RMD Serial Number: _____ **Date:** _____

Inspector Comments: _____ **Inspector:** Daniel T. McGimsey

Sample No.	RM. Eqv. ID	Component	Substrate	XRF Reading	Classification	Comment
91 271	018	D	M	0	NI	
92	"	DF	M	"	"	
93	"	W	B	"	"	A
94	"	"	"	"	"	B
95	"	"	"	"	"	C
96	"	"	"	"	"	D
97	"	W	CT	"	"	
98	"	FL	CT	"	"	
99	18B	D	M	"	"	
100		DF	W	"	"	
101		W	B	"	"	
102		"	"	"	"	
103		"	"	"	"	
104		"	"	"	"	
105	018D	DF	W	"	"	
106	018E	D	W	"	"	
107	"	DF	W	"	"	
108	"	FL	CT	"	"	
109	"	W	B	"	"	A
110	"	"	"	"	"	B
111	"	"	"	"	"	C
112	"	"	"	"	"	D
113	DB Cafeteria	W A	CT	3.97	P I	Office 18A could not Be Accessed
114	"	B	"	3.01	"	
115	"	C	"	2.95	"	
116	"	D	"	2.96	"	
117	"	FL	O	0.1	NI	
118	Bldg. 5	D		0		
119	"	DF		0		
120 300	"	F	M	0		

NOTES:

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NOVA

LEAD-BASED PAINT TESTING DATA SHEET

Test Site (Address): _____ **Page:** 1 of _____

RMD Serial Number: _____ **Date:** _____

Inspector Comments: _____ **Inspector:** Daniel T. McGimsey

Sample No.	RM. Eqv. ID	Component	Substrate	XRF Reading	Classification	Comment
121 301	B Brick 5	W	B	0		One wall
122	B Brick 5 Rm 1	W	B	0		A
123						B No Paint on
124						C PB Slab
125						D
126		D	M	0		
127		DF	M			
128	Rm 2	W	B			A
129						B
130						C
131						D
132		D	M			
133		DF				
134						
135						
136						
137						
138						
139						
140						
141						
142						
143						
144						
145						
146						
147						
148						
149						
150 330						

NOTES:

1) XRF Reading: Measured in milligrams per square centimeter (mg/cm2)
2) Substrate: B = Brick, C = Concrete, D = Drywall, M = Metal, P = Plaster, W = Wood, CT = Ceramic Tile, ST = Stucco
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4) Component: W = Wall, C = Ceiling, D = Door, DF = Door Frame, DJ = Door Jamb, CB = Cabinet, SL = Sill, SA = Sash, APR = Apror
WF = Window Frame, TR = Trough, S = Shelf, SS = Shelf Support, FL = Floor, BB = Baseboard, F = Frame

APPENDIX C

Qualifications and Conclusions

QUALIFICATIONS OF RECOMMENDATIONS

The findings, conclusions and recommendations presented in this report represent our professional opinions concerning the environmental conditions at the site. The opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at later dates or at locations not investigated. The opinions included herein are based on information provided to us, the data obtained at the specific time of the investigation, and our experience with similar sites.

Should conditions or events change, NOVA should be retained to evaluate those changes and their impact to the subject site.

This report is intended for the sole use of Quina Grundhoefer Architects only. The scope of work performed for this study was prepared for Quina Grundhoefer Architects based on the applicable ASTM standard. Use of this report or the findings, conclusions and recommendations by others will be at the sole risk of the user. NOVA is not responsible or liable for the interpretation by others of the data in this report, nor their conclusions, recommendations or opinions.

Our professional services have been performed, our findings obtained, our conclusions derived and our recommendations prepared in accordance with generally accepted environmental assessment principles and practices in the industry.

APPENDIX D
Certifications

UF | TREEO Center
UNIVERSITY of FLORIDA

Center for Training, Research and Education for Environmental Occupations

certifies

Daniel McGimsey

NOVA Engineering, 101 Parkside Cir., #. 127 Panama City Beach, FL 32413

Having passed a 25-question exam with a score of 70% or higher has successfully met training requirements for

Asbestos Refresher: Inspector Online

FDBPR Asbestos Licensing Unit: Provider # 0000995; Course # FL49-0006389 (½ Day; 3.40 Contact Hours)

(Reaccreditation for Inspector under TSCA Title II/AHERA)

Conducted

06/14/2021

Certificate #: 220085-1496
Exam Date: **06/14/2021**
EPA accreditation expires: **06/14/2022**
Principal Instructor: Brian Duchene, PE, LAC
CEUs: 0.4
FBPR LAC: #0000995; Course ## 0006389
FBPE CEHs: #0004021; Course #0009083/Educational Institutions: 4 CEHs

Andrew Campbell, Director

United States Environmental Protection Agency

This is to certify that

Daniel T McGimsey

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226 as:

Inspector

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires August 27, 2022

LBP-I-I206892-1

Certification #

August 13, 2019

Issued On

Adrienne Priselac, Manager, Toxics Office

Land Division

United States Environmental Protection Agency

This is to certify that

Lawrence G Schmaltz

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226 as:

Risk Assessor

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires June 22, 2021

LBP-R-I187801-1

Certification #

June 08, 2018

Issued On

Adrienne Priselac, Manager, Toxics Office

Land Division

Ron DeSantis, Governor

Halsey Beshears, Secretary

Florida dbpr

STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION

ASBESTOS LICENSING UNIT

THE ASBESTOS BUSINESS ORGANIZATION HEREIN IS LICENSED UNDER THE PROVISIONS OF CHAPTER 469, FLORIDA STATUTES

NOVA ENGINEERING AND ENVIRONMENTAL, LLC

LAWRENCE GERARD SCHMALTZ
4524 OAK FAIR BLVD SUITE 200
TAMPA FL 33610

LICENSE NUMBER: ZA308

EXPIRATION DATE: NOVEMBER 30, 2021

Always verify licenses online at MyFloridaLicense.com

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United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200703-0

Arrowhead Technologies, L.L.C.

Clearwater, FL

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2021-01-01 through 2021-12-31
Effective Dates

For the National Voluntary Laboratory Accreditation Program

January 24, 2022

Carter Quina, AIA
Quina Grundhoefer Architects

Project: **St. Andrew Cultural Center – Amphitheater**
Section: **Lighting Equipment**

Carter,

Having looked at the drawing and sketched out a potential lighting rig for the platform space at the Amphitheatre I have several recommendations.

The equipment for this space will depend on how quickly it needs to be dressed out for and event. If it desired to use the space at a moment's notice then some lighting and positions for those lights should be installed initially. If it is only intended to be used for planned events then only power and hang points need to be considered.

Temporary Design
Apparently, the design of the roof will incorporate steel I Beams, if this is the case there are multiple temporary mounting methods to hang trussing over the stage. Since the design of the roof does not overhang the front on the stage it is assumed that portable towers will be brought in when front lighting is necessary. The primary need at this point is the access to power for both lighting and sound equipment. Two 100 amp (3phase) should be sufficient for modern LED lighting rigs and sound equipment. These should be provided as an industry standard Company Switch with chamber and Cam-Lock power connections. The sound switch should be wired as an isolated ground. These can be placed in the mechanical room and to simplify access a 6" sleeve run through the wall, with caps for both ends, to cleanly lay the power cables to the temporary equipment.

Power should be provided for the possible use of followspots. I would assume a temporary platform at the back of the seating area. The two pole locations (Ballards?) along the walkway should include additional power for this purpose.

Permanent Design
For a permanent lighting design we would recommend installing trussing permanently attached to the steel beams for over the stage lighting. Two sets of trusses for both front and back lighting would be needed. To these permanent power boxes would be attached along with data plug ins. The power would come from a standard breaker panel in the mechanical room. A data distribution box would be provided in this room that will distribute the data to the lighting fixtures and provide a plug in for a portable lighting console. The Company Switches mentioned above should still be provided for larger events.

The design of the roof does not provide the suitable location for the installation of front lighting for the stage. Although "band" lighting often uses a more severe front lighting angle than theatrical the only available position is straight down. If possible, a slight alteration providing a 5' distance overhang in front of the stage is recommended to create this lighting angle. If not possible then then two poles could be installed in the audience seating area that would get permanent power and data runs. An alternate to the poles is vertically mounted trussing, these would provide an interesting look, but I'm not sure if we have enough wind load data on this method to meet code requirements.

There are suitable LED fixtures that meet IP65 ratings which could be permanently installed on the poles and the trussing that would allow instant access to light the stage area.

Bill of Materials
Temporary Design

2	ETC PSP – 100	Company Switches with Cam-Lock connections.

(Installation by EC)

Equipment: **$ 13,600.00**

Permanent Design

2	ETC PSP – 100	Company Switches with Cam-Lock connections.
1	eDin Panel	Data Distribution Panel to include: DMX input 10 – DMX outputs
8	Plug Boxes	Weather Proof Enclosure with 2 – 120v circuits and 1 DMX output Truss or pipe mount.
2	Plug Boxes	Weather Proof Enclosure with 2 – 120v circuits and 1 DMX output Wall mount.
24	Chauvet	Colorado 2 Zoom Wash fixtures complete with cables, connectors and clamps
1	ChamSys	QuickQ30 Lighting Control Console with 25’ and 100’ DMX cables.
7	Applied	12”x12” HD Plated Box Trusses with threaded rod hanging hardware.
1	Lot	System low voltage terminations and turn-on
1	Lot	Installation of trussing, lighting fixtures and training

(Installation of Company Switches and Plug Boxes by EC)

Equipment & Labor: **$ 107,000.00**

If you have any questions, please contact me directly.

Sincerely,

Dean A. Sternke
VP/Owner - dsternke@mainstage.com

January 20, 2022

Carter Quina, AIA
Quina Grundhoefer Architects

Project: **St Andrews School – Panama City, FL**

Carter,
I was onsite the 19th to review the status of the equipment and current stage layout at the St. Andrews School. There are several items to address to turn this into a "Community" use performance space.

Performance Space
This space is a small elementary style stage with fairly limited stage space which has been encroached upon by a fire sprinkler room. This room impacts the curtain layout and backstage area. Apparently, the air compressor segment of this system will be relocated during renovation, if this is the case perhaps the wall can be removed and a cage installed around the remaining equipment to give back as much space as possible to the stage.

To perform as a community additional stage space may be required for certain uses.

Stage Curtains
The existing stage curtains were installed in 2002 and are in generally good condition. The curtain fabric for the Main and Valance is a plum color, appropriately sized and the Main curtain track is operational. They are made from Prestige 25 oz Velour, and they are inherently flameproofed passing all current codes. They may need a light vacuuming but otherwise reusable The Valance curtain needs to be tacked back up to the nailer board in a few places.

The remaining Border, Leg and Rear curtains are made from a beige colored Chevron Rep. This fabric and color are more appropriate for an elementary school. The curtains do not completely mask the offstage space. The Rear curtain is mounted directly in front of the back wall, typically a crossover space is created by this curtain so now it only serves as decoration.

The curtain configuration should be altered to provide a more useable space and consideration given to at least downsizing the space absorbed by the sprinkler system stage right.

Stage Lighting System
The existing ETC DR12 dimmer racks service both the Stage and House lighting circuits. It is currently functional except for one House Light Entrance station. The existing House Lights do not dim even though those components are part of the system. The control console is an ETC Acclaim 36 channel two scene preset console which is designed to drive the dimmer racks but does not have the software to operate the any new LED lighting. The Keyed locks are missing on the dimmer cabinets along with one stripped bolt, these are required to close the door firmly to maintain proper air filtration. This system was installed in 2002.

The lighting fixtures are comprised of ETC Source Four Jr. Ellipsoidals, Altman 65Q Fresnels and Altman R40 Borderlights which utilize quartz and incandescent lamps. The Borderlights are no longer in production and the recommended R40 lamp is no longer available. Some replacement LED lamp types are available, but the 0-100% dimmable versions are difficult to find. The other

two fixtures are still in production however the industry is moving towards color changing LED based fixtures.

At minimum infrastructure for the use of LED stage lighting should be included in any renovation and consideration given for a complete LED replacement.

Recommendations
Performance Space
This stage is relatively small, the largest area that can be achieved will make if more flexible for a variety of events. Eliminating the wall surrounding the Sprinkler system and moving the noisy air compressor to another location will allow additional space on the stage proper. The addition of platforms in front of the stage will extend the possible acting area. These platforms could be stored in the down left room off the stage.

New connections will need to be made for the revised lighting and curtain layout, all hang points should be changed at this time. It is recommended that the ceiling over the stage be removed allowing access to the roof supports, this will aide in the revised layouts, but also for temporarily hanging scenery for individual events. All areas backstage should be painted black except for the rear wall.

Theatrical Equipment Budget Costs – Stage Platforms

1	Lot Staging Concepts	(6) total platforms – (3) 3'x8', (3) 4'x8', black HDPE surface and \ mill finish, standard shapes, no custom shapes. Adjustable SC90 support legs, cross bracing, and leg clamps, mill finish.Black, adjustable height skirting and skirt clips for (3) sides.

Package Price **$24,500.00**

Stage Curtains
The Valance and Main Curtain are in good shape, inherently flame resistant and can remain in place. The remaining curtain, although in good condition, should be removed and replace with to conform to a new curtain layout. See drawing. All of these curtains should be black. The rear wall will be covered by a curtain but can be used as a lighting surface. The rear wall should remain free of obstructions and be painted white or light blue.

Theatrical Equipment Budget Costs – Stage Curtains - Rigging

2	Border Curtain	Panels 4'6" tall x 23'0" wide of Encore 22 oz. Black Velour with 50% fullness.
6	Leg Curtain	Panels 13'6" tall x 5'0" wide of Encore 22 oz. Black Velour with 50% fullness.
1	Rear Curtain	Panel 13'6" tall x24'0" wide of Encore 22 oz. Black Velour with 50% fullness.
1	Lot	Tracks for Leg Curtains
1	Lot	Pipe for Border Curtains
1	New Pipe	for 3rd Electric
2	New Pipes	with hangers for FOH
1	Lot	New Hardware for hang points.
1	Lot	Installation

Package Price **$30,800.00**

Stage Lighting System
If budget allows now is the time for the lighting to change to LED stage lighting fixtures. The existing stage dimmer racks can remain with new Relay modules provided to power the LED fixtures.

The existing Borderlight fixtures should be retired. The remaining Source Four Jr. and 65Q Fresnel fixtures could be maintained and be used for “Specials”. New LED fixtures should incorporate color changing profile spots, PARS and Cyc units.

The existing console needs to be changed to one that has software to manage the LED fixture addresses. New runs of DMX data will need to be installed at the FOH and onstage Electrics to control the LED fixtures.

Two changes should be made to the current fixture mounting. A Third Electric should be installed at the rear of the stage to provide better backlighting angles and a position for the Cyc lights to light the back wall. The current Front of House (FOH) lighting positions are a series of four slots recessed in the ceiling. Utilizing the existing pipes that currently hold the fixtures a new pipe could be suspended from these below the ceiling. This pipe would be wider than the slots and provide better positioning for the extended stage. The existing circuit could be reused.

The house lighting is controlled by the dimmer system which requires some service and one station repair. The existing lights are slated to be changed and new controls will be required to interface them to the existing system.

New electrical circuiting will need to be run to the third electric, at the same time a minimum of two plug boxes should be installed on stage to provide for dimmable power at the floor level for a variety of lighting and/or effects.

Theatrical Equipment Budget Costs – Stage Lighting and Control

1	ETC Element 2	Lighting Control Console
1	Touchscreen	Monitor
1	Standard	Monitor
1	15’	DMX Control Cable
8	ETC R20	Relay Modules for powering LED Stage and House Fixtures
5	ETC ECPB-DMX	DMX Plug In Stations – Pipe Mount
1	eDin Panel	Stage and House Electronics Panel with: 7 – 0-10v DC outputs, 8 DMX outputs.
2	Plug Boxes	2 Circuits + DMX output – Wall Mount
1	Lot	Repair of Dimmer Racks and Control Station
18	ETC ColorSource Jr.	LED Variable Focus Profile Fixture complete with 10’ DMX cable and 10’ Powercon Jumper Cable
9	ETC ColorSource PAR.	LED PAR Fixtures with 2 each extra lenses complete with 10’ DMX cable and 10’ Powercon Jumper Cable
4	ETC ColorSource Cyc	LED Cyc lighting fixture complete with 10’ DMX cable and 10’ Powercon Jumper Cable
1	Lot	Low Voltage Terminations and Turn-on
1	Lot	Initial Fixture hang and focus
1	Lot	Training

Package Price **$72,800.00**

The above prices do not include any electrical or general construction costs. They are budgeted for a project to begin late 2022 to early 2023. Supply chain issues or dates beyond these may impact pricing.

If you have any questions please contact me directly.

Sincerely,
Dean A. Sternke