CITY OF FERNANDINA BEACH

INVITATION TO BID

Fernandina Beach Fire Station No. 2

CITY ITB#: 21-11

PREPARED BY:

PASSERO ASSOCIATES, LLC
4730 Casa Cola Way, Suite 200
St. Augustine, FL 32095

PA PROJECT No. 99000047.0086 **July 7, 2021**

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INTRODUCTION

The City of Fernandina Beach, Florida is accepting competitive sealed bids for **FERNANDINA BEACH FIRE STATION NO. 2.**

The City will receive sealed bid submittals at the location stated below not later than **2:00pm (Eastern Time), August 26, 2021.**

A Non-Mandatory Pre-bid meeting will be held at 11:00am (Eastern Time), July 16, 2021 at the Fernandina Beach Municipal Airport, 700 Airport Road, Fernandina Beach, FL 32034, Second Floor Conference Room adjacent to the Second Floor Observation Deck.

Any submittal received after the above stated time and date will not be considered. It shall be the sole responsibility of the Bidder to have its Bid delivered to the City of Fernandina Beach, by U.S. Mail, hand delivery or any other method available to him/her; however, facsimile, or electronic submittals will not be accepted. Delay in delivery shall be the sole responsibility of the Bidder. Submittals received after the deadline will not be considered. Award of the Bid is subject to authorization and appropriation of funds.

The original bid submittal **[1 original, 3 copies and 1 electronic copy, (CD or thumb drive)]** must be delivered to City Hall in a sealed package, clearly marked on the outside, **ITB #21-11** and addressed to:

City of Fernandina Beach
Attn: City Clerk's Office – **ITB #21-11**
204 Ash Street
Fernandina Beach, FL 32034

Hand delivered Submittal is to be taken to the Clerk's Office at the above address.

The bid shall be submitted on the specified **"Contact Sheet",** hereto attached as "**Exhibit A**" and **"Bid Form"**, hereto attached as **"Exhibit A-1"**. The person signing the Bid Response Form shall have the authority to bind the proposer to the Bid. All information on the Bid form shall be provided, or the Bid may not be accepted.

The competitive sealed Bid shall be accompanied by a **"Public Entity Crimes",** herein provided as "**Exhibit B**", **"Drug-Free Workplace Certification"** herein provides as **"Exhibit C"**, "**E-Verify Statement**" herein provided as **"Exhibit D"**, **"Proposer Acknowledgements and Agreements"**, herein provided as "**Exhibit E**", **"Conflict of Interest",** herein provided as, "**Exhibit F**", **"Non-Collusion Affidavit",** herein provided as "**Exhibit G", "Dispute Disclosure",** herein provided as **"Exhibit H", "Statement of Bidders Qualifications form"**, hereto provided as **"Exhibit I", "Addendum Receipt"**, herein provided as **"Exhibit J" and City of Fernandina Beach, "Sample Contract",** herein provided as **"Attachment B".**

In accordance with Item 16, General Terms and Conditions, please provide **proof the Contractor/Vendor is not listed in the Excluded Parties List System**, a federal suspension and debarment listing.

CITY OF FERNANDINA BEACH
ITB 21-11
FERNANDINA BEACH FIRE STATION NO 2

SCOPE OF WORK

The following scope of work will consist of but will not be limited to construction of a new combination Fire Station and ARFF at Fernandina Beach Municipal Airport. Building to consist of PEMB apparatus area with 4 bays and support spaces attached to a concrete block and plank support building with Meeting Room, Offices, Kitchen, Fitness Room, Dayroom, Bunk Rooms and Bathrooms, etc. The exterior of the building will consist of a combination of the PEMB, masonry walls and mansard roof with metal framing and roofing. Site area took into consideration the preservation of most existing trees while providing a landscape plan with minimal new trees and landscaping since the site is adjacent to the end of Runway 4-22. An irrigation system will be designed/installed to maintain the landscaping and will draw water from an existing well. A training tower approximately 45' tall will also be constructed on site. The existing access road will be reconstructed as required including a new security access gate. The site area is designed to contain stormwater on site. The existing utilities on site will be required to be relocated including the Airfield powerlines underground and the overhead powerlines both running to the existing Airfield Electric Vault adjacent to the project site.

For complete scope of work refer to Specifications and Construction Drawings.

SAFETY

The Contractor shall provide all necessary barriers and signage and take necessary precautions to protect buildings, general public and Contractor personnel. The Contractor shall at all times guard against damage or loss of City property or the general public and shall be held responsible for replacing or repairing any loss or damage to the satisfaction of The City of Fernandina Beach.

GENERAL CONSTRUCTION GUIDELINES

1. The contractor shall be required to coordinate his work schedule with City during the course of the project.

2. Survey Construction staking and testing of materials will be the contractor's responsibility for all aspects of the work including, but not limited to, compaction, proof-rolling, concrete mix, gradations, and concrete testing. The cost of such testing shall be included in the Contractors bid, and no additional compensation will be made.

3. The City does not commit to furnishing full-time inspection or testing of the work in progress or at material sources. Lack of inspection and/or testing by the City or A/E will in no way relieve the Contractor of their responsibility to provide quality workmanship in accordance with the Contract Documents.

4. The Contractor is required to submit shop drawings and material submittals to the A/E for review and approval prior to delivery and installation.

5. Bidder agrees to commence work within ten days after the Notice to Proceed is issued and to complete all work within **330** calendar days from Notice to Proceed.

6. Contractor is solely responsible for all construction means, methods, techniques, sequences, procedures and coordinating all portions of Work under Contract.

7. Contractor is responsible for all acts and omissions of his Subcontractors.

8. Engineer will not establish limits of Work between Contractor and Subcontractors, nor will he act as an arbiter in establishing such limits.

CUTTING & PATCHING OF WORK

1. Contractor is responsible for all cutting, fitting, or patching that may be required to complete Work or to make its several parts fit together properly.

2. Contractor is responsible for cutting, fitting, or patching provided by Subcontractors.

EXCAVATING & BACKFILLING

1. Contractor is responsible for all excavating, trenching, backfilling or compaction that may be required to complete Work or to make its several parts fit together properly.

2. Contractor is responsible for excavating, backfilling, trenching or compaction provided by Subcontractors.

CONTRACT TIME

The Owner has established a **contract performance time of 330 calendar days** from the date of Notice-to-Proceed. All work shall be substantially completed within the stated timeframe. This project is subject to liquidated damages to be specified in the contract.

QUALIFICATIONS

Bidders must submit with the Bid Submittal evidence of capabilities to complete the **Fernandina Beach Fire Station No. 2** project**.** This will include a reference list of similar projects (scope and size) successfully completed in the past, a reference list, and equipment list, a list of subcontractors, and other information requested by the City of Fernandina Beach. Failure to submit qualification information with the Bid Submittal may result in rejection of a Bid.

AWARD

Award recommendation shall be made to the most responsive and responsible bidder offering the best value. The City reserves the right, based upon its deliberations and in its opinion, to accept or reject any or all proposals. The City also reserves the right to waive minor irregularities or variations to the specifications and in the bidding process.

Successful Bidder is required to have a Business License in the city where their home office is located. If Bidder's business office is located in the City of Fernandina Beach a business tax license is required.

Bid Package

Bid Documents and Specifications are available to download from the City of Fernandina Beach website at www.fbfl.us/bids, and DemandStar at www.demandstar.com. Questions regarding bid package can be directed to Wanda Weaks, Purchasing Agent, wweaks@fbfl.org.

CONTACT

Specification questions during the bid period shall be submitted in writing to Purchasing Agent, Wanda Weaks, wweaks@fbfl.org.

Bidders are hereby put-on notice that no contact shall be made with any of the City Commission members, other City staff, or others that may be involved in the selection process to discuss this request or to influence the outcome of the selection.

ADDENDA

A written response to bidder questions will be issued via Addendum and posted on the City's website at www.fbfl.us/bids and DemandStar at www.demandstar.com. It is the bidder's responsibility to check the City's website for Addenda prior to submitting their bid. The deadline for questions is **ten** days before bid opening.

If there is an Addendum it becomes part of the original Bid and shall be acknowledged by attaching a copy of the Addendum, signed by an authorized representative of the person or company submitting the bid or proposal. Failure to do so may disqualify the bid or proposal.

ITB 21-11 SCHEDULE

Invitation to Bid	**Date/Time**
Advertisement of Bid	July 07, 2021
Non-Mandatory Pre-Bid Meeting	11:00AM(EST) July 16, 2021
Addendum No 1 issued	3:00PM(EST) July 23, 2021
Deadline for submission of written questions	5:00PM(EST) August 16, 2021
Final Addendum issued	3:00PM(EST) August 19, 2021
Deadline for submission of Bids	2:00PM(EST) August 26, 2021

CONTRACTOR PERSONNEL

1. CITY reserves the right to reject any CONTRACTOR employee doing business for the awarded CONTRACTOR that has not received the proper safety training or is not performing work in a safe manner. Any costs resulting in a rejection of personnel will be solely at the CONTRACTOR's expense.

2. No sub-contractor shall be employed by CONTRACTOR for the provision of these services without the prior written approval of the CITY.

PERFORMANCE STANDARDS/QUALITY REQUIREMENTS

In addition to those requirements set forth in the Scope of Work, all services (and items incidental thereto) and work provided by CONTRACTOR shall conform to the following:

PROJECT SCHEDULE

CONTRACTOR shall begin no later than ten calendar days from issuance of Notice to Proceed; all work must be completed **within 330 calendar days of Notice to Proceed**.

TIME OF PERFORMANCE

1. CONTRACTOR may, upon approval by City designee, be provided weekends and after-hours access to the site, if necessary or desired, to complete the project, weather permitting. However, no additional sums shall be paid other than that specified in the bid response.

2. CONTRACTOR may set up equipment onto the jobsite without commencing work for a maximum of seven calendar days. Location of equipment storage will be provided by the City designee.

3. CONTRACTOR will, prior to any delay submit notification of delay in writing within five calendar days to the City designee. This notice of delay excludes weather-related days claimed by the contractor.

4. CONTRACTOR shall submit documentation explaining the cause of the delay. CITY shall determine the extent of delay and extend the time for completing the work if, in CITY's judgement, the findings justify an extension. Any delay shall not entitle CONTRACTOR to any additional compensation. The sole remedy of CONTRACTOR shall be an extension of time.

5. CONTRACTOR shall arrange with the City designee a sequence of procedure, means of access, space for storage of materials and equipment and use of approaches, corridors, and stairways. CITY shall not be responsible for lost or stolen materials or tools left on the job site.

SITE MAINTENANCE

1. Extreme care shall be taken to safeguard all existing facilities, paved walkways, site amenities, utilities, windows, and vehicles on or around the job site. Damage to public and/or private property shall be the responsibility of CONTRACTOR and shall be repaired and/or replaced in equal or better condition at no additional cost to the CITY. CONTRACTOR shall use all means to protect existing objects, structures and vegetation designated to remain. In the event of damage, immediately make all repairs, replacements, and dressings to damaged materials, to the approval of CITY, at no additional cost to the CITY. In the event of damage to public and/or private property, CONTRACTOR shall immediately contact the CITY's designee and inform them about the location and extent of the damages and will stay on site until his investigation of the damage is concluded.

2. CONTRACTOR shall place all debris in refuse container and keep the premises free from rubbish at the end of each working day. The CONTRACTOR shall be responsible for supplying, emptying and the removal of waste containers/dumpsters, as necessary. Contractor is responsible for preventing migration of any/all debris from the job site at all times. This project is adjacent to the approach end of a runway, the City requires mitigation of any debris that might stand a chance of blowing onto the airport through the fence and impacting aircraft operations.

3. CONTRACTOR shall arrange material storage so as not to interfere with the CITY's operations.

4. CONTRACTOR shall at the completion of the job, remove unused material and rubbish from the site. If CONTRACTOR refuses at any time to remove the debris from the premises, or to keep the working area clean, such cleaning will be completed by the CITY and deducted from the balance due CONTRACTOR.

5. CONTRACTOR shall store all materials to be protected against weather, vandalism, and theft. Any materials found to be damaged or missing shall be replaced by CONTRACTOR at no cost to the CITY.

6. CONTRACTOR shall be responsible for clean up at the site at the conclusion of the project, including excess construction materials, and a thorough cleaning of all areas that were affected by CONTRACTOR or their subcontractors to the satisfaction of the CITY.

SAFETY

The Contractor shall provide all necessary barriers and signage and take necessary precautions to protect buildings, general public and Contractor personnel. The Contractor shall at all times guard against damage or loss of City property or the general public and shall be held responsible for replacing or repairing any loss or damage to the satisfaction of The City of Fernandina Beach.

1. CONTRACTOR shall be aware that this project is subject to public and private vehicular and pedestrian traffic at all times.

2. CONTRACTOR shall comply with all Federal/County/City laws/ordinances and City Fire codes during the execution of this project.

3. CONTRACTOR shall continuously maintain adequate protection of all work from damage and shall protect public and privately owned property, structures, vehicles, utilities, and work of any kind against damage or interruptions of service, which may result from the operations of the CONTRACTOR.

4. CONTRACTOR shall provide Safety Data Sheets: If any chemicals or materials or products containing toxic substances, as defined by Chapter 442, Florida Statutes, are to be used at any time during this the contract period, CONTRACTOR shall furnish Safety Data Sheets to the City designee prior to commencing this project.

5. CONTRACTOR shall perform all work under supervision of a capable supervisor using skilled employees.

6. CONTRACTOR shall have a person, which is on their payroll and with ***the authority to make decisions, on site at all times.***

REQUIRED INSPECTIONS

Prior to the start of any work, CONTRACTOR shall examine all surfaces and report in writing to the City designee any conditions detrimental to work. Failure to observe this injunction constitutes a waiver to any subsequent claims to the contrary.

CITY'S RIGHTS TO INSPECT, REJECT, AND STOP WORK

1. Right to Inspect Work - CITY will have the right to inspect the work at all times. Such inspection will not relieve CONTRACTOR of any of its obligations to perform the work in strict accordance with the contract documents.

2. Right to Reject Work - CITY will have the right to reject work which does not conform to the contract documents. No additional contract time will be allotted to remedy work rejected that does not conform with the contract documents. CITY may require special inspection or testing of the work.

3. Right to Stop Work - If CITY reasonably believes that CONTRACTOR is failing to carry out the work in accordance with the contract documents; CITY may order CONTRACTOR to stop the work, or a portion of the work, until such time as the cause of such stop order has been eliminated.

4. Right to Carry Out Work - If CONTRACTOR fails to perform the work properly or fails to perform any provision of the contract documents, including unauthorized project schedule delays, CITY, after three days written notice to CONTRACTOR without correction, may correct the deficiencies through the CITY's own forces or through others and may deduct the cost thereof from the payment then or thereafter due to the CONTRACTOR.

WARRANTY

1. CONTRACTOR shall provide warranty stating that the **Fire Station No.2** is complete in detail and finish, and free of hazardous conditions. The material warranty and workmanship must have a one-year warranty.

2. If CITY deems it unacceptable to have CONTRACTOR correct the work, which has been incorrectly done, a deduction from the contract price shall be made as determined by CITY. Such a deduction from the contract price shall in no way affect the CONTRACTOR's responsibility for defects, which may occur nor their ability for correcting them, and damage caused by them.

3. Supplies and/or services furnished as a result of this bid shall be covered by the most favorable commercial warranties, expressed or implied, that the bidder and/or manufacturer gives to any customer. The rights and remedies provided herein are in addition to and do not limit any rights afforded to the CITY by any other clause of this bid. Any applicable written warranty from the product manufacturer and/or representative company shall commence from date of completion and acceptance by the CITY.

LIQUIDATED DAMAGES

Should the awarded CONTRACTOR fail to complete work and make the area available for use within the stipulated period CONTRACTOR may be assessed by the CITY the amount of **Five hundred dollars ($500.00)** for each consecutive calendar day that expires after the time specified for completion and ready for final payment

until the work is complete. The per diem charge may be invoked at the discretion of the CITY and said sum to be taken as liquidated damages and deducted from the final payment or charged back to CONTRACTOR. This deduction is in addition to other remedies available to the CITY pursuant to Florida Statutes or the terms and conditions of this solicitation.

INSURANCE REQUIREMENTS

Insurance requirements are outlined in the General Conditions of this Invitation to Bid.

BOND REQUIREMENTS

Bid bonds requirements are outlined in the General Conditions of this Invitation to Bid.

EQUAL OPPORTUNITY/AFFIRMATIVE ACTION

The City is an equal opportunity/affirmative action employer. The City is committed to equal opportunity employment effort and expects firms that do business with the City to have an affirmative action program.

GENERAL CONDITIONS OF INVITATION TO BID

1. **PREPARATION OF BID -** INVITATION TO BID shall be prepared in accordance with the following:
   a. The enclosed Contact Sheet, attached hereto as **"Exhibit A"** and Bid Form, attached hereto as **"Exhibit A-1"**, shall be used when submitting your INVITATION TO BID.
   b. All information required by the Contact Sheet/Bid Form shall be furnished. The Bidder shall print or type his/her name and manually sign the Form and any continuation sheet on which an entry is made.
   c. Unit prices shall be shown and where there is an error in extension of price, the unit price shall govern.
   d. Alternate Bids will not be considered unless authorized by the Invitation to Bid.
   e. Bidders will **not** include federal taxes nor State of Florida sales, excise, and use taxes in prices, as the City is exempt from payment of such taxes. An exemption certificate will be signed where applicable upon request.
   f. Bidders shall make all investigations necessary to thoroughly inform themselves about any and all conditions related to the performance of the contract. Plea of ignorance by the Bidder of conditions that exists or may hereafter exist as a result of failure or omission on the part of the Bidder to make the necessary examinations and investigations, or failure to fulfill in every detail the requirements provided for in the Purchasing Policy, Purchasing Ordinance and/or State and Federal Statutes. The City's Purchasing Ordinance is set forth in Chapter 2-420, *et seq*.
   g. Prices quoted must be FOB City of Fernandina Beach, Florida with all transportation charges prepaid unless otherwise specified in the Invitation to Bid.
   h. Deliveries are to be FOB Destination unless otherwise specified in the Invitation to bid
   i. Deliveries are to be made during regular business hours.
   j. Bids and Bid prices shall be valid for a minimum of ninety (90) days, unless otherwise stated on the INVITATION TO BID.

2. **SUBMISSION OF BID**
   a. Bids and changes thereto shall be enclosed in sealed envelopes & addressed as instructed on the Bid Form. The name and address of the Bidder, the date and hour of the Invitation to Bid opening and the material or service shall be placed on the outside of the envelope.
   b. INVITATION TO BID must be submitted on the forms furnished. Electronic Bids will not be considered.

3. **REJECTION OF BID**
   a. The City reserves the right to accept or reject any or all Bids, to waive irregularities and technicalities, and to request resubmission or to re-advertise for the services. The City shall be the sole judge of the submittals. The City's decision shall be final.

4. WITHDRAWAL OF BID

a. Bids may not be withdrawn after the time set for the opening for a period of time as specified.
b. Bids may be withdrawn prior to the time set for the opening. Such request must be in writing.

5. LATE BID

a. INVITATION TO BID and modifications received after the time set for the opening will not be considered.
b. Modifications in writing received prior to the time set for the opening will be accepted.

6. LOCAL, STATE, AND FEDERAL COMPLIANCE

a. Bidders shall comply with all local, state, and federal directives, orders and laws as applicable to the INVITATION TO BID and subsequent contract(s) in accordance with the requirements as stated in CFR 200.321, including but not limited to Equal Employment Opportunity (EEO), Minority Business Enterprise (MBE), and Occupational Safety and Health Administration (OSHA) as applicable to this contract.
b. A "Public Entity Crimes Statement", in accordance with Florida Statutes, Section 287.133 (3) (a), on Public Entity Crimes, attached hereto as "Exhibit B", must be received at the time of the bid.
c. A "Drug Free Workplace Certification" attached hereto as "Exhibit C", must be received at the time of the bid.
d. The City of Fernandina Beach requires that the Bidder selected will not discriminate under the contract against any person, in accordance with federal, state and local government regulations.
e. An "E-Verify Statement" attached hereto as "Exhibit D" must be received at the time of the bid.

7. AWARD OF INVITATION TO BID

a. The INVITATION TO BID will be awarded to the most responsive and responsible bidder offering the best value to the City of Fernandina Beach.
b. The City reserves the right to accept and award item by item, and/or by group, or in the aggregate.
c. A written award of acceptance, (Purchase Order), mailed or otherwise furnished to the successful Bidder shall result in a binding contract without further action by either party.
d. Unless otherwise noted in the specifications, the length of the agreement shall be one year, with 2 one-year renewals possible based on the mutual consent of the parties.
e. Upon award, for construction projects, the Contractor will be required to complete/execute the City's Contract and General Conditions for Construction Services. An example of the contract can be found on the City's website at www.fbfl.us/bids, Bids and Purchasing web page.
f. Agreement may be cancelled with 60-day notice unless otherwise stated in signed contract documents.

8. NOT RESPONSIBLE FOR COSTS

a. The City shall not be responsible for any cost incurred by a prospective Bidder in responding to this INVITATION TO BID.

9. BONDS

- If Bid is less than $100,000 no Bid Bond or Payment and Performance Bond required.
- If Bid is greater than $100,000 and is for material only, a Bid Bond is required but no Payment and Performance Bond is required.
- If Bid is $100,000 - $200,000, and is for services, a Bid Bond is required but no Payment and Performance Bond is required.
- If Bid is greater than $200,000, and is for services, Bid Bond and Payment and Performance Bond is required.

BID BOND:

a. If the Base Bid or the Base Bid plus the sum of any alternates fall into the criteria above requiring a Bid Bond, the bidder shall enclose a Certified Check or Bid Bond with each bid. A Certified Check or Bid Bond shall be for an amount not less than five percent (5%) of the Bid price and shall be made payable to the CITY OF FERNANDINA BEACH as a guarantee that the Bidder will not withdraw its bid for a period of ninety (90) calendar days after Bid closing time. Bid Bonds or Certified Checks will be returned to unsuccessful bidders within 10 days of bid award. Successful bidders will receive their Certified Check or Bid Bond after the contract/agreement has been signed and a Performance and Payment Bond is received.

PERFORMANCE AND PAYMENT BONDS:

a. In the event the Contract is awarded to the Bidder, Bidder will thereafter enter into a written contract with the CITY OF FERNANDINA BEACH and furnish a Payment and Performance Bond in an amount equal to the contract price. The form of the bonds shall be in accordance with Section 255.05 of Florida Statutes. Failing to do so, Bidder shall forfeit its bid security.

   Payment and Performance Bond shall be secured from or countersigned by an agency or surety company recognized in good standing and authorized to do business in the State of Florida.

The following exceptions to bidder providing Performance and Payment Bonds are as follows: In lieu of the Performance and Payment Bonds, a contractor may file with the City an alternative form of security in the form of cash, a money order, a certified check, a cashier's check, an irrevocable letter of credit, or a security of a type listed in part II of chapter 625, Florida Statutes. Any such alternative form of security shall be for the same purpose and be

subject to the same conditions as those applicable to the bonds. The value of an alternative form of security shall be in the amount of the bid.

10. PUBLIC INFORMATION

a. All information contained in this Bid is public information, and as such will be handled in accordance with chapter 119, Florida Statutes.

11. ADDITIONAL INFORMATION

a. The City reserves the right to require Bidders to provide references and information on previous similar experience prior to award of the contract.

12. QUESTIONS

a. Any questions about the INVITATION TO BID should be communicated per instructions in the INVITATION TO BID.

13. INDEMNIFICATION AND INSURANCE

INDEMNIFICATION

The CONTRACTOR agrees to assume liability for and indemnify, hold harmless, and defend the City, its commissioners, mayor, officers, employees, agents, and attorneys of, from, and against all liability and expense, including reasonable attorney's fees, in connection with any and all claims, demands, damages, actions, causes of action, and suits in equity of whatever kind or nature, including claims for personal injury, property damage, equitable relief, or loss of use, to the extent caused by the negligence, recklessness, or intentionally wrongful conduct of the CONTRACTOR, its agents, officers, contractors, subcontractors, employees, or anyone else employed or utilized by the CONTRACTOR in the performance of this Agreement. The CONTRACTOR's liability hereunder shall include all attorney's fees and costs incurred by the City in the enforcement of this indemnification provision. This includes claims made by the employees of the CONTRACTOR against the City and the CONTRACTOR hereby waives its entitlement, if any, to immunity under Section 440.11, Florida Statutes. The obligations contained in this provision shall survive termination of this Agreement and shall not be limited by the amount of any insurance required to be obtained or maintained under this Agreement.

Subject to the limitations set forth in this Section, the CONTRACTOR shall assume control of the defense of any claim asserted by a third party against the City and, in connection with such defense, shall appoint lead counsel, in each case at the CONTRACTOR's expense. The City shall have the right, at its option, to participate in the defense of any third-party claim, without relieving CONTRACTOR of any of its obligations hereunder. If the CONTRACTOR assumes control of the defense of any third party claim in accordance with this paragraph, the CONTRACTOR shall obtain the prior written consent of the City before entering into any settlement of such claim. Notwithstanding anything to the contrary in this Section, the CONTRACTOR shall not assume or maintain control of the defense of any third-party claim, but shall pay the fees of counsel retained by the City and all expenses, including experts' fees, if (i) an adverse determination with respect to the third-party claim would, in the good faith judgment of the City, be detrimental in any material respect to the City's reputation; (ii) the

third party claim seeks an injunction or equitable relief against the City; or (iii) the

CONTRACTOR has failed or is failing to prosecute or defend vigorously the third-party claim. Each party shall cooperate, and cause its agents to cooperate, in the defense or prosecution of any third-party claim and shall furnish or cause to be furnished such records and information, and attend such conferences, discovery proceedings, hearings, trials, or appeals, as may be reasonably requested in connection therewith.

It is the specific intent of the parties hereto that the foregoing indemnification complies with Section 725.06, Florida Statutes, as amended. CONTRACTOR expressly agrees that it will not claim, and waives any claim, that this indemnification violates Section 725.06, Florida Statutes, as amended. Nothing contained in the foregoing indemnification shall be construed as a waiver of any immunity or limitation of liability the City may have under the doctrine of sovereign immunity or Section 768.28, Florida Statutes.

INSURANCE

Prior to commencement of any work under this Contract and until completion and final acceptance of the work, the CONTRACTOR/VENDOR shall, at its sole expense, maintain the following insurance on its own behalf, and furnish to the CITY certificates of insurance evidencing same and reflecting the effective date of such coverage as follows:

The term "Contractor" as used in the insurance rider, shall mean, and include Subcontractors of every tier.

A. Worker's Compensation and Occupational Disease Insurance in accordance with the applicable law or laws; Employer's Liability Insurance with limit of at least One Million ($1,000,000) dollars. This includes sole proprietorships and officers of corporations who will be performing work on the job.

B. Commercial General Liability with a combined Bodily Injury and Property Damage limit of not less than ONE Million ($1,000,000.00) dollars per occurrence and TWO Million ($2,000,000) Dollars in the aggregate. The aggregate must be applicable on a per project basis. Coverage must include the following perils:
   1. Broad Form Blanket Contractual Liability for liability assumed under this Contract and all other Contracts relative to the project.
   2. Completed Operations/Products Liability.
   3. Broad Form Property Damage
   4. Personal and Advertising Injury Liability
   5. Independent Contractors
   6. Endorsements must be furnished reflecting the inclusion of the interests of Owner, Construction Manager, General Contractor, Contractor, (your company) , their officers, directors, partners, representatives, agents and employees, and naming each as an Additional Insured on a primary and non-contributing basis.

7. Coverage is to be endorsed to reflect that insurance is to be primary and non-contributory with respect to any other collectable insurance, for the Owner, General Contractor, Contractor, (your company) and all other parties required to be named as additional insureds.
8. Coverage is to be provided on an "occurrence" basis with carriers licensed and admitted to conduct business in the State of [your state] or otherwise acceptable to the Contractor (your company).
9. A copy of policy and/or endorsement(s) and any other documents required to verify such insurance are to be submitted with the appropriate certificate(s), or upon the request of Contractor (your company). Failure to provide these documents is not to be construed as a waiver of the requirements to provide such insurance.

C. Commercial Automobile Liability Insurance covering the use of all Owned, Non-Owned, and Hired Vehicles with combined Bodily Injury and Property Damage Limit of at least One Million ($1,000,000.00) Dollars.

D. Umbrella I Excess Liability Insurance with a limit of no less than One Million ($1,000,000) minimum per occurrence.

E. During the term of this agreement, (if applicable) the Contractor/Vendor will carry Professional Liability Insurance which will cover liability for any damage or non-performance on account of any error, omission, or other provable negligence caused by the Contractor/Vendor. The amount of insurance shall not be less than One Million ($1, 000,000) per occurrence and aggregate.

F. Loss Deductible – If the insurance of any CONTRACTOR/VENDOR contains deductible(s), penalty(s) or self-insured retention(s), the CONTRACTOR/VENDOR
Whose insurance contains such provision(s) shall be solely responsible for payment of such deductible(s), penalty(s) or self-insured retention(s).

G. Where an Off Project Site Property exposure exists, the Contractor at its sole expense shall furnish to the Owner and Contractor (your company) Certificates of Insurance and other required documentation evidencing the following coverage which shall provide for the interests of [Name of Owner] , [Name of General Contractor] and (your company) to be named as Loss Payees and shall contain a provision requiring the insurance carriers to waive their rights of subrogation against all indemnities' named in the contract.
"All Risk" Property Insurance on all materials, equipment and supplies intended to become a permanent part of the construction stored on premises away from the project site and while in transit, until actually delivered to the project site. Coverage is to be provided on a replacement cost basis.

H. The above insurances shall each contain the following wording verbatim: "[Name of Owner], [Name of General Contractor], and (your company) are interested in the maintenance of this insurance and it is agreed that this insurance will not be canceled materially changed or not renewed without at least a thirty (30) day advance written notice to [Name and address of Owner], [Name and address of General Contractor] and [Name and address of your company] by certified mail-return receipt requested."

I. The amount of insurance contained in the aforementioned insurance coverages shall not be construed to be a limitation of the liability on the part of the Subcontractor or any of its Subcontractors.

J. The Contractor shall file certificates of insurance prior to the commencement of work with the Owner and the General Contractor which shall be subject to the Owner, General Contractor and (your company) approval of adequacy of protection and the satisfactory character of the Insurer.

K. Any type of insurance or any increase of limits of liability not described above which the Subcontractor requires for its own protection or on account of statute shall be its own responsibility and at its own expense.

L. The carrying of the insurance described shall in no way be interpreted as relieving the Contractor or Subcontractor of any responsibility of liability under this Contract.

M. Any policies effected by the Contractor on its Owned and/or Rented Equipment and Materials shall contain a provision requiring the insurance carriers to waive their rights of subrogation against the [Name of Owner], [Name of General Contractor], [Name of Contractor (your company)] and all other indemnities named in the Contract.

N. Should the Contractor engage a Subcontractor, the same conditions will apply under this contract to each Subcontractor, however, the retained Subcontractor shall be required to maintain limits of liability of not less than One Million ($1,000,000.00) Dollars per occurrence and Two Million ($2,000,000) Dollars in the aggregate, with said limits applicable on a per project basis, or such greater limits as may be required by the retaining Subcontractor.

14. PAYMENT

Payment due hereunder shall be made by the City to CONTRACTOR/VENDOR in accordance with the Florida Prompt Payment Act. The City's preferred method of payment is electronically by credit card/line. Upon award, CONTRACTOR/VENDOR will be contacted by the City's provider, Commerce Bank, to participate in the City's electronic payments program. **CONTRACTOR/ VENDOR must state on Exhibit "A" Contact Sheet whether they accept credit card payments and provide their Accounting Department contact name, phone number and email address.**

15. BID PROTESTS

Bid protest conditions and procedures are in accordance with City Ordinances – Part 2, Chapter 2, Article VII, Division 2, Section 2-444.

16. FEDERAL GRANT MONEY

In the event this project is funded with federal grant monies, CONTRACTOR/VENDOR may not participate in the bid if CONTRACTOR/VENDOR is listed in the Excluded Parties List System (EPLS) a federal suspension and debarment listing www.sam.gov CONTRACTOR/VENDOR shall include copy of search results with bid or proposal.

17. LOBBYING

a. Lobbying is defined as any action taken by an individual, firm, association, joint venture, partnership, syndicate, corporation, and/or all other groups who seek to influence the governmental decision of a Board Member, the City Manager, and/or any City Personnel during the solicitation process. The lobbying black-out period commences upon the issuance of this solicitation and concluded upon the signing of the agreement. CONTRACTORS shall not contact any Commission Member and/or any requesting or evaluating Department/Office personnel during said black-out period. All questions and procedural matters shall be directed to the City Manager. The City Commissioners and/or the City Manager may disqualify any solicitation response where any Commissioner, the City Manager, and/or City Personnel have been lobbied in violation of the black-out period.

EXHIBITS

EXHIBIT "A" **Contact Sheet**

EXHIBIT "A-1" **Bid Form**

EXHIBIT "B" **Public Entity Crimes**

EXHIBIT "C" **Drug-Free Workplace Certification**

EXHIBIT "D" **E-Verify Statement**

EXHIBIT "E" **Proposer Acknowledgements and Agreements**

EXHIBIT "F" **Conflict of Interest**

EXHIBIT "G" **Non-Collusion Affidavit**

EXHIBIT "H" **Disputes Disclosure**

EXHIBIT "I" **Statement of Bidder's Qualifications Form**

EXHIBIT "J" **Addendum Receipt**

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

EXHIBIT "A"

CONTACT SHEET

Name: _____

Federal Taxpayer ID: _____

Mailing Address: _____

City, State, & Zip Code: _____

Telephone: _____ Fax: _____

Email: _____

Submitted By: _____

Title: _____

FIRM Accepts Credit Cards*: Yes No

Accounting Contact:

Name: _____Title: _____

Email Address: _____ Phone: _____

***See preferred method of payment under "Prompt Payment Act" section of the General Conditions**

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

EXHIBIT "A-1" BID FORM – BASE BID

SECTION	DESCRIPTION	QNTY	UNIT	UNIT PRICE	HANDWRITTEN TOTAL COST	TOTAL COST
C-100	CONTRACTOR QUALITY CONTROL & MATERIAL TESTING PROGRAM	1	LS	$	_____ DOLLARS	$
C-102-5.1	TEMPORARY AIR AND WATER POLLUTION, SOIL EROSION, AND SILTATION CONTROL	1	LS	$	_____ DOLLARS	$
C-105-6.1	MOBILZATION	1	LS	$	_____ DOLLARS	$
C-106-4.1	MAINTENANCE & PROTECTION OF TRAFFIC	1	LS	$	_____ DOLLARS	$
C-108-6.1	PROJECT SURVEY & STAKEOUT	1	LS	$	_____ DOLLARS	$
C-108-6.2	AS-BUILT SURVEY	1	LS	$	_____ DOLLARS	$
P-101-5.1	PAVEMENT REMOVAL (BITUMINOUS LAYER ONLY)	900	SY	$	_____ DOLLARS	$
P-101-5.2	PAVEMENT REMOVAL (FULL DEPTH)	800	SY	$	_____ DOLLARS	$
P-151-4.1	CLEARING & GRUBBING (MISCELLANEOUS DEMOLITION), COMPLETE	1	LS	$	_____ DOLLARS	$
P-152-4.1	UNCLASSIFIED EXCAVATION	2420	CY	$	_____ DOLLARS	$
P-152-4.2	EMBANKMENT IN PLACE	780	CY	$	_____ DOLLARS	$

THIS FORM MUST BE INCLUDED WITH BID PROPOSAL

EXHIBIT "A-1" BID FORM – BASE BID

SECTION	DESCRIPTION	QNTY	UNIT	UNIT PRICE	HANDWRITTEN TOTAL COST	TOTAL COST
P-160-6.1	12-INCH SUBGRADE STABILIZATION	800	SY	$	_____ DOLLARS	$
P-200-4.1	6-INCH ROCK BASE COURSE	800	SY	$	_____ DOLLARS	$
P-200-4.2	8-INCH ROCK BASE COURSE	2790	SY	$	_____ DOLLARS	$
P-210-9.1	REWORKING OF LIMEROCK BASE COURSE	900	SY	$	_____ DOLLARS	$
P-409-4.1	1.5-INCH ASPHALT SURFACE COURSE, FDOT SP-12.5MM	70	TON	$	_____ DOLLARS	$
P-409-4.2	2.5-INCH ASPHALT SURFACE COURSE, FDOT SP-12.5MM	500	TON	$	_____ DOLLARS	$
P-411-8.1	PERVIOUS PAVEMENT, COMPLETE	2380	SF	$	_____ DOLLARS	$
P-420-1	8-INCH REINFORCED CEMENT CONCRETE PAVEMENT	1880	SY	$	_____ DOLLARS	$
P-710-5.1	PAINTED PAVEMENT MARKINGS	400	SF	$	_____ DOLLARS	$
T-904-5.1	SODDING	4000	SY	$	_____ DOLLARS	$
T-905-5.1	TOPSOILING	330	CY	$	_____ DOLLARS	$

THIS FORM MUST BE INCLUDED WITH BID PROPOSAL

EXHIBIT "A-1" BID FORM – BASE BID

SECTION	DESCRIPTION	QNTY	UNIT	UNIT PRICE	HANDWRITTEN TOTAL COST	TOTAL COST
428	POTABLE & FIRE WATER SERVICE, COMPLETE, INCLUDING BACKFLOW PREVENTERS AND ALL OTHER ITEMS/APPURTENANCES	1	LS	$	_____ DOLLARS	$
429	SANITARY SEWER, COMPLETE, INCLUDING DIRECTIONAL DRILLING, GRINDER PUMP STATION, OIL/WATER SEPARATOR AND ALL OTHER ITEMS/APPURTENANCES	1	LS	$	_____ DOLLARS	$
450-1	PRIMARY THREE-PHASE FIRE STATION BUIDLING ELECTRICAL POWER SUPPLY TO TRANSFORMER, COMPLETE, INCLUDING CONDUITS, PAVEMENT CROSSING, TRANSFORMER PAD AND ALL INCIDENTALS (PER FPU REQUIREMENTS)	1	LS	$	_____ DOLLARS	$
450-2	SECONDARY POWER SUPPLY FROM TRANSFORMER TO FIRE STATION BUILDING DISCONNECT, COMPLETE	1	LS	$	_____ DOLLARS	$
450-3	PRIMARY SINGLE-PHASE AIRFIELD ELECTRICAL VAULT ELECTRICAL POWER SUPPLY TO TRANSFORMER, COMPLETE, INCLUDING CONDUITS, PAVEMENT CROSSING, TRANSFORMER PAD AND ALL INCIDENTALS (PER FPU REQUIREMENTS)	1	LS	$	_____ DOLLARS	$

THIS FORM MUST BE INCLUDED WITH BID PROPOSAL

EXHIBIT "A-1" BID FORM – BASE BID

SECTION	DESCRIPTION	QNTY	UNIT	UNIT PRICE	HANDWRITTEN TOTAL COST	TOTAL COST
450-4	SECONDARY AIRFIELD ELECTRICAL VAULT ELECTRICAL POWER SUPPLY FROM TRANSFORMER TO VAULT BUILDING, COMPLETE	1	LS	$	_____ DOLLARS	$
460	NATURAL GAS SUPPLY TO GENERATOR & BUILDING INCLUDING DIRECTIONAL DRILLING, COMPLETE	1	LS	$	_____ DOLLARS	$
D-701-5.1	8-INCH SDR-21 STORM SEWER ROOF LEADERS, INCLUDING CLEANOUTS	370	LF	$	_____ DOLLARS	$
D-701-5.2	8-INCH HDPE STORM SEWER WITH CONCRETE BACKFILL IN PAVED AREA	150	LF	$	_____ DOLLARS	$
D-701-5.3	12-INCH HDPE STORM SEWER WITH CONCRETE BACKFILL IN PAVED AREA	53	LF	$	_____ DOLLARS	$
D-751-5.1	12-INCH YARD DRAIN	1	EA	$	_____ DOLLARS	$
D-751-5.2	FDOT TYPE C INLET, MODIFIED, POND CONTROL STRUCTURE	2	EA	$	_____ DOLLARS	$
D-751-5.3	FDOT U-TYPE ENDWALL, INDEX 430-011, MODIFIED FOR 8-INCH PIPE, 4:1 SLOPE, WITH BAFFLES	1	EA	$	_____ DOLLARS	$
D-751-5.4	FDOT MES, INDEX 430-021, MODIFIED FOR 8-INCH PIPE, 4:1 SLOPE	4	EA	$	_____ DOLLARS	$
D-751-5.5	FDOT U-TYPE ENDWALL, INDEX 430-011, MODIFIED FOR 12-INCH PIPE, 4:1 SLOPE, WITH BAFFLES	1	EA	$	_____ DOLLARS	$

THIS FORM MUST BE INCLUDED WITH BID PROPOSAL

EXHIBIT "A-1" BID FORM – BASE BID

SECTION	DESCRIPTION	QNTY	UNIT	UNIT PRICE	HANDWRITTEN TOTAL COST	TOTAL COST
L-108-5.1	AIRFIELD ELECTRICAL DEMOLITION	1	LS	$	_____ DOLLARS	$
L-108-5.2	NO. 8 AWG, 5KV, L-824C CABLE, INSTALLED IN CONDUIT	3000	LF	$	_____ DOLLARS	$
L-108-5.3	BARE COUNTERPOISE WIRE, INSTALLED IN TRENCH OR DUCT BANK, INCLUDING GROUND RODS AND GROUND CONNECTORS	385	LF	$	_____ DOLLARS	$
L-110-5.1	ELECTRICAL CONDUIT (4) 2 INCH PVC SCH. 40, INSTALLED IN TRENCH	370	LF	$	_____ DOLLARS	$
L-115-5.1	30 INCH SQUARE AIRFIELD ELECTRICAL PRECAST CONCRETE PULLBOX WITH FRAME AND COVER	3	EA	$	_____ DOLLARS	$
F-162-5.1	MOTORIZED SLIDING GATE WITH ACCESS CONTROL SYSTEM, COMPLETE	1	LS	$	_____ DOLLARS	$
521-1	WHEEL STOPS	24	EA	$	_____ DOLLARS	$
522-1	4" THICK CONCRETE SIDEWALK, COMPLETE, INCLUDING ADA RAMPS, DETECTABLE WARNINGS, & SIDEWALK CURB	286	SY	$	_____ DOLLARS	$
580	LANDSCAPE INSTALLATION, COMPLETE, INCLUDING REMOVAL & DISPOSAL/RELOCATION OF EXISTING TREES	1	LS	$	_____ DOLLARS	$

THIS FORM MUST BE INCLUDED WITH BID PROPOSAL

CITY OF FERANDINA BEACH
ITB 21-11
FERNANDINA BEACH FIRE STATION NO. 2

EXHIBIT "A-1" BID FORM – BASE BID

SECTION	DESCRIPTION	QNTY	UNIT	UNIT PRICE	HANDWRITTEN TOTAL COST	TOTAL COST
581	IRRIGATION INSTALLATION, COMPLETE	1	LS	$	_____ DOLLARS	$
615	BOLLARDS AT GATE	2	EA	$	_____ DOLLARS	$
700-1	HANDICAPPED PARKING SIGN ON STEEL POST, COMPLETE	2	EA	$	_____ DOLLARS	$
700-2	STOP SIGN ON STEEL POST, COMPLETE	2	EA	$	_____ DOLLARS	$
700-3	EMERGENCY VEHICLE TRAFFIC CONTROL FLASHING SIGNAL - RRFB, COMPLETE	4	EA	$	_____ DOLLARS	$
710-1	FLAG POLE ASSEMBLY, COMPLETE, INCLUDING FOUNDATION	3	EA	$	_____ DOLLARS	$
MISC-1	GENERATOR PAD, COMPLETE	1	LS	$	_____ DOLLARS	$
MISC-2	BIKE RACK, COMPLETE	1	LS	$	_____ DOLLARS	$
B-01	FIRE STATION BUILDING, COMPLETE	1	LS	$	_____ DOLLARS	$
B-02	TRAINING TOWER, PER PLANS, COMPLETE	1	LS	$	_____ DOLLARS	$
A-002	EQUIPMENT/FURNITURE ALLOWANCE	1	FIXED	$40,000	FORTY THOUSAND _____ DOLLARS	$40,000.00
				BASE BID TOTAL	_____ DOLLARS	$

THIS FORM MUST BE INCLUDED WITH BID PROPOSAL

EXHIBIT "A-1" BID FORM – BID ALTERNATE NO. 1

SECTION	DESCRIPTION	QNTY	UNIT	UNIT PRICE	HANDWRITTEN TOTAL COST	TOTAL COST
B-02-ALT	TRAINING TOWER, METAL STRUCTURE WITH CONCRETE FOUNDATION, COMPLETE (INCREASE OR DECREASE TO BASE BID)	1	LS	$	_____ _____ DOLLARS	$

THIS FORM MUST BE INCLUDED WITH BID PROPOSAL

UNIT PRICES

Additions to or deductions from Base Bid quantities will be computed in accordance with the following fixed unit prices which include all direct and indirect construction costs, overhead, profit, and taxes. The undersigned agrees that such unit prices represent the total cost to the City for additions to or deductions from the Contract Sum.

PARTICULARS

THE FOLLOWING IS THE LIST OF SEPARATE PRICES REFERENCED IN THE BID SUBMITTED BY:
(BIDDER): _____
DATED _____ AND WHICH IS AN INTEGRAL PART OF THE BID FORM.

ITEM DESCRIPTIONS

5.01 ITEM #1:
A. Description: Gear Washer & Gear Dryer Complete
B. Value: $ _____

5.02 ITEM #2:
A. Description: Generator Complete
B. Value: $ _____

5.03 ITEM #3:
A. Description: Access Gate including Operator Complete
B. Value: $ _____

5.04 ITEM #4:
A. Description: 4-Fold Apparatus Bay Doors Complete
B. Value: $ _____

5.05 ITEM #5:
A. Description: Curve Acoustic Cloud System Complete
B. Value: $ _____

5.06 ITEM #6:
A. Description: Commercial Kitchen Hood with Ansul System Complete
B. Value: $ _____

5.07 ITEM #7:
A. Description: Commercial Gas Range with Griddle/Broiler Complete
B. Value: $ _____

5.08 ITEM #8:
A. Description: Exhaust Fan KEF-1 Complete
B. Value: $ _____

5.09 ITEM #9:
A. Description: Make-Up Air Unit MAU-1 Complete
B. Value: $ _____

THIS FORM MUST BE INCLUDED WITH BID PROPOSAL

This Bid is submitted by:

An Individual

Name (typed or printed): _____

By: _____
(Individual's signature)

Doing business as: _____

A Partnership

Partnership Name: _____

By: _____
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability): _____

By: _____
(Signature -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(CORPORATE SEAL)

Attest _____

Date of Qualification to do business in Florida is ____/____/____.

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

A Joint Venture

Name of Joint Venture: _____

First Joint Venturer Name: _____ (SEAL)

By: _____

(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____
Title: _____

Second Joint Venturer Name: _____
(SEAL)

By: _____

(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(Each joint venture entity must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)Bidder's

Business Address
_____
_____

Phone No. _____ Fax No. _____

E-mail _____ _____

SUBMITTED on_____ 20 ____.
State Contractor License No. _____

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

EXHIBIT "B"

SWORN STATEMENT UNDER F.S. SECTION 287.133(3) (A), ON PUBLIC ENTITY CRIMES
THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICER AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted with Bid, Proposal or Contract for _____.

2. This sworn statement is submitted by (entity) _____ whose business address is _____ and (if applicable) Federal Employer Identification Number (FEIN) is _____(If a Sole Proprietor and you have no FEIN, include the last four (4) digits of your Social Security Number: _____.)

3. My name is_____and my relationship to the entity named above is _____.

4. I understand that a "public entity crime" as defined in Paragraph 287.133(a) (g). Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or with the United States, including, but not limited to, any proposal or contract for goods or services to be provided to any public entity or any agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

5. I understand that "convicted" or "conviction" as defined in paragraph 287.133(a) (b), Florida Statutes, means finding of guilt or a conviction of a public entity crime with or without an adjudication of guilt, in any federal or state trial court of records relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or nolo contendere.

6. I understand that an "affiliate" as defined in Paragraph 287.133(1) (a), Florida Statutes, means:

    1. A predecessor or successor of a person convicted of a public entity crime; or

    2. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The City of Fernandina Beach, Florida ownership by one of shares constituting a controlling income among persons when not for fair interest in another person, or a pooling of equipment or income among persons when not for fair market value under a length agreement, shall be a prima facie case that one person controls another person. A person who was knowingly convicted of a public entity crime, in Florida during the preceding 36 months shall be considered an affiliate.

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

7. I understand that a "person" as defined in Paragraph 287.133(1) (e), Florida Statutes, means any natural person or entity organized under the laws of the state or of the United States with the legal power to enter into a binding contract for provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

8. Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement. (Please indicate which statement applies)

____ Neither the entity submitting this sworn statement, nor any officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, nor affiliate of the entity have been charged with and convicted of a public entity crime subsequent to July 1, 1989.

____ The entity submitting this sworn statement, or one or more of the officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. (Please attach a copy of the final order.)

____ The person or affiliate was placed on the convicted FIRM list. There has been a subsequent proceeding before a hearing officer of the State of Florida, Division of Administrative Hearings. The final order entered by the hearing officer determined that it was in public interest to remove the person or affiliate from the convicted FIRM list. (Please attach a copy of the final order.)

____ The person or affiliate has not been placed on the convicted FIRM list. (Please describe any action taken by, or pending with, the Department of General Services.)

_____
Signature Date:

STATE OF FLORIDA
COUNTY OF _____
PERSONALLY, APPEARED BEFORE ME, the undersigned authority, who, after first being sworn by me, affixed his/her signature at the space provided above on this ___ day of _____, 20___, and is personally known to me, or has provided _____ as identification.

_____
Notary Public
My Commission expires: _____

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

EXHIBIT "C"

DRUG-FREE WORKPLACE CERTIFICATION

The below-signed INDIVIDUAL/FIRM certifies that it has implemented a drug-free workplace program. In order to have a drug-free workplace prepare, a business shall:

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violation of such prohibition.
2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or services a copy of the statement specified in paragraph 1.
4. In the statement in paragraph 1., notify the employees that, as a condition of working on the commodities or contractual services that are under proposal, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of nolo contendere to, any violation occurring in the workplace no later than five (5) working days after such conviction.
5. Impose a sanction on, or require fine satisfactory participation in drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is convicted.
6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

As the person authorized to sign this statement, I Certify that this firm complies fully with the above drug-free workplace requirements.

COMPANY: _____

CITY: _____ STATE: _____ ZIP CODE: _____

SIGNATURE: _____PHONE:_____

NAME (TYPED OR PRINTED):_____TITLE:_____

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

EXHIBIT "D"

E-VERIFY STATEMENT

Bid/Proposal Number: _____

Project Description: _____

_____

I/FIRM acknowledges and agrees to the following:

I/FIRM shall utilize the U.S. Department of Homeland Security's E-Verify system, in accordance with the terms governing use of the system, to confirm the employment eligibility of:

1. All persons employed by the FIRM during the term of the Contract to perform employment duties within Florida; and

2. All persons assigned by the FIRM to perform work pursuant to the contract with the Department.

Individual/Company/Firm: _____

Authorized Signature: _____

Title: _____

Date: _____

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

EXHIBIT "E"

PROPOSER ACKNOWLEDGEMENTS AND AGREEMENTS

The undersigned, as an employee or agent of the Proposer, having the authority to sign a binding agreement on behalf of the corporation, company, or firm presenting this submittal, confirms understanding and/or agreement and/or takes exception with any statement in the following sections of this RFP document.

1. INTRODUCTION AND GENERAL INFORMATION
   Understands and agrees to all terms.

2. PROPOSAL INSTRUCTIONS, TERMS AND CONDITIONS
   Understands and agrees to all terms.

3. EVALUATION AND CONTRACT OVERVIEW
   Understands and agrees to all terms.

4. PROPOSER'S RESPONSE: SUBMITTAL INFORMATION
   Understands and agrees to all terms.

5. PROPOSER'S RESPONSE: PROPOSED TEAM
   Understands and agrees to all terms.

6. PROPOSER'S RESPONSE: PROPOSED COMPENSATION
   Understands and agrees to all terms.

Name: _____Title: _____

Signature: _____Date: _____

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

EXHIBIT "F"

CONFLICT OF INTEREST STATEMENT

This sworn statement is submitted with Bid, Proposal or Contract for _____.

This sworn statement is submitted by (entity) _____ whose business address is _____ and (if applicable) Federal Employer Identification Number (FEIN) is _____(If a Sole Proprietor and you have no FEIN, include the last four (4) digits of your Social Security Number: _____.)
My name is_____and my relationship to the entity named above is_____.

1. The above-named entity is submitting a Proposal for the City of Fernandina Beach.
2. The Affiant has made diligent inquiry and provides the information contained in the Affidavit based upon his/her own knowledge.
3. The Affiant states that only one submittal for the above proposal is being submitted and that the above-named entity has no financial interest in other entities submitting proposals for the same project.
4. Neither the Affiant nor the above-named entity has directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraints of free competitive pricing in connection with the entity's submittal for the above proposal. This statement restricts the discussion of pricing data until the completion of negotiations if necessary and execution of the Contract for this project.
5. Neither the entity not its affiliates, nor anyone associated with them, is presently suspended or otherwise ineligible from participation in contract letting by any local, State, or Federal Agency.
6. Neither the entity nor its affiliates, nor anyone associated with them have any potential conflict of interest due to any other clients, contracts, or property interests for this project.
7. I certify that no member of the entity's ownership or management is presently applying for an employee position or actively seeking an elected position with the City of Fernandina Beach.
8. I certify that no member of the entity's ownership or management, or staff has a vested interest in any aspect of the City of Fernandina Beach.
9. In the event that a conflict of interest is identified in the provision of services, I, on behalf of the above-named entity, will immediately notify the City of Fernandina Beach.

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

_____
Signature Date:

STATE OF FLORIDA
COUNTY OF _____

PERSONALLY, APPEARED BEFORE ME, the undersigned authority, who, after first being sworn by me, affixed his/her signature at the space provided above on this ___ day of _____, 20___, and is personally known to me, or has provided _____ as identification.

_____ My Commission expires: _____
Notary Signature

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

EXHIBIT "G"

NON-COLLUSION AFFIDAVIT

This sworn statement is submitted with Bid, Proposal or Contract for _____.
This sworn statement is submitted by (entity) _____ whose business address is _____ and (if applicable) Federal Employer Identification Number (FEIN) is _____(If a Sole Proprietor and you have no FEIN, include the last four (4) digits of your Social Security Number: _____.)

My name is_____and my relationship to the entity named above is_____.

1. The above named is fully informed respecting the preparation and contents of the attached submittal and of all pertinent circumstances respecting such submittal;
2. Such Submittal is genuine and is not a collusive or sham submittal;
3. Neither the said Submitter nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affiant, has in any way colluded, connived, or agreed, directly or indirectly, with any other Bidder, firm or person to submit a collusive or sham Submittal in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm, or person to fix the price or prices in the attached submittal or any other Bidder, or to fix any overhead, profit or cost element of the submittal price or the submittal price of any other Bidder, or to secure through any collusion, connivance, or unlawful agreement any advantage against the City of Fernandina Beach, Florida or any person interested in the proposed Contract; and
4. The price or prices quoted in the attached submittal are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

_____
Signature Date:

STATE OF FLORIDA
COUNTY OF _____

PERSONALLY, APPEARED BEFORE ME, the undersigned authority, who, after first being sworn by me, affixed his/her signature at the space provided above on this ___ day of _____, 20__, and is personally known to me, or has provided _____ as identification.

_____ My Commission expires: _____
Notary Signature

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

EXHIBIT "H"

DISPUTES DISCLOSURE FORM

Answer the following questions by placing as "X" after "YES" or "NO". If you answer "YES", please explain in the space provided, or via attachment.

Has your firm or any of its officers, received a reprimand of any nature or been suspended by the Department of Professional Regulations or any other regulatory agency or professional association within the last five (5) years?
YES___ NO____

Has your firm, or any member of your firm, been declared in default, terminated or removed from a contract or job related to the services your firm provides in the regular course of business within the last five (5) years?
YES_____NO_____

Has your firm had against it or filed any request for equitable adjustment, contract claims, bid protest, or litigation in the past five (5) years that is related to the services your firm provides in the regular course of business?
YES_____NO_____

If yes, state the nature of the request for equitable adjustment, contract claim, litigation, or protest, and state a brief description of the case, the outcome or status of the suit and the monetary amounts or extended contract time involved.

I hereby certify that all statements made are true and agree and understand that any misstatement or misrepresentation or falsification of facts shall be cause for forfeiture of rights for further consideration of this proposal for the City of Fernandina Beach.

_____

Firm Date

_____

Authorized Signature Printed or Typed Name and Title

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

EXHIBIT "I"

STATEMENT OF BIDDERS QUALIFICATIONS FORM

All questions in this section must be answered. The data provided must be clear and comprehensive. This statement must be signed and notarized. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information he/she desires in response to each question.

The Sponsor reserves the right to reject any bid proposal that is not supported by documented qualifications and recent, relevant, successful project experience from the bidder, bidder's principal, bidder's project manager, bidder's construction superintendent or other related factor listed within this section.

1. Name of Bidder: _____

2. Permanent office address: _____

3. Years at permanent office address: _____

4. What is the general character of work performed by your company: _____

5. How many years has the firm been engaged in the business related to this project, under present firm or trade name? _____

6. Are you licensed to do business as a contractor in Florida for this project? Yes No

7. Has your contractor's license been revoked at any time in the last five years? Yes No

8. Has a surety firm completed a contract on your behalf, or paid for completion because your firm was in-default or terminated (in any way) by the project owner within the last five years? Yes No

9. At the time of submitting this form, is your firm ineligible to bid on or be awarded any local, state or federal public works contract, or perform as a subcontractor on any such public works contract? Yes No

10. At any time during the last five years, has your firm or any of its owners or officers been convicted of a crime involving the awarding of a contract of a government construction project, or the bidding or performance of a government contract? Yes No

11. In the past five years, have you ever failed to complete any work awarded to you? Yes No

12. In the past five years, have you ever been terminated by the Owner of a project? Yes No

13. In the last five years has your firm been assessed and paid liquidated damages prior to or after completion of the project under a construction contract with either a public or private owner? Yes No

14. In the last five years has your firm been debarred, disqualified, removed or otherwise prevented from bidding on, or completing any government agency or public works project for any reason? Yes No

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

15. In the past five years has any claim against your firm concerning your firm's work on a construction project been filed in court or arbitration? Yes No

16. In the past five years has your firm filed any claim against a project owner or consultant concerning work on a project or payment for a contract and filed that claim in court or arbitration? Yes No

17. In the last five years, have you sued an Owner of a project? Yes No

18. In the past five years, have you sued a Consultant (engineer, architect or other) representing the Owner of a project? Yes No

19. Identify and list all administrative, arbitration, or litigation actions, terminations, construction claims or the like (cumulatively referred to as "claims") related to issues arising from any construction contract performed within the past five years for which the Bidder or its team members was a party. For each claim, identify the project, the parties to the claim, the court or jurisdiction (if applicable), the initiator of the claim and the final resolution, or if not resolved the status (attach additional sheets as needed).

_____
_____
_____
_____

20. Experience for Bidder (Business / Corporation): Relevant and recent experience in similar work by the Bidder is required on this project. Please provide the following information on three (3) projects completed:

1. Scope (size, type of construction, dollar-value) of the projects:
2. Client's name, titles, and telephone numbers:
3. Dates of Completion:

21. Experience for Bidder (Principal / Owner responsible for this project): Relevant and recent experience in similar work by the Bidder's Principal / Owner (responsible for this project) is required on this project. Please provide the following information on three projects completed in the past three years:

1. Scope (size, type of construction, dollar-value) of the projects:
2. Client's name, title, and telephone numbers:
3. Dates of Completion:

22. Experience for Bidder (Business / Corporation): Relevant and recent experience in similar work by the Bidder is required on this project. Please provide the following information on three projects completed in the past three years:

1. Scope (size, type of construction, dollar-value) of the projects:
2. Client's name, title, and telephone numbers:
3. Dates of Completion:

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

23. Experience for Bidder (Project Manager): Relevant and recent experience in similar work is by the Bidder's Project Manager is required on this project. Please provide the following information on three projects completed in the past three years:

1. Scope (size, type of construction, dollar-value) of the projects:
2. Client's name, title, and telephone numbers:
3. Dates of Completion:

24. Experience for Bidder (Construction Superintendent): Relevant and recent experience in similar work by the Bidder's Construction Superintendent is required on this project. Please provide the following information on three projects completed in the past three years:

1. Scope (size, type of construction, dollar-value) of the projects:
2. Client's name, title, and telephone numbers:
3. Dates of Completion:

25. Experience for Major Subcontractor (Any subcontractor that is completing more than 10% of the work): Relevant and recent experience in similar work by any subcontractor that is completing more than 10% of the work is required on this project. Please provide the following information on three projects completed in the past three years:

1. Scope (size, type of construction, dollar-value) of the projects:
2. Client's name, title, and telephone numbers:
3. Dates of Completion:

26. Primary Bank Reference: _____
_____
_____
_____

27. Bonding Capacity: Provide documentation from your surety identifying the following:

Name of bonding company / surety: _____
Name of surety agent: _____
Address: _____
Phone: _____

28. Will you, upon request, fill out a detailed financial statement and furnish any other pertinent information that may be required by the Owner? Yes No

The undersigned hereby authorizes and requests any persons, firm, or corporation to furnish any information requested by the Owner, in verification of the recitals comprising this Statement of Bidder's Qualifications.

Dated at _____, this _____ day of _____, 20___.

_____ By: _____
(Contractor)

Title: _____

_____, being duly sworn deposes and says that he/she is of

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

_____and that the answers to the foregoing questions and all statements therein contained are true and correct.

SUBSCRIBED AND SWORN to before me this _____ day of _____, 20___.

Notary's Signature _____

Notary's Printed Name_____

NOTARY PUBLIC, STATE OF _____

My commission expires:
_____, 20 ____

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

EXHIBIT "J"

ADDENDUM RECEIPT

Addendum No.	Dated
_____	_____
_____	_____
_____	_____
_____	_____

_____
NAME OF BIDDER

BY: _____
NAME

_____
TITLE

Business Address: _____

_____

Telephone Number: _____

Manufacturer's or
Contractor's I.D. No. _____

THIS FORM MUST BE INCLUDED WITH BID/PROPOSAL

"ATTACHMENT B"
CITY OF FERNANDINA BEACH
"SAMPLE CONTRACT" AND GENERAL CONDITIONS
FOR
CONSTRUCTION SERVICES

This **AGREEMENT** made on the _____ day of _____in the year of 20____, **BETWEEN** the owner, CITY OF FERNANDINA BEACH, 204 Ash Street, Fernandina Beach, FL 32034 (hereinafter referred to as "Owner" or "City") and the Contractor, (insert Name, Address, City, State, Zip)

PROJECT: FERNANDINA BEACH FIRE STATION NO 2

CONTRACTOR:

ARCHITECT/ENGINEER: PASSERO ASSOCIATES

The OWNER and CONTRACTOR agree as follows:

ARTICLE 1 - CONTRACT DOCUMENTS

1. Enumeration of Contract Documents

Contract Documents comprise this Agreement, the plans, drawings, specifications, project manual, addenda, and other materials contained in City of Fernandina Beach Bid Number_____. Documents comprising Bid Number _____are incorporated into this Agreement by reference and are a part of this Agreement as if attached or repeated herein. This Agreement represents the entire Agreement between the parties hereto and supersedes any prior negotiations, representations, agreements, or understandings, either written or oral.

2. Intent of Contract Documents

Execution of the Contract by the Contractor is a representation that the Contractor has become familiar with the Contract Documents and field conditions under which the Work is to be performed within the requirements of Work specified by the Contract Documents.

The headings of the sections of this Agreement and capitalizations are for the purpose of convenience only and shall not be deemed to expand or limit the provisions contained in such sections.

3. Definitions:

Definitions are provided in Appendix 1 of this Agreement.

ARTICLE 2 - SCOPE OF WORK

The Contractor shall execute the entire Work described in the Contract Documents, Summary of Work.

ARTICLE 3 - COMMENCEMENT DATE

The Commencement Date shall be established by the Owner and communicated to the Contractor in a Notice to Proceed (NTP) sent by registered mail to the Contractor's place of business not later than 30 days following execution of the Contract, or receipt of all insurance certificates, bonds, and Schedules of Values required by the Contract, whichever is later. Failure to provide the required insurance or bonds within ten (10) days of the Award of Bid shall constitute a delay by the Contractor in honoring his Bid.

The Contractor will not commence Work on the project until receiving a Notice to Proceed from the Owner.

ARTICLE 4 - SUBSTANTIAL COMPLETION DATE

The Contractor shall commence work within ten calendar days from the date of Notice to Proceed. The Contractor shall achieve Substantial Completion of the Work not later than _____consecutive calendar days after the date specified by the Notice to Proceed, subject to adjustments of the Contract Time as provided in the Contract Documents. The Contractor shall achieve Final Completion of the work not later than thirty (30) days after reaching Substantial Completion.

Time limits herein 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.

ARTICLE 5 - CONTRACT AMOUNT

The Owner shall pay the Contractor the sum of $_____ subject to additions and deductions as provided in the Contract Documents for all Work described in Article 2.

ARTICLE 6 - LIQUIDATED DAMAGES

The Contractor and Owner mutually agree that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will ensure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the Work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing.

If the said Contractor shall neglect, fail or refuse to complete the work within the time specified, or any proper extension thereof granted in

accordance with this Agreement, then the Contractor does hereby agree, as a part consideration for the award of this contract, to pay to the Owner Five Hundred Dollars ($500.00) per calendar day from the twenty first day beyond the Substantial Completion Date not as a penalty but as liquidated damages for such breach of Contract. Furthermore, the Contractor agrees to pay to the Owner the amount of Five Hundred Dollars ($500.00) for each calendar day that the Work remains incomplete after the date established for Final Completion.

The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticably and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain. Also, failure to meet requirements for substantial or final completion shall subject the Contractor to reinspection fees as set forth in the specifications.

In addition to liquidated damages, should the Owner become liable for additional architectural fees due to delays by the Contractor which extend construction beyond the contracted construction time, the Contractor shall be liable for payment of such expenses to the Owner.

Both Liquidated Damages and Reinspection Fees shall be implemented using a Deductive Change Order or Construction Change Directive. The exact form used and its titling of such change order shall be as determined by the Owner.

ARTICLE 7 - PAYMENTS

1. Progress Payments

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

The period covered by each Application for Payment shall be one calendar month ending on the last day of the month.

Provided an Application for Payment is received by the Architect/Engineer not later than the 15th day of the month, the Owner shall make payment to the Contractor not later than the last day of the month. If a valid Application for Payment is received by the Architect/Engineer after the Application date fixed above, payment shall be made 15 days after the Architect/Engineer received the Application for Payment.

Each Application for Payment shall be based upon the Schedule of Values submitted by the Contractor in accordance with the Contract Documents.

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

Subject to the provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

Take that portion of the Contract Amount properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the total Contract Amount allocated to that portion of the Work in the Schedule of Values, less retainage of 10%.

Add that portion of the Contract Amount properly allocable to materials and equipment delivered and stored at the Project Site for subsequent incorporation into the Work, less retainage of 10%.

Subtract the aggregate of previous payments made by the Owner.

The progress payment amount shall be further modified under the following circumstances:

Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to 90% of the Contract Amount, less such amounts as the Architect/Engineer and Owner shall determine for incomplete Work and unsettled claims.

2. Final Payment

Final payment, comprising the entire unpaid balance of the Contract Amount, shall be made by the Owner to the Contractor when the Contract has been fully performed and accepted by the Owner. Final payment shall be contingent upon the Contractor providing all warranties, guaranties and waivers of liens required under the Project Closeout Section of the Specifications. Furthermore, payment shall be made in accordance with the Florida Prompt Payment Act applicable to local governments.

3. Certifying a Schedule of Values

Within 10 days after award of the Contract, the Contractor shall submit to the Architect/Engineer a Schedule of Values allocating the values

of various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Architect/Engineer or Owner may require. This Schedule of Values shall be reviewed by the Architect/Engineer and approved by the Owner, and shall be used as the basis for reviewing the Contractor's Applications for Payment.

The Schedule of Values shall include a cost breakdown indexed per the Sections of the Specifications, which shall clearly set forth labor as distinct from materials and from equipment. Rough-in work shall be shown separately from finish work.

4. Contractor Applications for Payment

By the 15th of each month the Contractor shall submit to the Architect/Engineer an itemized Application for Payment in accordance with the Schedule of Values. Such application shall be supported by data substantiating the Contractor's right to payment as the Owner or Architect/Engineer may require. Payment shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation into Work. If approved in writing by the Owner, payment may similarly be made for materials and equipment suitably stored off the site.

Applications for Payment shall not include:

- Request payments on account of changes in the Work which have not been approved by the Owner in a Change Order; and
- Payment of amounts the Contractor does not intend to pay to a Subcontractor or Supplier because of a dispute or other reason.

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 all work, equipment and materials included in the Application for Payment are to the best of the Contractor's knowledge, information and belief, free from liens, claims, security interests or encumbrances.

5. Certification of Payment Requests

Within seven (7) days after receipt of a Contractor's Application for Payment, the Architect/Engineer, in consultation with the Owner, will issue a Certificate for Payment for an amount the Architect/Engineer and Owner determines is due, or notify the Contractor in writing of the reasons for withholding certification. A Certificate for Payment shall not constitute acceptance of Work not in accordance with the Contract Documents.

6. Criteria for Withholding A Certificate for Payment

The Architect/Engineer or Owner may withhold approval of a Certificate for Payment or, because of subsequent events, may nullify a prior approval of payment in whole or in part if in the Architect/Engineer's or Owner's opinion Contractor representations to the Owner are not supported or are deemed inaccurate. If the Contractor and Architect/Engineer or Owner cannot agree on a revised amount, the Architect/Engineer will promptly issue a Certificate of Payment for the amount to which the Architect/Engineer and Owner are able to certify payment. Certification may be withheld for these reasons:
Defective Work not corrected;

- Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Amount
- Damages owed to the Owner or others;
- 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 estimated Liquidated Damages; or
- Failure by Contractor to make payments properly and promptly to subcontractors or suppliers; or
- Persistent failure to carry out the Work in accordance with the Contract Documents or other material breach by Contractor.

When reasons for withholding certification are corrected, the Architect/Engineer and Owner will certify amounts previously withheld.

ARTICLE 8 - TERMINATION OR SUSPENSION OF THE CONTRACT

1. Termination by The Contractor

The Contractor may terminate the Contract if work is stopped for a period of 60 days or longer for the following reasons:

- Issuance of a Stop Work Order by a court regulatory agency having jurisdiction over the project; or
- An act of Government making materials or labor unavailable.

If any one of the reasons stated above exists, the Contractor shall be compensated as provided in this Agreement only for Work executed in accordance with the Contract Documents.

2. Termination by The Owner For Cause

The Owner may terminate the Contract due to the Contractor's inability to perform for these reasons:

- Refusal or failure to supply properly skilled workers or materials;
- Disregarding the laws, ordinances or regulations of public authorities having jurisdiction over the Work; or
- Substantially breaching provisions of the Contract Documents.

If such conditions exist the Owner may, without prejudice of any other rights or remedies of the Owner, after having given the Contractor and the Contractor's surety seven days written notice, terminate the Agreement and, subject to any prior rights of the surety:

- Take possession of the site and materials, equipment, tools, and machinery therein owned by the Contractor;
- Accept assignment of Subcontracts; and
- Finish the work by whatever means are available to the Owner.

Should the Work be terminated according to this section the Contractor shall not be entitled to receive further payment until the Work is finished.

If the unpaid balance of the Contract Amount exceeds the costs of finishing the work, such excess shall be used to pay the Contractor amounts due for materials and equipment stored on site and Work completed in accordance with the Contract Documents which has been Certified by the Architect/Engineer and accepted by the Owner. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the Owner, which obligation for payment shall survive the termination of the Agreement.

The costs of finishing the Work include, without limitation, all reasonable attorney's fees, additional title costs, insurance, additional interest because of delay in completing the Work, and all other direct, indirect, and consequential costs incurred by the Owner by reason of the termination of the Contractor as stated herein. The Owner shall be entitled to hold all amounts due the Contractor at the date of termination until all of the Owner's costs have been established, and to apply such amounts to such costs.

Should the Owner's termination of the Contractor for Cause be challenged, and should such challenge prevail, then the Owner's termination of the Contractor shall be deemed to have been a Termination for Convenience, and Contractor's entitlement to compensation shall be determined in accordance with paragraph 3 below.

3. Termination by the Owner for Convenience

The Owner may, without cause, order the Contractor in writing to suspend, delay or terminate the Work in whole or in part for such period of time the Owner may determine. The Owner shall adjust the Contract Amount for increases in the cost of performance under the Contract caused by suspension, delay, or interruption.

No change in Contract Amount shall be made where the suspension, delay, or interruption for which the Contractor is responsible or attributable.

In the event of termination for convenience by the Owner, the Contractor shall only be entitled to and paid compensation earned through the date of termination and Termination Expenses. Termination Expenses are those jobsite costs directly attributable to termination (such as jobsite demobilization costs). Contractor shall not be entitled to direct, indirect, or consequential damages, or other damages for loss from and including, but not limited to economic loss, lost profit on under-performed portions of the work, loss of anticipated profits, idle equipment expenses, interest or carrying costs, overhead expenses, loss of efficiency, or loss of productivity, lost or reduced bonding capacity.

ARTICLE 9 - EXECUTION OF THE PROJECT

A. OBLIGATIONS OF THE ARCHITECT/ENGINEER

1. Architect/Engineer as Owner's Representative

The Architect/Engineer will provide project management services as described in the Contract Documents, and will serve as the Owners representative during construction, and until final payment is certified. The Architect/Engineer will consult with and advise the Owner. The Architect/Engineer will have the authority to act on behalf of the Owner only to the extent as provided in the Contract documents.

The Architect/Engineer specifically assumes no duty or responsibility which may be construed as being for the benefit of and thereby enforceable by other parties providing labor, materials or services in connection with the Work such as, though not limited to, Contractor, Subcontractors, Sub-subcontractors, their agents, employees, or any of their bonding companies, it being understood that the Architect/Engineer's obligations are to the Owner, and in performing such obligations the Architect/Engineer may consequently alter the burdens and expense of such other parties. If the Contractor claims additional cost or time on account of the Architect/Engineers performing such obligations, the Contractor shall give notice as provided in Article 13.

The Owner and Contractor shall communicate through the Architect/Engineer. Communications by and with the Architect/Engineer and Architect/Engineer's consultants shall be through the Architect. Communications by and with subcontractors and suppliers shall be through the Contractor. Communication by and with other Contractors working on the site which are not parties to this Agreement shall be through

the Owner.

2. Monitoring Progress, Quality and Compliance with Contract Requirements

The Architect will perform site inspections at critical stages of construction to become generally familiar with progress and quality of completed Work to determine if in general the Work is performed in accordance with the Contract Documents. The Architect will have authority to reject work which does not comply with the Contract Documents. Wherever considered necessary, the Architect may require additional inspection or testing of the Work whether the Work is fabricated, installed or completed.

The Architect will not have control over or charge of and will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility. The Architect will not be responsible for the Contractor's failure to carry out the Work in accordance with 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 of any other persons performing portions of the Work.

Actions of the Architect undertaken while providing administration of the Contract shall not be construed as either supervision or coordination, since these are solely the Contractor's responsibility.

3. Review and Approval of Contractor's Submittals

The Architect will review and approve the Contractor's Submittals, such as shop drawings and product samples, for the limited purpose of checking for compliance with the Contract Documents. The Architect's review does not relieve the Contractor of his obligations under the Contract to comply with the plans and specifications.

The Architect's approval of a submittal which contains a deviation which has not been specifically called to the Architect's attention excludes approval of that deviation and shall not serve as a waiver of the rights of the Architect or Owner unless the Architect makes specific written acceptance of said deviation on the Architect's letterhead or Owner makes specific written acceptance of said deviation on the Owner's letterhead.

4. Interpret Plans

The Architect will provide interpretations of the Plans and Specifications for compliance with the Contract Documents. The Architect's response to interpretation requests shall be made with reasonable promptness, or a maximum of 15 days from the date of written request.

Interpretations of the Architect will be consistent with the intent of the Contract Documents and will be documented in writing or in the form of plans and drawings.

The Architect may, as the Architect judges desirable, issue additional drawings or information indicating in greater detail the construction or design of the various parts of the Work; such drawings or information may be affected by field order or other notice to the Contractor, and provided such drawings or information are reasonably consistent with the previously existing Contract Documents, the Work shall be executed in accordance with such additional drawings or information without additional cost or extension of the Contract Time. If the Contractor claims additional cost or time on account of such additional drawings or information, the Contractor shall give the notice provided in Article 13.

5. Approving Non-Substantial Deviations

The Architect will have the authority to order minor changes in the Work not involving adjustments of Contract Amount or Contract Time, and which is not inconsistent with the intent of the Contract Documents. Such changes shall be implemented by issuing a Construction Change Directive which shall be immediately binding on the Contractor upon receipt.

6. Certifying Applications for Payment

Based on the Architect's observations and evaluations of the Contractor's Applications for Payment, the Architect will review amounts due the Contractor and will, upon approval by Owner, issue Certificates for Payments.

7. Preparing Change Orders

The Architect will prepare Change Orders for approval by the Owner.

8. Substantial Completion and Acceptant Reviews

The Architect will conduct inspections, and if Work is found Complete by the Owner and Architect, establish the date or dates of Substantial

Completion and the date of Final Completion. The Architect will receive and forward to the Owner for the Owners' review, project records, written warranties and related documents required by the Contract and assembled by the Contractor. The Architect will issue a final Certificate for Payment upon compliance with requirements of the Contract Documents and acceptance by the Owner.

B. OBLIGATIONS OF THE OWNER

1. Project Manager

The Owner will designate a Project Manager, through which the City will communicate with the Architect and Contractor.

2. Information Provided by Owner

The Owner shall furnish surveys describing physical characteristics of the site, and utility locations.

Information or services requested by the Contractor and under the Owner's control shall be promptly supplied to the Contractor in order to promote orderly progress of the Work. Such information and services will be provided to the Contractor free, unless otherwise provided in the Contract Documents.

The Owner will furnish the Contractor, free of charge, a maximum of ten sets of Construction Documents.

The Owner disclaims any responsibility for information not expressly set forth in the plans or specifications. Therefore, the Owner shall not be responsible for archived information or other information that may be in the Owner's possession or control, but which has not been utilized by the Project Architect and expressly contained, depicted, or otherwise expressly set forth in the Contract Documents.

3. Permits

Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for any and all Permits necessary to construct the facilities described by the Contract Documents.

4. Owner's Right to Stop Work

If the Contractor fails to correct Work which is not in accordance with requirements of the Contract Documents or persistently fails to carry out Work in accordance with the Contract Documents, the Owner may order the Contractor to stop work or any portion thereof until the cause of such order has been eliminated. Such an order must be in writing.

5. Owner's Right to Carry Out Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, after giving seven (7) days written notice, the Owner may without prejudice to other remedies, correct such deficiencies. In such a case, a Change Order shall be issued deducting from the Contract Amount the cost of correcting such deficiencies, including additional design and administrative costs as may be necessary by the default, neglect, or failure.

6. Interpretation of Contract Documents and Performance

In all matters concerning performance under this Agreement and requirements of the Contract Documents, the Owner's interpretation will prevail.

7. Approving Substantial Deviations

The Owner will approve in writing all changes in the Work involving:

- Adjustments to the Contract Amount;
- Contract Time; or
- Work that is inconsistent with the Intent of the Contract Documents.

8. Owner's Right to Expedite Schedule

If Owner determines, in its reasonable opinion, that the performance of the Work as of any date during construction has not progressed or reached the level of completion required by the Contract Documents and/or the construction schedule acceptable to Owner, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction including, without limitation, (I) working additional shifts or overtime, (ii) supplying additional manpower, equipment and facilities, and (iii) other similar measures (hereinafter referred to collectively as "Corrective Measures"),. Such Corrective Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents and the construction schedule. The Contractor shall not

be entitled to an adjustment in the Contract Sum in connection with Corrective Measures required by Owner pursuant to this paragraph. The Owner may exercise the rights furnished hereunder or specifically pursuant to this paragraph as frequently as Owner deems reasonably necessary to ensure that the Contractor's performance of the Work will comply with the construction schedule and the Contract Documents.

Such changes shall be affected by a Change Order signed by the Contractor, Architect, and the Owner.

C. OBLIGATIONS OF THE CONTRACTOR

1. Superintendent

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.

2. Review of Contact Documents

The Contractor shall carefully review Contract Documents and information provided by the Owner, and shall at once report to the Architect any errors, omissions, or inconsistencies discovered.

If the Contractor performs any construction activities with knowledge of an error, omission or inconsistencies in the Contract Documents without such notice to the Architect, the Contractor shall assume responsibility for such performance.

3. Review of Field Conditions

The Contractor shall take field measurements and verify field conditions and carefully compare such with the Contract Documents before commencing the Work. Errors, omissions or inconsistencies discovered shall be reported to the Architect at once. The Contractor and each Subcontractor shall evaluate and satisfy themselves as to the conditions and limitations under which the Work is to be performed, including, without limitation (1) the location, condition, layout and nature of the Project site and surrounding areas, (2) generally prevailing climatic conditions, (3) anticipated labor supply and costs, (4) availability and cost of materials (except for unforeseeable serious material shortages), tools and equipment, (5) availability of temporary utility service and (6) other similar issues. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. Except as set forth in subparagraph

10.1.2, the Contractor shall be solely responsible for providing a safe workplace. The Owner shall not be required to make any adjustment in either the Contract Sum or Contract Time in connection with any failure by the Contractor of any Subcontractor to comply with the requirements of this Subparagraph.

4. Supervision and Construction Procedures

The Contractor shall perform the Work in accordance with the Contract Documents and Submittals approved by the Architect.

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 Contract, unless otherwise specified in the Contract Documents.

The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors, Suppliers, and their agents and employees, and other persons performing portions for the Work under a contract with the Contractor or his Subcontractors.

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

5. Inspection of Work

The Contractor shall be responsible for inspection of portions of the Work already performed under this Contract to determine if such portions are in proper condition to receive subsequent Work.

6. Labor and Materials

Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, water, electric, other utilities, transportation, taxes and other facilities and services necessary for proper execution and completion of the Work. It is the Contractor's responsibility to provide these resources whether temporary or permanent, and whether or not incorporated or to be incorporated in the Work.

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

7. Warranty

The Contractor warrants to the Owner that materials, equipment, and skilled labor will be provided in accordance with the Contract Documents, and that the Work will be free from defects. Work not conforming with these requirements, including substitutions not properly approved and authorized, may be considered defective.

8. Construction Schedule

Prior to issuance of a Notice to Proceed, but not later than fourteen (14) days after Notice of Award, the Contractor shall prepare and submit to the Architect a Construction Schedule for the Work. The Schedule shall not exceed the time limits established in the Contract Documents, nor shall the Schedule reflect an early completion of the Work. The construction schedule shall document major construction activities and tasks, identifying the estimated beginning and ending dates for each identifiable component of the Work with activity durations limited to 14 days. The Construction Schedule shall also identify the critical path and any other near critical events which would most greatly affect the Construction Schedule. The Construction Schedule will be prepared in sufficient detail as may be acceptable to the Architect. The Construction Schedule shall be revised at appropriate intervals as required by conditions of the Work.

9. Project Records

The Contractor shall maintain the following project records at the project site:

- Construction Schedule
- Plans and Drawings
- Specifications
- Addenda
- Change Orders
- Construction Change Directives
- Shop Drawings
- Product Data
- Samples
- Required Submittals
- Superintendent's Log

Records shall be maintained in good order and, marked to reflect current changes and selections made during the construction process.

Records shall be available to the Architect and Owner and, with the exception of the Superintendent's Log, shall be delivered to the Architect for submittal to the Owner upon completion of the Work.

Additionally, the Superintendent's Log shall at a minimum document the dates and times of critical inspections; instructions received from the Architect; and weather conditions including dates, times, and amount of rainfall received.

10. Approval of Shop Drawings and Other Submittals

The Contractor shall review, approve, and submit to the Architect Shop Drawings, Product Data, Samples, and other Submittals required by the Contract Documents for approval by the Architect prior to their implementation. The Contractor shall perform no portion of the Work requiring submittal and review of these or similar data until approved by the Architect. Such Work shall be accomplished in accordance with approved Submittals.

The Contractor shall not submit any shop drawing or other submittal that is merely a tracing or other copy of any of the Contract Documents. Each submittal item must be prepared by the Contractor, or for the Contractor by a Subcontractor or Supplier of the Contractor. The Architect shall have the authority to reject any submittal items that violate this provision, and no extension of Contract Time shall be given on account of such rejection. Architect's review and action on any such Submittals shall not serve as a basis for or give rise to any claim in favor of Contractor or any third party against the Owner or Architect.
By submitting the materials described above to the Architect for approval, the Contractor represents that he has determined and verified materials, field measurements, and field construction criteria related to the Submittals and has checked and verified their compliance with requirements of the Contract Documents. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or other Submittals. The Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents unless the Architect makes specific written acceptance of said deviations on the Architect's letterhead.

11. Use of the Project Site

The Contractor shall confine operations to the Site as designated by the Owner and shall confine operations and activities to those permitted by law, ordinances, permits, and the Contract Documents; and should not unreasonably encumber the site with materials or equipment. The Contractor is specifically prohibited from the storage of materials, equipment, or supplies not related to the Work on the Project Site.

The Owner will be responsible for resolving disputes between the Contractor and other Contractors with which the Owner has a separate Agreement concerning use of the Project Site.

12. Cleanup of Project Site

The Contractor shall keep the premises and surrounding area reasonably free of rubbish, waste materials, or debris caused by operations under the Contract. At completion of the Work, the Contractor shall remove from and about the Project Site, waste materials, rubbish, tools, construction equipment, machinery, and surplus materials to the Owner's satisfaction. Should the Contractor fail to clean up as provided in the Contract Documents, the Owner may do so and the cost charged to the Contractor through a deductive Change Order or Construction Change Directive.

13. Observations and Inspections

The Contractor shall provide Owner and Architect access to the Work, wherever located and in whatever stage of construction for the purpose of providing inspections and observations necessary to assess compliance with applicable codes and to identify the quality and quantity of Work performed.

If a portion of the Work is covered contrary to the Architect's request or to the requirements expressed in the Contract Documents, it must be uncovered to allow the requested inspection or observation and replaced at the Contractor's expense without change in Contract Time.

If a portion of the Work has been covered for which the Owner or Architect has not specifically requested prior observation, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work has been completed in accordance with the Contract Documents, the cost for uncovering and replacement shall be born by the Owner and implemented through a Change Order recommended by the Architect and approved by the Owner. If such Work was inspected and found not to be in conformance with the Contact Documents, the Contractor shall pay the cost of uncovering and replacement without a change in Contract Time.

14. Correcting Rejected Work

The Contractor shall promptly correct Work rejected by the Architect for failing to conform to the requirements of the Contact Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. The Contractor shall bear the costs of correcting such Work, including those for additional testing and inspections and compensation for any additional design or necessary administrative costs.

If, within one year after the date of Final Acceptance, or before the expiration of warranties provided by the Contractor, Subcontractor, or Suppliers, whichever is greater, or by the terms of a special warranty required by the Contract Documents; any of the Work is found not to be in accordance with the requirements of the Contract Documents, the Contractor shall correct it within ten (10) days after receipt of a written notice from the Owner. This obligation shall survive acceptance of the Work under the Contract and Termination of the Contract, if such

Termination has been exercised by the Owner.

If the Contractor fails to correct nonconforming Work within ten (10) days or such reasonable time as may apply, the Owner may complete the work in accordance with the provisions in Article 9-B-5 and 9-B-8 of this Agreement.

15. Acceptance of Non-Conforming Work

The Owner may at his option accept Work which is not in accordance with the requirements of the Contact Documents instead of requiring its removal and correction. In such cases the Contract Amount will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

16. Tests & Inspections

Tests, inspections and approvals of portions of the Work required by law, ordinance, rules, regulations, or other orders of public authorities having jurisdiction shall be made at the appropriate time. Unless otherwise provided, the Contractor will make arrangements for such tests, inspections and approvals, and shall be responsible for paying testing, inspection, and reinspection fees.

Other tests, inspections, and approvals required by the Contact Documents shall also be made at the appropriate times. The Contractor shall make arrangements for such tests, inspections and approvals with the independent testing laboratories or entities designated by the

Owner. The Owner shall bear the costs related to these tests, inspections and approvals.

For all tests and inspections conducted under this section, the Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that observations may be made.

If tests or inspections reveal failure of portions of the Work to comply with the Contract Documents, or approval is not secured from a public authority having jurisdiction over the project for a portion of the Work covered by the Contract Documents, the Contractor shall bear all costs made necessary by such failure.

Certificates of testing, inspection or approval shall be secured by the Contractor and promptly delivered to the Architect

ARTICLE 10 - SUBCONTRACTORS

1. Reporting of Proposed Subcontractors

As soon as practical after the issuance of a Notice to Proceed, or as otherwise provided in the Contract Documents, the Contractor will furnish in writing to the Architect the names of persons or entities, including Subcontractors, material suppliers, equipment suppliers, and fabricators proposed for Principal Portions of the Work. After conferring with the Owner, the Architect will promptly inform the Contractor in writing whether or not there are reasonable objections to the any of the proposed persons or entities unto which the Contractor proposes to enter into an Agreement.

2. Rejection of Subcontractors

Neither the Contractor nor the Owner shall be required to Contract with anyone to whom either party has made a reasonable objection; excepting instances where the Contract Documents require use of a material, equipment, or other product for which there is no acceptable alternate supplier or installer.

3. Removal of Subcontractors

The Contractor shall not change a Subcontractor, person or entity previously selected if the Owner makes reasonable objection to such change.

4. Subcontractors Bound by Contract Documents

By appropriate 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 the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, under this Agreement, assumes toward the Owner.

Each Subcontract shall preserve and protect the right of the Owner 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 the Subcontractor, to the extent provided in the Contract Documents, the benefit of all rights, remedies and redress against the Contractor that the Contractor has against the Owner.

In all Contracts between the Contractor and Subcontractor, suppliers, or fabricators, the Owner will be named as third party beneficiary.

Each Subcontract for a portion of the Work is assigned by the Contractor to the Owner under these conditions:

- Assignment is effective only after termination of the Contract by the Owner for cause pursuant to Article 8-2 of this Agreement.
- Assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

ARTICLE 11 - CONSTRUCTION BY OWNER OR SEPARATE CONTRACTORS

1. Owner's Right to Perform Construction

The Owner reserves the right to perform construction or operations related to the Project outside the scope of this Agreement with Owner's own forces and to award separate Contracts in connection with other portions of the Project not covered under the scope of this Agreement.

2. Owner to Provide Coordination

The Owner shall provide for coordination of activities of the Owner's own forces and for Contractors under a separate Agreement to provide construction services on the Project Site. If part of the Contractor's Work depends upon prior Work performed by the Owner or other separate Contractors, the Contractor shall, prior to proceeding with that portion of the Work, at least forty-eight (48) hours prior to the start of such activity, report to the Architect apparent discrepancies or defects in other such construction that would render it unsuitable for the proper execution and results of the Contractor's Work. Failure of the Contractor to so report shall constitute an acknowledgment that the

Owner's previously completed construction is fit and proper to receive the Contractor's Work. Further, Contractor shall cooperate in scheduling the work by providing the Owner with all requested schedule information and shall adjust the sequencing of its work, at no additional cost to the Owner.

ARTICLE 12 - CHANGES IN THE WORK

1. Contract Held Valid

Changes in the Work may be accomplished after execution of the Contract without invalidating the Contract where they are documented by a Construction Change Order or Construction Change Directive executed in accordance with this Agreement.

2. Construction Change Directive

Changes in the Work may be directed by a Construction Change Directive prepared and signed by the Architect. A Construction Change Directive signed by the Contractor indicates agreement of the Contractor with the actions specified in the Directive, including the inclusion or absence of an adjustment in Contract Amount or Contract Time or the method for determining them. Construction Change Directives shall be issued using AIA Form G714.

3. Construction Change Order

In addition to a Construction Change Directive, a Construction Change Order will be required wherever the issuance of a Construction Change Directive would involve a change in:

- Contract Amount
- Contract Time
- The intent of the Contract Documents

In such instances, a Construction Change Order must be signed by the Architect, Contractor and Owner. Construction Change Orders shall be issued using AIA Form G701.

Change Orders may not have typed text altered or additions placed thereon after the signing process has begun. Change Orders with alterations to typed text or additions placed thereon shall not be considered altered by such, and the original Change Order shall govern. Should alterations or additions to a Change Order be desired, said Change Order shall be re-typed and re-signed, and said Change Order shall be identified as "Revised".

4. Changes in Contract Amount

No change in the Work, whether by way of alteration or addition to the Work, shall be the basis of an addition to the Contract Sum or a change in the Contract Time unless and until such alteration or addition has been authorized by a Change Order executed and issued by Owner. This requirement is of the essence of the Contract Documents. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that the Owner has been unjustly enriched by an alteration or addition to the Work, whether or not there is in fact any such unjust enrichment, shall be the basis for any claim to an increase to the Contract Sum or change in the Contract Time. Claims for disputes concerning Contract Amount shall be determined in accordance with Article 13 of this Agreement.

5. Cost of Work

The term "Cost of Work," or "Direct Cost." for the purpose of Change Orders, means the costs necessarily incurred and paid by the Contractor in the proper performance of the Change Order Work. Except as may be agreed to in writing by the Owner, such costs shall be in amounts no higher than those prevailing in the area of the project and may include the following categories:

- Labor (payroll, taxes, fringe benefits, workers' compensation, health and retirement benefits, sick leave)
- Owned equipment (at lowest applicable equipment manual rate)
- Rented equipment (at actual rental rate)
- Materials
- Supplies
- Subcontractor's costs
- Bonds and insurance

The Contractor shall require all Subcontractors and suppliers to comply with all requirements of, and provide itemizations of all claims in accordance with this Article.

The term "Cost of the Work" or "Direct Cost" shall not include any of the following:

- Payroll costs and other compensation of the Contractor's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, lawyers, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by the Contractor whether at the site or in its principal or a branch office for general administration of the Change Order Work and not specifically included in the agreed upon schedule of job classifications, all of which are to be considered administrative costs covered by the Contractor's allowance for overhead and profit.
- Extraordinary fringe benefits not specifically identified above.
- Expenses of Contractor's principal and branch offices other than the Contractor's office at the job site.
- Any part of the Contractor's capital expenses, including interest on the Contractor's capital used for the Change Order Work and charges against the Contractor for delinquent payments.
- Costs due to the negligence of the Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including, but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

For all changes, the Contractor shall submit an itemized cost breakdown, together with supporting data in such detail and form as prescribed by the Architect. When a credit is due, the amount of credit to be allowed by the Contractor to the Owner for any such change which results in a net decrease in direct cost will be the amount of the actual net decrease in direct cost as determined by the Architect plus the actual reduction in overhead and profit. When both additions and credits are involved in any change, the combined overhead and profit shall be calculated on the basis of the net change, whether an increase or decrease. In any event, the minimum detail shall be an itemization of all man-hours required by discipline/trade with the unit cost per man-hour and total labor price, labor burden equipment hours and rate for each piece of equipment, material by units of measure and price per unit, other costs specifically itemized, plus the overhead and profit allowance.

The allowance for combined overhead and profit included in the total cost to the Owner shall be based upon the following schedule:

- For the Contractor, for Work performed by the Contractor's own forces, fifteen percent (15%) of the cost.
- For the Contractor, for Work performed by the Contractor's Subcontractor, seven and one-half percent (7-1/2%) of the amount due to the Subcontractor.
- For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, fifteen percent (15%) of the cost.
- For each Subcontractor, for Work performed by the Subcontractor's Sub-contractor, seven and one-half percent (7-1/2%) of the amount due the Sub-contractor.

6. Changes in Contract Time

Changes in Contract Time shall be granted only by Construction Change Order. Claims for disputes concerning Contract Time shall be determined in accordance with Article 13 of this Agreement.

7. Changes in Contract Time Due to Weather Conditions

The Contractor shall consider climatic conditions in preparing the construction schedule and shall anticipate therein periods where work may not be practical due to adverse weather conditions.

Weather conditions shall not comprise grounds for extension of Contract Time unless the Contractor is able to demonstrate that the number of rain days during the entire Contract Time exceeded 120% of that for the same period in the prior year. In making such an assertion the Contractor shall use rain data recorded in the Superintendent's Log, which must include the date, duration and volume of rain recorded at the Project Site for each day, as compared to that recorded for the area closest to the Project Site, as reported by the National Weather Service. The Owner shall determine the criteria for establishing "rain days".

8. Contractor's Obligation to Comply with Construction Change Directives

Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work. The Contractor shall promptly comply with the Construction Change Directive whether or not a Construction Change Order has been executed.

9. Effective Date of Change Orders

Construction Change Orders shall become effective immediately upon execution by the Contractor, Architect, and Owner.

ARTICLE 13 - CLAIMS AND DISPUTES

1. Time Limits on Claims

Contractor Claims must be made by written notice within 14 days after the occurrence of the event giving rise to such Claim or within 14 days after the Contractor would have reasonably first recognized the condition giving rise to the Claim, whichever is later. Claims for additional time and additional compensation must be made in accordance with the conditions of this Article.

Such written notice of Contractor Claims shall be complete. Written notice which is incomplete and only partially identifies a claim, with wording such as "(time or cost) impact to be determined at a later date" or "we reserve the right to claim additional (time or cost) at a later date" will not be considered.

2. Continuing Performance on the Contract

Pending resolution of a Claim, unless otherwise agreed to in writing, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

3. Claims for Concealed or Unknown Conditions

If conditions are encountered at the Site which are subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents, or comprise unknown physical conditions of an unusual nature which differ materially from those ordinarily found to exist and are generally recognized as inherent in construction activities of the character provided for in the Contract Documents; then the Contractor shall inform the Project Architect of the materially different field conditions in writing within 14 days after first observance of the conditions, or within 14 days after the Contractor would have reasonably first recognized the materially different field conditions.

The Architect will promptly investigate and report to the Owner if field conditions were found to be materially different than those which could have been reasonably found given the criteria indicated above. If field conditions are found to be materially different, the Owner shall prepare a Construction Change Order providing an equitable adjustment in Contract Amount and/or Contract Time.

If the Owner 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 are justified, the Owner shall so notify the Contractor in writing stating the reasons.

4. Claims for Additional Time

Claims for an increase in Contract Time will be made by the Contractor by presenting a "Request for Delay" (RFD) form to the Architect within 14 days of the occurrence giving rise to the claim. All claims for an increase in the Contract Time are waived if not so presented. RFD forms will be supplied to the Contractor by Owner or the Architect.

The sole and exclusive manner of increasing the Contract Time due to some occurrence giving rise to the representation of an RFD form is by Construction Change Order. Timely presentation of a RFD form is the prerequisite for obtaining a Construction Change Order. The Construction Change Order shall address any and all Claims based on said occurrence. With respect thereto, Contractor agrees that its exclusive remedy for delays in the performance of the Contract caused by events beyond its control, including delays claimed to be caused by the Owner or the Architect or attributable to the Owner or the Architect, and including Claims based on breach of Contract or negligence, shall be an extension of the Contract Time. Contractor hereby waives any and all other Claims based on said occurrence which are not addressed by the Construction Change Order.

Nothing contained herein will prevent the parties from increasing the Contract Time by mutual agreement.

5. Claims for Additional Compensation

Owner's liability to Contractor for any Claims other than Claims for extension of Contract Time, as described above, arising out of or related to the subject matter of this Contract including, but not limited to, claims for payment by Owner of the costs, damages, or losses because of changed condition under which the Work is to be performed or for additional Work, shall be governed by Article 12-4 and must be submitted in strict accordance with the following provisions:

All Claims must be submitted as a Request for Construction Change Order in the manner provided herein;

- Contractor must submit a Notice of Claim to the Owner and to the Architect within fourteen days (14) of when the Contractor was, or should have been, aware of the occurrence of the event giving rise to the Claim; and
- Within fourteen days (14) of submitting its Notice of Claim, Contractor shall submit to the Architect and Owner its Request for Construction Change Order using AIA Form G701, which shall include a written statement of details of the Claim, including a description of the Work affected.

Contractor agrees that the Owner shall not be liable for any Claim the Contractor fails to submit as a Request for Construction Change Order or as a timely presented RFD form as provided in this Agreement.

After receipt of a Request for Construction Change Order, Owner, in consultation with the Architect, shall deliver to Contractor within thirty (30) days after receipt of request its written determination of the Claim.

Contractor's exclusive remedy for delays in performance of construction caused by events beyond its control, including delays claimed to be caused by or attributable to the Owner or the Architect including claims based on breach of contract or negligence, shall be a Claim or a RFD form submitted in compliance with this Article.

Contractor expressly agrees that the conditions established by this Article constitutes its sole and exclusive remedies for delays and changes in such Work and eliminates any other remedies for Claim for increase in the Contract Amount, delays, changes in the Work, damages, losses, or additional compensation.

6. Resolution of Disputes by the Owner

If a Claim has not been resolved after consideration under other terms of this Article, the Architect shall notify the Contractor in writing that the Owner shall make a determination within seven (7) days, which determination shall be final and binding on the Parties, but subject to litigation in a court having competent jurisdiction. Upon expiration of such time period, the Owner shall render to the parties a written decision relative to the Claim, including any change in Contract Amount and/or Time.

If there is surety and there appears to be a possibility of the Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the dispute.

7. Injury of Damage to Person or Property

If any party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, of any of the other party's employees or agents, or for others whose acts such party is legally liable; written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable amount of time not exceeding 21 days after first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. If a Claim for additional cost or time related to the Claim is to be asserted, it shall be filed as a Claim pursuant to the conditions of this Article.

ARTICLE 14 - PROJECT CLOSEOUT

1. Substantial Completion of a Designated Portion

The Owner may release a Designated Portion of the Work under this Contract upon the issuance of a Certificate of Substantial Completion for the Designated Portion. Subsequent to said release, the Owner may make payment to the Contractor up to the pro-rated amount of the Contract Amount which is allocable to the value of the Designated Portion of the Work under the Contract. Payment under this provision may be made in full with no retainage or, a lesser retainage, at the sole discretion of the Owner.

Further, the parties agree that in the event the Owner releases a Designated Portion of the Work, whether or not retainage is released for the Designated Portion of the Work, the Contractor agrees that all insurance required by the Contract Documents will remain in full force and effect until final acceptance of the entire Work by the Owner.

2. Substantial Completion

When the Contractor considers that the Work, or a portion thereof, which the Owner agrees to accept separately, is Complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed and corrected. The Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on the list does not relieve the Contractor of the responsibility to complete all Work in accordance with the Contract Documents.

Upon receipt of the Contractor's list, the Architect will make an inspection, and with the approval of the Owner, determine whether the Work, or designated portion thereof, is Complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not in accordance with the requirements of the Contact Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect.

The Contractor may request additional inspections by the Architect as may be reasonable to determine when Substantial Completion has been achieved. When the Work or designated portion thereof, is Complete, the Architect will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion and shall establish responsibilities of the Owner and Contractor for:

- Security
- Maintenance
- Water, sewer, electric and other utilities
- Damages to the Work; and

- Insurance Responsibilities

The Certificate shall also establish the time within which the Contractor shall finish all items on the list of incomplete Work or corrections otherwise necessary to meet the requirements of the Contract Documents.

Warranties required by the Contract Documents shall commence on the date of Substantial Completion, or designated portion thereof, unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to each.

Upon Substantial Completion of the Work, or designated portion thereof, and upon application by the Contractor, certification by the Architect, and approval by the Owner, the Owner shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof as provided in the Contract Documents.

3. Final Acceptance and Payment

Upon receipt of written notice that the Work is ready for Final Inspection and upon receipt of a Final Application for Payment, the Architect shall promptly inspect the Work. When the Architect and Owner find the Work acceptable under the Contract Documents and the Contract fully performed, the Architect shall issue a Certificate for Final Payment.

Neither final payment nor any remaining retainage shall become due until the Contractor submits to the Architect all information required in the Contract Documents, including, but not limited to, warranties, as-built plans, and operation and maintenance manuals.

Furthermore, final payment, nor any remaining retainage, shall be due until the Contractor executes and presents to the Owner a "Certificate of Claims Paid" and "Release of all Claims" form in such a form as may be acceptable to the Owner. Acceptance of final payment by the Contractor shall comprise a release of all claims under the Contract, and receipt of which acknowledges full and complete payment for all Work done, materials and equipment furnished, and damages or claims arising under this Agreement.

ARTICLE 15 - PROTECTION OF PERSONS AND PROPERTY

1. Compliance with Federal, State, and Local Laws, Ordinances, and Regulations

Contractor agrees to comply with all applicable Federal, State, and local laws, regulations, and ordinances, including, but not necessarily limited to, the following:

- Title VI of the 1964 Civil Rights Act.
- Title VII of the 1964 Civil Rights Act, as amended by the Equal Employment Opportunity Act which prohibits discrimination I employment.
- Age Discrimination Act of 1973.
- Contract Work Hours and Safety Standards Act.
- Section 504 of the Rehabilitation Act prohibiting discrimination in the employment of the handicapped.
- Fair Labor Standards Act.
- Chapter 112, Florida Statutes, prohibiting conflicts of interest in the procurement of contracts with a governmental agency.
- Trench Excavation System & Shoring standards as adopted by the Department of Labor and Employment Security and related trenching regulations.
- Construction Work Hours and Safety Act (Construction Safety Act)

2. Safety of Employees and Property

The Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

- Employees on the Project Site and other persons who may be affected thereby;
- 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 or the Contractor's Subcontractors or sub-subcontractors; and
- 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.

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

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.

The Contractor shall promptly remedy damage and loss (other than damage or loss insured under requirements of the Contract Documents) to property referred in this Section caused in whole or in part by the Contractor, Subcontractor, 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, except damage or loss 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 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.

The Contractor shall not load or permit any part of the construction or Site to be loaded so as to endanger its safety.

3. 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 this Agreement.

ARTICLE 16 - INDEMNIFICATION, INSURANCE AND BONDS

1. Indemnification

The parties recognize that the Contractor is an independent contractor. The Contractor agrees to assume liability for and indemnify, hold harmless, and defend the Owner, its commissioners, mayor, officers, employees, agents, and attorneys of, from, and against all liability and expense, including reasonable attorney's fees, in connection with any and all claims, demands, damages, actions, causes of action, and suits in equity of whatever kind or nature, including claims for personal injury, property damage, equitable relief, or loss of use, to the extent caused by the negligence, recklessness, or intentionally wrongful conduct of the Contractor, its agents, officers, contractors, subcontractors, employees, or anyone else utilized by the Contractor in the performance of this Agreement. The Contractor's liability hereunder shall include all attorney's fees and costs incurred by the City in the enforcement of this indemnification provision. This includes claims made by the employees of the Contractor against the Owner and the Contractor hereby waives its entitlement, if any, to immunity under Section 440.11, Florida Statutes. Such obligations contained in this provision shall survive termination of this Agreement and shall not be limited by the amount of any insurance required to be obtained or maintained under this Agreement.

Subject to the limitations set forth in this Section, Contractor shall assume control of the defense of any claim asserted by a third party against the Owner and, in connection with such defense, shall appoint lead counsel, in each case at the Contractor's expense. The Owner shall have the right, at its option, to participate in the defense of any third party claim, without relieving Contractor of any of its obligations hereunder. If the Contractor assumes control of the defense of any third party claim in accordance with this paragraph, the Contractor shall obtain the prior written consent of the Owner before entering into any settlement of such claim. Notwithstanding anything to the contrary in this Section, the Contractor shall not assume or maintain control of the defense of any third party claim, but shall pay the fees of counsel retained by the Owner and all expenses, including experts' fees, if (i) an adverse determination with respect to the third party claim would, in the good faith judgment of the Owner, be detrimental in any material respect to the Owner's reputation; (ii) the third party claim seeks an injunction or equitable relief against the Owner; or (iii) the Contractor has failed or is failing to prosecute or defend vigorously the third party claim. Each party shall cooperate, and cause its agents to cooperate, in the defense or prosecution of any third party claim and shall furnish or cause to be furnished such records and information, and attend such conferences, discovery proceedings, hearings, trials, or appeals, as may be reasonably requested in connection therewith. It is further the specific intent and agreement of said parties that all the Contract Documents on this Project are hereby amended to include the foregoing indemnification. CONTRACTOR expressly agrees that it will not claim, and waives any claim, that this indemnification violates Section 725.06, Florida Statutes or is unenforceable pursuant to Section 725.06, Florida Statutes.

Nothing contained in the foregoing indemnification shall be construed as a waiver of any immunity or limitation of liability the Owner may have under the doctrine of sovereign immunity or Section 768.28, Florida Statutes.

2. Waiver of Subrogation

The Owner and the Contractor waive all rights against each other for damages caused by perils coverage by insurance provided under this Agreement to the extent covered by such insurance, except such rights as they may have to the proceeds of such insurance held by the Owner and the Contractor as trustees. The Contractor shall require similar waivers from all subcontractors and their subcontractors and suppliers.

The Owner and the Contractor waive all rights against each other for loss or damage to any equipment used in connection with the Project and covered by any property insurance. The Contractor shall require similar waivers from all subcontractors and their subcontractors and suppliers.

The Owner waives subrogation against the Contractor on all property and consequential loss policies carried by the Owner on adjacent properties and under property and consequential loss policies purchased for the Project after its completion.

If the insurance policies referred to in this Section require an endorsement to provide for continued coverage where there is a waiver of subrogation, the owner of such policies will cause them to be so endorsed; failure to obtain endorsement nullifies the waiver of subrogation.

3. Contractor's Insurance

The Contractor shall not commence any Work in connection with this Agreement until he has obtained all of the following types of insurance and such insurance has been approved by the Owner, has named the Owner as an additional insured, except for Worker's Compensation Coverage, 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.

Such insurer shall have a currently valid Certificate of Authority issued by the State of Florida, Department of Insurance authorizing it to write insurance policies in the State of Florida and be doing business in the State of Florida. Insurers shall have at least a Policy Holders Rating of A-, and Financial Rating of Class VI as identified in the latest issue of "Best's Key Rating Guide" unless otherwise accepted by the Owner in writing.

The Contractor's insurance, and the insurance of any other party bound to the Contractor, shall be considered primary. The Owner's insurance, if any, shall be considered excess, as may be applicable to claims which arise out of indemnifications, insurance, certificates of insurance and any additional insurance provisions of this Agreement.

4. Loss Deductible

The Owner shall be exempt from, and in no way liable for, any sums of money which may represent a deductible in any insurance policy. The payment of deductibles shall be the sole responsibility of the Contractor.

5. Subcontractor's Insurance

The Contractor shall require each of his Subcontractors to procure and maintain, during the life of the subcontract, insurance of the types specified in this Article or insure the activities of his Subcontractors in his policy as required in this Article.

6. Certificate of Insurance

The Owner shall be furnished proof of insurance coverage as follows:

- The name of the insured Contractor, the specific job by name and job number, the name of the insurer, the number of the policy, its effective date, and its termination date
- Statement that the insurer will mail notice to the Owner and a copy to the Architect at least thirty (30) days prior to any material changes in provisions, cancellation, renewal, or non-renewal of the policy
- Certificate of Insurance shall be in the form as approved by the Owner and such Certificate shall clearly state all the coverages required in this Article
- If requested by the Owner, the Contractor shall furnish complete copies of his and his Subcontractor's insurance policies, forms and endorsements; and
- Receipt of certificates or other documentation of insurance or policies or copies of policies by the Contractor or by any of its representatives which indicate less coverage than required by the Contract Documents does not constitute a waiver of the Contractor's obligations to fulfill the requirements of this Article.

7. Workers' Compensation Insurance

The Contractor shall take out and maintain, during the life of this Agreement, Workers' Compensation and Employer's Liability Insurance for all his employees connected with the Work of this Project, and in case any Work is sublet, the Contractor shall require the Subcontractor similarly to provide Workers' Compensation Insurance for all of the latter's employees, unless such employees are covered by the protection afforded by the Contractor. Such insurance shall comply with the Florida Workers' Compensation Law. In case any class of contract at the Project Site is not protected under the Workers' Compensation statute, the Contractor shall provide adequate insurance, satisfactory to Owner for the protection of employees not otherwise protected.

8. Liability Insurance

The Contractor shall take out and maintain, during the life of this Agreement, Commercial General Liability and Commercial Automobile Liability Insurance as shall protect Owner from claims for damage for bodily injury and personal injury, including accidental death, as well as claims for property damages which may arise from operating under this Agreement, whether such operations are by himself or by anyone directly or indirectly employed by him, and the amount of such insurance shall be minimum limits as follows:

Commercial General Liability:

- Minimum Coverage is $2,000,000 including a separate project aggregate limit of $2,000,000 for the Contract.
- Coverage shall include premises, operations, products, completed operations, independent contractors, contractual liability covering this Agreement, contracts and leases, broad form property damage coverages, personal injury and bodily injury.

- The Contractor is required to continue to purchase products and completed operations coverage for Work performed under this Agreement for a minimum of three (3) years following Substantial Completion.
- If Umbrella or Excess liability coverage is used to satisfy the requirements of this Section, it shall not be more restrictive than the underlying insurance policy coverages.

Commercial Automobile Liability:

- Minimum Coverage is $1,000,000.

Coverage shall include bodily injury and property damage arising out of ownership, maintenance or use of any auto, including owned, non-owner and hired automobiles and employee non-ownership use.

9. Builder's Risk Coverage

The Contractor shall take out and maintain during the life of this Agreement a "Builder's Risk Policy" completed value form issued to provide coverages on an "all risk" basis, including:

- Theft Coverage, and flood insurance where specified in the Contract Documents.
- A waiver of any co-insurance or deductible requirements.
- Off-site storage, transit and installation risks.
- Coverage of the interests of all parties, including the Contractor, Owner, Subcontractors, Sub-subcontractors and suppliers.
- A provision that the coverage shall not be lapsed or canceled due to occupancy by the Owner prior to final acceptance and payment by the Owner.
- The Owner being named as an additional insured.

10. Payment and Performance Bond

Contractor shall provide Owner with a Payment and a Performance Bond in the amount of the Contract Price within ten (10) days of the Notice of Award of Contract. Failure to provide the bond(s) shall result in this Agreement becoming null and void. No action on the part of the Owner shall be deemed to waive this requirement except a written amendment to this Agreement. Said bonds shall be in substantially the same form as in Section 255.05, Florida Statutes.

Additionally, bonds must meet the following specifications:

- The surety company shall have a currently valid Certificate of Authority issued by the State of Florida, Department of Insurance, authorizing it to write surety bonds in the State of Florida and be doing business in the State of Florida
- The surety company shall have a currently valid Certificate of Authority issued by the United States Department of the Treasury under Sections 9304 and 9308, Title 31, of the United States Code.
- The surety company shall be in full compliance with the provisions of the Florida Insurance Code
- The surety company shall have at least twice the minimum surplus and capital required by the Florida Insurance Code at the time the invitation to bid is issued; and
- The surety company shall have at least a Policy Holding's Rating of "A-" and Financial Rating of VI in the latest issue of "Best's Key Rating Guide".

Alternative forms of security as described in Section 255.05, Florida Statues, are acceptable where approved by the Owner in writing.

ARTICLE 17 - COMMENCEMENT OF STATUTORY LIMITATION PERIOD

1. The Commencement of Statutory Limitation Periods Between the Owner, Contractor and assignees are as follows:

- Before Substantial Completion. As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion.

- Between Substantial Completion and Final Certificate for Payment. As to acts or failure to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and

- After Final Certificate for Payment. As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any warranty provided under the Contract Documents, the date of any correction of the Work or failure to correct the Work by the Contractor or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last.

2. Concerning Latent Defects and Fraud

As to latent defects and fraud, the applicable statute of limitations shall commence upon the date of discovery or the date discovery of the defect should reasonably have occurred.

ARTICLE 18 - MISCELLANEOUS PROVISIONS

1. Governing Law

This Agreement shall be governed by the laws of the State of Florida.

2. Successors and Assigns

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

3. Written Notice

Written notice shall be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an officer of the corporation for which it was intended, or if delivered at or sent by registered or certified mail to the last business address known to the party giving notice. Email delivery shall also constitute delivery of written notice, and may, at Owner's sole discretion, include US Mail with proof of delivery in addition to the email.

4. Limitation of Liability

The Owner shall be liable only to the extent of its interest in the Project; and no elected official, officer, agent, or employee of the Owner shall ever be personally or individually liable with respect to this Contract or the Work. Each Subcontract shall include the foregoing limitation, which shall be effective if the Owner ever succeeds to the Contractor's rights or obligations under a Subcontract.
The Architect shall be liable only to the extent of its interest in the Project; and no officer, director, partner, agent, or employee of the Architect (or any partner of a partner or any agent or employee of a partner) shall ever be personally or individually liable with respect to this Contract or the Work. Each Subcontract shall include the foregoing limitation.

5. Attorney Fees and Costs

In the event of any action brought by either party against the other to enforce any of the obligations hereunder or arising out of any dispute concerning the terms and conditions hereby created, the losing party shall pay the prevailing party such reasonable amounts for fees, costs, and expenses, including attorney fees, as may be set by the Court.

6. Validity, Severability and Reformation

The validity, interpretation, construction, and effect of this agreement shall be in accordance with and be governed by the laws of the State of Florida. Any provision or part of this Agreement held to be void or unenforceable under any law shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon the parties. The parties agree that this Agreement shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision which comes as close as possible to expressing the intention of the stricken provision.

7. Force Majeure

Neither party hereto shall be liable for its failure to perform hereunder due to any circumstances beyond its reasonable control, such as acts of God, wars, riots, acts of terrorism, national emergencies, sabotage, strikes, labor disputes, accidents, and governmental laws, rules, ordinances, rules of regulations. The Contractor or Owner may suspend its performance on any assignment as a result of a force majeure

without being in default of this Agreement, but upon the removal of such force majeure, the Contractor or Owner shall resume its performance as soon as is reasonably possible.

8. Contractor Not A Third Party Beneficiary

Contractor understands and agrees that it shall look only to the City/Owner for payment and that it is not a third party beneficiary or in any manner otherwise a beneficiary of that certain Interlocal Agreement between the City of Fernandina Beach and Nassau County, Florida regarding payment of invoices on this project. Contractor, for good and valuable consideration contained in this Agreement does hereby irrevocably waive any right it might claim to seek payment from Nassau County, Florida for work performed on this project.

9. Public Records Law and Obligations

Pursuant to Section 119.0701, Florida Statutes, Contractor shall: (a) keep and maintain all public records as that term is defined in Chapter 119, Florida Statutes ("Public Records"), that ordinarily and necessarily would be required by the City in order to perform the work contemplated by this Agreement; (b) provide the public with access to Public Records, on the same terms and conditions that the City would provide the records and at a cost that does not exceed the costs provided in Chapter 119, Florida Statutes, or as otherwise provided by law; (c) ensure that Public Records that are exempt or confidential and exempt from public

records disclosure requirements are not disclosed except as authorized by law; (d) meet all requirements for retaining Public Records and transfer, at no cost to the City, all public records in possession of Contractor within thirty (30) days after termination of this Agreement, however terminated, and destroy any duplicate Public Records that are exempt or confidential and exempt from public records disclosure requirements and provide the City with a letter confirming that this has been done within thirty (30) days of the termination of this Agreement. All Public Records stored electronically must be provided to the City in a format that is compatible with the information technology of the City. If Contractor does not comply with a public records request, the City may pursue any and all remedies available in law or equity, including but not limited to specific performance.

IN WITNESS WHEREOF the parties have executed the Agreement on the day and date first above written.

OWNER: The City of Fernandina Beach

_____
Dale L. Martin, City Manager

_____
ATTEST –Caroline Best, City Clerk

APPROVED AS TO FORM AND LEGALITY:

_____
Tammi E. Bach, City Attorney

CONTRACTOR:

_____
Contractor's Name:

_____
Title/Officer

_____

ATTEST -

APPENDIX I - DEFINITIONS

Allowance - An amount included in the contract amount to be used exclusively for equipment, materials, or some other purpose specified in the Contract Documents and whose use is under the control of the Owner.

Application for Payment - A formal written request for payment submitted by the Contractor to the Architect for payment for work performed pursuant to this Agreement.

Architect - The design professional retained by the Owner responsible for designing the facilities to be constructed and/or the design professional responsible for providing contract administration during construction services and to assess whether construction services are provided in accordance with the Contract Documents.

Bid - A properly signed proposal to do the work, or designated portion thereof for the stipulated sum indicated on the bid form and supported by data required by the Bid Documents.

Bid Documents - The documents either provided or incorporated by reference defining and documenting the scope of services, conditions under which services are to be provided, conditions under which a contractor will be selected and the work will be performed, and the technical specifications for the equipment, goods, or services being procured.

Certificate for Payment - An application for payment which has been signed by the Architect, who certifies that the pay request is proper and all representations made by the Contractor are correct.

Certificate of Substantial Completion - A form signed by the Architect certifying that the work, or a designated portion of the work, has been completed to such an extent that it may be occupied by the Owner for its intended purpose.

Change Order - A form documenting the Contractor's and Owner's agreement to modify the work where the modification involves a change in Contract Amount, Contract Time, or the intent of the Contract Documents.

Claim - A demand or assertion by one of the parties to the Agreement for an adjustment or interpretation of contract terms, payment of money, extension of time, or other relief with respect to the terms of the Contract. Claims may also include other disputes between the Owner and Contractor concerning the manner in which work is being performed.

Construction Change Directive - An order signed by the Architect instructing the Contractor to change the Work.

Construction Schedule - An action plan summarizing how the Contractor proposes to complete the entire work in the Contract Documents within the established Contract Time. The Construction Schedule should identify key tasks and activities necessary to complete the project within the Contract Time.

Contract/Agreement - The Agreement between the Owner and the Contractor as defined by the Contact Documents.

Contractor - The person or entity identified in the Contract Documents as being responsible for performing the work under the Contract.

Contract Amount - The stipulated sum to which the Owner agrees to pay the Contractor for performing the work described in the Contract Documents, as modified by Change Order.

Contract Documents - Individual documents which collectively comprise the Contract between the Owner and Contractor, including: 1) the Agreement between the Owner and Contractor, 2) Bid Documents including the invitation to bid, Instructions to bidders and Contractor bid package, 3) Drawings, Specifications, Plans prepared by the Architect which describe the work to be performed, 4) addenda issued prior to execution of the Contract, 5) other documents listed in the Agreement, and 6) modifications issued after execution of the Contract, including: 1) written amendments to the Contract signed by both parties, 2) Construction Change Orders, and Construction Change Directives.

Contract Time - The period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the work. Contract Time is the time between the Date of Commencement identified in the Notice to Proceed issued by the Owner and the date established in the Agreement for Substantial Completion.

Date of Commencement - The date specified in the Notice to Proceed issued by the Owner specifying when the Contractor may begin work on the Project.

Day - As referenced in this Agreement "Day" includes all calendar days including weekends, holidays, and days of inclement weather.

Drawings & Plans - 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.

Final Acceptance - The Owner's final acceptance of the work performed by the Contractor as recognized by making final and complete payment for all work intended by the Contract Documents.

Invitation to Bid - A formal solicitation issued by the City of Fernandina Beach identifying the scope, terms, conditions, and specifications of goods and services procured from private contractors.

Non-Substantial Deviation - A change in the work or - deviation from the plans, specifications, or other Contract Documents which does not change the Contract Amount, Contract Time, or the intent of the Contact Documents.

Notice of Award of Contract - Written notice to the Contractor that his Bid has been accepted by the City Commission with the intent to enter into a Contract for the Construction of the Project.

Notice of Claim - A memorandum or letter presented to the Architect detailing a Claim for additional compensation. The memorandum or letter must be labeled "Notice of Claim" and specifically identify the conditions giving rise to the Claim and the amount of additional compensation being requested.

Notice to Proceed - A letter issued by the Owner officially communicating the date when the Contractor may begin work on the Project or a designated portion of the Project.

Owner - The City of Fernandina Beach, or the City of Fernandina Beach's authorized representatives.

Partial Occupancy or Substantial Completion of a Designated Portion - Declaration by the Owner that a designated portion of the work has been completed so that it is ready for occupancy by the Owner for its intended purpose.

Principal Portion of the Work - Work or equipment provided by a Subcontractor with which the Contractor has a direct Contract; and Sub-Subcontractors or other material or equipment providers as designated by the Architect or Project Manager.

Project - All physical improvements planned for a defined site. Work performed under the Contract Documents may comprise the whole work, or a part of the work planned for the Project Site.

Product Data - 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.

Project Manual - A volume or volumes usually assembled to describe the work which may include bidding requirements, sample forms, the Contract, and specifications.

Project Manager - The City's authorized agent for communication with the Architect and Contractor and making decisions on the City's behalf as provided in the Contract Documents.

Project Site - The physical location identified in the Contact Documents where work is to be accomplished.

Samples - Physical examples which illustrate the materials, equipment, workmanship, or application methods by which the work will be judged.

Schedule of Values - The amount of money and percentage of the Contract Amount attributable to various components or portions of the work, where prepared in such a form and supported by such data to substantiate its accuracy.

Shop Drawings - Drawings, diagrams, schedules and other data specially prepared for the work by the Contractor or a Subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the work in greater detail than is provided in the plans or specifications.

Specifications - That portion of the Contract Documents comprising written standards and requirements for materials, equipment, construction systems, and workmanship for the work, and performance of related systems.

Subcontractor - A person or entity who has a direct Contract with the Contractor to perform a portion of the work.

Substantial Completion - The stage of construction where the work or designated portion thereof is sufficiently complete so that the Owner can occupy or use the work for its intended purpose.

Substantial Deviation - A change in the work which deviates from the intent of the Contract Documents, Contract Amount, or Contract Time.

Superintendent - The Contractor's authorized representative on the Project Site.

Supplier - A person or entity who provides equipment, material, or other resources required by the Contractor or Subcontractors to perform the Work.

Work - The construction and services required by the Contract Documents, whether completed or partially completed, including all labor, materials, equipment and services provided or to be provided by the Contractor in fulfillment of obligations under the Contract. The work may constitute the whole Project or part of the Project.

PART 2

FAA ADVISORY CIRCULAR

FAA ADVISORY CIRCULAR 150/5370-2G, OPERATIONAL SAFETY ON AIRPORT DURING CONSTRUCTION, located here and incorporated by reference:

https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5370-2G.pdf

PART 3

TECHNICAL SPECIFICATIONS

SECTION 00 01 15 - LIST OF DRAWING SHEETS

GENERAL

1.01 GENERAL

G-000 Cover Page
G-001 Symbols & Details
G-002 Typical Accessibility Details
G-003 Code Sheet

1.02 CIVIL

C-101 Land Development Criteria
C-102 Safety, Security & General Notes
C-103 Construction Safety & Phasing Plan
C-201 Existing Conditions & Demolition Plan
C-202 Site Plan
C-301 Utility Plan
C-302 Utility Details
C-303 Utility Details
C-401 Grading & Erosion Control Plan
C-402 Drainage Details
C-403 Drainage Details
C-501 Gate Details
C-502 Gate Details
C-503 Gate / Bicycle & Flag Details
C-504 Pavement Details
C-505 Pavement Details
C-506 Signage & Markiing Details
L-001 Tree Protection Site Plan
L-002 Landscape Site Plan
L-003 Landscape & Irrigation Notes
L-004 Landscape Details
C-601 Stormwater Pollution Prevention Plan
C-602 Stormwater Pollution Prevention Plan
C-603 Stormwater Pollution Prevention Plan
C-604 Stormwater Pollution Prevention Plan

1.03 ARCHITECTURAL

A-100 First Floor Plan - Dimension
A-101 First Floor Plan - Call Outs
A-102 Mezzanine Floor Plan & Details
A-103 Roof Plan
A-110 Reflected Ceiling Plan
A-111 Enlarged Reflected Ceiling Plan
A-200 Exterior Elevations
A-201 Exterior Elevations
A-300 Building Sections
A-310 Wall Sections

A-311 Wall Sections
A-312 Wall Sections
A-313 Wall Sections
A-314 Entrance Canopy Details
A-315 Canopy Details
A-400 Kitchen// Day Room - Enlarged Plans & Details
A-401 Enlarged Plans & Details
A-402 Enlarged Plans & Details
A-403 Toilet Rooms - Enlarged Plans & Details
A-500 Details
A-501 Roof Details
A-510 Millwork Details - Kitchen
A-511 Millwork Details - Kitchen / Day Room
A-512 Millwork Details
A-513 Millwork Details
A-600 Room Finish Schedule
A-601 Door Schedule
A-602 Door Details
A-603 Window & Signage Details
A-605 Furniture & Equipment Plan & Schedule
A-700 Training Tower Plans
A-701 Training Tower Elevations
A-702 Training Tower Section

1.04 STRUCTURAL

S-001 Structural General Notes
S-002 Design Criteria & Schedules
S-003 Column Schedule & Baseplates Details
S-004 Special Inspections
S-101 Foundation Plan
S-102 Training Tower Plans & Details
S-103 Mezz & Roof Framing Plan
S-301 Foundation Sections
S-302 Foundation Sections & Pier Details
S-303 Framing Sections
S-304 Framing Sections
S-501 Typical Concrete Details
S-502 Typical Concrete Details
S-503 Typical Masonry Details
S-504 Typical Precast Concrete & Steel Details
S-505 Typical Equipment Tie-down Details

1.05 MECHANICAL

M-001 Mechanical Notes
M-201 Mechanical Floor Plan
M-202 Mechanical Roof Plan
M-401 Mechanical Sections
M-402 Mechanical 3D View

M-601 Mechanical Schedules
M-701 Mechanical Details
M-702 Mechanical Details

1.06 ELECTRICAL

E-001 Electrical Notes
E-100 Electrical Design Schematic
E-101 Site Power Plan
E-201 Lighting Plan
E-202 Training Tower Electrical Plans
E-301 Power Floor Plan
E-401 Mechanical Power Plan
E-501 Electrical Riser Diagram
E-601 Electrical Panel Schedules

1.07 PLUMBING

P-001 Plumbing Notes
P-201 Sanitary Plan
P-202 Roof Plumbing Plan
P-301 Domestic Water Plan
P-501 Sanitary Isometrics
P-502 Water Isometrics
P-503 Gas & Storm Isometrics
P-701 Plumbing Details

1.08 FIRE PROTECTION

FS-001 Fire Sprinkler Site Plan
FS-201 Fire Sprinkler Floor Plan

END OF SECTION

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SECTION 01 10 00 - SUMMARY

PART 1 GENERAL

1.01 PROJECT INFORMATION

A. Project Identification: Fernandina Fire Station No. 2.
B. Owner: City of Fernandina Beach.
   1. Owner's Address:
      204 Ash Street
      Fernandina Beach, FL 32034
C. Owner's Representative: Passero Associates.
   1. Architect's Representative: Christopher Nardone, cnardone@passero.com.
   2. Structural Representative: Patrick Williams, pwilliams@passero.com.
   3. Civil Representative: Matt Singletary, msingletary@passero.com
D. Architect's Consultants: Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:
   1. Mechanical, Electrical, Plumbing and Fire Protection Engineer: Promus, Inc., 4245 Land Road, Ball Ground, GA 30107.
      a. Primary Contact: Darin Frick, darin.frick@promus.us
E. Web-Based Project Software: Project software administered by Architect will be used for purposes of managing communication and documents during the Final Design and Construction stages.
F. The Project generally consists of the final design and construction of New combination Fire Station and ARFF at Fernandina Beach Municipal Airport. Building to consist of PEMB apparatus area with 4 bays including concrete plank mezzanine with support spaces below enclosed by concrete block. Attached to the PEMB is a concrete block and plank support building with Meeting Room, Offices, Kitchen, Fitness Room, Dayroom, Bunk Rooms and Bathrooms, etc.. Exterior of building to generally consist of a combination of PEMB, masonry walls and mansard roof with metal framing and metal roofing. Site area took into consideration the preservation of a majority of existing trees while providing a landscape plan with minimal new trees and landscaping since the site is adjacent to the end of Runway 4-22. The site area is designed to contain stormwater on site. Additional site work will consist of but not be limited to the relocating of the existing electrical power supporting the Airfield Electrical Vault including the relocating of Airfield Electrical suppling the airfield. .

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price.

1.03 WORK BY OWNER

A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Substantial Completion. Some items include:
   1. Coffee Maker.
   2. Elliptical Machine.
   3. Treadmill.
   4. Furniture not covered by Allowance. .

1.04 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.
B. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas indicated on C-103 Construction Safety and Phasing Plan..
B. Arrange use of site and premises to allow:
   1. Owner occupancy at substantial completion.
C. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.
D. Utility Outages and Shutdown:
   1. Limit disruption of utility services to hours the site is unoccupied.
      a. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
   2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
   3. Limit shutdown of utility services to 4 hours at a time, arranged at least 24 hours in advance with Owner.
   4. Prevent accidental disruption of utility services to other facilities.
   5. The utilities supporting the Electrical Vault is critical to the security and safety at the Airport requiring limited shutdown. Shutdown can only occur during Daylight hours and clear weather.

1.06 WORK SEQUENCE

A. Coordinate construction schedule and operations with Architect.

1.07 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
B. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
   1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
   2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
   3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.08 DEFINITIONS

A. Construction Documents. The signed and sealed plans prepared by the Design-Build Firm and accepted by the Architect, including reproductions thereof, showing the location, character, dimensions, and details of the work. Upon review and approval by the Architect, the plans will

be stamped "Released for Construction" dated and initialed by the reviewer.

1.09 ADDITIONAL CONTRACT REQUIREMENTS

A. Corrections for Construction Errors.
   1. For work that the Contractor constructs incorrectly or does not meet the requirements of the Contract Documents, the Contractor has the prerogative to submit an acceptance proposal to the Architect for review and disposition. The acceptance proposal shall describe the error or defect and either describe remedial action for its correction or propose a method for its acceptance. In either case, the acceptance proposal shall address structural integrity, aesthetics, maintainability, and the effect on Contract Time. The Architect will judge any such proposal for its effect on these criteria and also for its effect on Contract Administration.
   2. When the Architect judges that a proposal infringes on the structural integrity or maintainability of the structure, the Contractor's Architect/Engineer of Record will perform a technical assessment and submit it to the Architect for approval. Do not take any corrective action without the Architect's approval.
   3. Carry out all approved corrective construction measures at no expense to the Owner.
   4. Notwithstanding any disposition of the compensation aspects of the defective work, the Architect's decision on the technical merits of a proposal is final.

B. Coordination of Contract Documents.
   1. These Specifications, the plans, Special Provisions, and all supplementary documents are integral parts of the Contract; a requirement occurring in one is as binding as though occurring in all. In addition to the work and materials specifically called for in the Contract Documents and any additional incidental work, not specifically mentioned, when so shown in the plans, or if indicated, or obvious and apparent, as being necessary for the proper completion of the work will be included in the Contract Lump Sum Price.
   2. Computed dimensions govern over scaled dimensions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 20 00 - PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.
B. Documentation of changes in Contract Sum and Contract Time.
C. Change procedures.
D. Correlation of Contractor submittals based on changes.
E. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 01 21 00 - Allowances: Payment procedures relating to allowances.
B. Section 01 22 00 - Unit Prices: Payment and modification procedures relating to unit prices.
C. Section 01 78 00 - Closeout Submittals: Project record documents.

1.03 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
C. Forms filled out by hand will not be accepted.
D. Submit Schedule of Values in duplicate within 15 days after date established in Notice to Proceed.
E. Include in each line item, the amount of Allowances specified in this section.
F. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.
B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.
C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
D. Forms filled out by hand will not be accepted.
E. Execute certification by signature of authorized officer.
F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed.
G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
H. Submit one electronic of each Application for Payment.
I. Include the following with the application:
    1. Transmittal letter as specified for submittals in Section 01 30 00.
    2. Construction progress schedule, revised and current as specified in Section 01 30 00.
    3. Partial release of liens from major subcontractors and vendors.
J. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

B. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 5 days.

D. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation.

E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
   3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
   4. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.

F. Substantiation of Costs: Provide full information required for evaluation.
   1. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

G. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 70 00.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 21 00 - ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cash allowances.

1.02 RELATED REQUIREMENTS

A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CASH ALLOWANCES

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from Allowance.

B. Costs Included in Cash Allowances: Cost of product to Contractor or subcontractor, less applicable trade discounts

C. Costs Not Included in Cash Allowances: Product delivery to site and handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing. [_____] .

D. Architect Responsibilities:
   1. Consult with Contractor for consideration and selection of products .
   2. Select products in consultation with Owner and transmit decision to Contractor.
   3. Prepare Change Order.

E. Contractor Responsibilities:
   1. Assist Architect in selection of products .
   2. Obtain proposals from suppliers and installers and offer recommendations.
   3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
   4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
   5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

F. Funds will be drawn from the Allowance only by Change Order.

G. Differences in costs will be adjusted by Change Order.

H. At closeout of Contract, funds remaining in Allowance will be credited to Owner.

1.04 ALLOWANCES SCHEDULE

A. Allowance No. 1 (Cash Allowance): Include the sum of $40,000.
   1. This allowance includes equipment/furniture items listed on A-605.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 22 00 - UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids.
B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

1.02 RELATED REQUIREMENTS

A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.04 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.
B. **Alteration of work and quantities.** The Owner reserves the right to make such changes in quantities and work as may be necessary or desirable to complete, in a satisfactory manner, the
original intended work. Unless otherwise specified in the Contract, the Owner's Architect shall be and is hereby authorized to make, in writing, such in-scope alterations in the work and variation of quantities as may be necessary to complete the work, provided such action does
not represent a significant change in the character of the work.
For purpose of this section, a significant change in character of work means: any change that is outside the current contract scope of work; any change (increase or decrease) in the total contract
cost by more than 25%; or any change in the total cost of a major contract item by more than 25%.

1.05 MEASUREMENT OF QUANTITIES

A. Assist by providing necessary equipment, workers, and survey personnel as required.
B. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
C. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.

1.06 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.
B. Payment will not be made for any of the following:
    1. Products wasted or disposed of in a manner that is not acceptable.
    2. Products determined as unacceptable before or after placement.
    3. Products not completely unloaded from the transporting vehicle.

4. Products placed beyond the lines and levels of the required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected Products.

1.07 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not complying with specified requirements.
B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct one of the following remedies:
   1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Architect.
   2. The defective Work will be partially repaired to the instructions of the Architect, and the unit price will be adjusted to a new unit price at the discretion of Architect.
C. The authority of Architect to assess the defect and identify payment adjustment is final.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00 - ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of Alternates.

1.02 RELATED REQUIREMENTS

A. Document 00 21 13 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.

1.03 ACCEPTANCE OF ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.04 SCHEDULE OF ALTERNATES

A. Alternate No. 1 - PEMB Training Tower:

1. Base Bid Item: Provide training tower and associated pavement as reflected on civil drawings, C-202, and structural drawings, S-102 including architectural drawings, A-700, A-701, and A-702.
2. Alternate Item: Provide pre-manufactured metal building training tower as specified in Section 13 34 44. Note training tower foundation and slab including additional feature options not included in Section 13 34 44 shall remain as per the Base Bid.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

A. Section 01 21 00 - Allowances, for cash allowances affecting this section.
B. Section 01 22 00 - Unit Prices, for additional unit price requirements.
C. Section 01 23 00 - Alternates, for product alternatives affecting this section.
D. Section 01 30 00 - Administrative Requirements: Submittal procedures, coordination.
E. Section 01 60 00 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
    1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
        a. Unavailability.
        b. Regulatory changes.
    2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
        a. Substitution requests offering advantages solely to the Contractor will not be considered.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
    1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
    2. Agrees to provide the same warranty for the substitution as for the specified product.
    3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
    4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
    5. Waives claims for additional costs or time extension that may subsequently become apparent.
B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
    1. No specific form is required. Contractor's Substitution Request documentation must include the following:
        a. Project Information:

1) Official project name and number, and any additional required identifiers established in Contract Documents.

b. Substitution Request Information:
1) Discrete and consecutive Substitution Request number, and descriptive subject/title.
2) Indication of whether the substitution is for cause or convenience.
3) Issue date.
4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
5) Description of Substitution.
6) Reason why the specified item cannot be provided.
7) Differences between proposed substitution and specified item.
8) Description of how proposed substitution affects other parts of work.

c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
1) Physical characteristics.
2) In-service performance.
3) Expected durability.
4) Visual effect.
5) Warranties.
6) Other salient features and requirements.
7) Include, as appropriate or requested, the following types of documentation:
(a) Product Data:
(b) Samples.
(c) Certificates, test, reports or similar qualification data.
(d) Drawings, when required to show impact on adjacent construction elements.

d. Impact of Substitution:
1) Savings to Owner for accepting substitution.
2) Change to Contract Time due to accepting substitution.

D. Limit each request to a single proposed substitution item.
1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submit request for Substitution for Cause immedately upon discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
B. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
3. Bear the costs engendered by proposed substitution of:

a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
b. Other unanticipated project considerations.

C. Substitutions will not be considered under one or more of the following circumstances:
1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
2. Without a separate written request.
3. When acceptance will require revisions to the Contract Documents.

3.03 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
B. Architect will notify Contractor in writing of decision to accept or reject request.

3.04 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.05 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

END OF SECTION

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SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.
B. Electronic document submittal service.
C. Preconstruction meeting.
D. Site mobilization meeting.
E. Progress meetings.
F. Construction progress schedule.
G. Contractor's daily reports.
H. Progress photographs.
I. Coordination drawings.
J. Submittals for review, information, and project closeout.
K. Number of copies of submittals.
L. Requests for Interpretation (RFI) procedures.
M. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 32 16 - Construction Progress Schedule: Form, content, and administration of schedules.
B. Section 01 60 00 - Product Requirements: General product requirements.
C. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
D. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 REFERENCE STANDARDS

A. AIA G716 - Request for Information 2004.
B. AIA G810 - Transmittal Letter 2001.
C. CSI/CSC Form 12.1A - Submittal Transmittal Current Edition.
D. CSI/CSC Form 13.2A - Request for Information Current Edition.

1.04 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
B. Make the following types of submittals to Architect:
    1. Requests for Interpretation (RFI).
    2. Requests for substitution.
    3. Shop drawings, product data, and samples.
    4. Test and inspection reports.
    5. Design data.
    6. Manufacturer's instructions and field reports.
    7. Applications for payment and change order requests.
    8. Progress schedules.
    9. Coordination drawings.
    10. Correction Punch List and Final Correction Punch List for Substantial Completion.
    11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
   1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
   2. Contractor and Architect are required to use this service.
   3. It is Contractor's responsibility to submit documents in allowable format.
   4. Subcontractors, suppliers, and Architect's consultants will be permitted to use the service at no extra charge.
   5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
   6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
   7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Submittal Service: The selected service is:
   1. Newforma Info Exchange, provided by Architect.

C. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.

C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   5. Submission of initial Submittal schedule.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   7. Scheduling.

D. Architect will record minutes and distribute copies within two days after meeting.

3.03 SITE MOBILIZATION MEETING

A. Schedule meeting at the Project site prior to Contractor occupancy.
B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Contractor's superintendent.
   5. Major subcontractors.
C. Agenda:
   1. Use of premises by Owner and Contractor.
   2. Owner's requirements.
   3. Survey and building layout.
   4. Security and housekeeping procedures.
   5. Schedules.
   6. Application for payment procedures.
   7. Procedures for testing.
   8. Procedures for maintaining record documents.
   9. Requirements for start-up of equipment.
   10. Inspection and acceptance of equipment put into service during construction period.
D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

A. Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Special consultants.
   5. Contractor's superintendent.
   6. Major subcontractors.
C. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Review of RFIs log and status of responses.
   7. Review of off-site fabrication and delivery schedules.
   8. Maintenance of progress schedule.
   9. Corrective measures to regain projected schedules.
   10. Planned progress during succeeding work period.
   11. Coordination of projected progress.
   12. Maintenance of quality and work standards.
   13. Effect of proposed changes on progress schedule and coordination.

14. Other business relating to work.

D. Architect will record minutes and distribute copies within two days after meeting.

3.05 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date established in Notice to Proceed, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
    1. Include written certification that major contractors have reviewed and accepted proposed schedule.
D. Within 10 days after joint review, submit complete schedule.
E. Submit updated schedule with each Application for Payment.

3.06 DAILY CONSTRUCTION REPORTS

A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
B. In addition to transmitting electronically a copy to Owner and Architect, submit two printed copies at weekly intervals.
C. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
    1. Date.
    2. High and low temperatures, and general weather conditions.
    3. List of subcontractors at Project site.
    4. Material deliveries.
    5. Safety, environmental, or industrial relations incidents.
    6. Meetings and significant decisions.
    7. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
    8. Meter readings and similar recordings.
    9. Directives and requests of Authority(s) Having Jurisdiction (AHJ).
    10. Change Orders received and implemented.
    11. Testing and/or inspections performed.
    12. List of verbal instruction given by Owner and/or Architect.
    13. Signature of Contractor's authorized representative.

3.07 PROGRESS PHOTOGRAPHS

A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
B. Photography Type: Digital; electronic files.
C. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect.
D. In addition to periodic, recurring views, take photographs of each of the following events:
    1. Completion of site clearing.
    2. Excavations in progress.
    3. Foundations in progress and upon completion.

4. Structural framing in progress and upon completion.
5. Enclosure of building, upon completion.

E. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
2. Consult with Architect for instructions on views required.
3. Provide factual presentation.
4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

F. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
1. Delivery Medium: Via email.
2. File Naming: Include project identification, date and time of view, and view identification.
3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
4. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.

3.08 COORDINATION DRAWINGS

A. Review drawings prior to submission to Architect.

B. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
1) Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
2) Show location and size of access doors required for access to concealed dampers, valves, and other controls.
3) Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

C. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
2. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
3. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
4. Mechanical and Plumbing Work: Show the following:

a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.

5. Electrical Work: Show the following:
   a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor-control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.
6. Fire-Protection System: Show the following:
   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
7. Review: Architect will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.

D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
   1. File Submittal Format: Submit or post coordination drawing files using PDF format.
   2. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
      a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.

3.09 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Prepare in a format and with content acceptable to Owner.
      a. Use AIA G716 - Request for Information .
      b. Use CSI/CSC Form 13.2A - Request for Interpretation.
   3. Prepare using software provided by the Electronic Document Submittal Service.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Sections 01 25 00 - Substitution Procedures and 01 60 00 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
   2. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response.
   3. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Discrete and consecutive RFI number, and descriptive subject/title.
   3. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
   4. Annotations: Field dimensions and/or description of conditions which have engendered the request.
   5. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 3:00 PM will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
   1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.

2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
3. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.10 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.
   1. Coordinate with Contractor's construction schedule and schedule of values.
   2. Format schedule to allow tracking of status of submittals throughout duration of construction.
   3. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.

3.11 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Design data.
   3. Shop drawings.
   4. Samples for selection.
   5. Samples for verification.
B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
C. Samples will be reviewed for aesthetic, color, or finish selection.
D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.
B. Submit Final Correction Punch List for Substantial Completion.
C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.
D. Final Property Survey.
E. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

A. General Requirements:

1. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
2. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
3. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents. Architect will not review submittals unless certifed by Design-Builder.
4. Schedule submittals to expedite the Project, and coordinate submission of related items.
    a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
5. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
6. When revised for resubmission, identify all changes made since previous submission.
7. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
8. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
9. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:
1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.
3. Submit concurrently with related shop drawing submittal.
4. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Do not reproduce Contract Documents to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.15 SUBMITTAL REVIEW

A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

D. Architect's and consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
    a. "Approved", or language with same legal meaning.

b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
    1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
    1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.

2. Not Authorizing fabrication, delivery, and installation:
    a. "Revise and Resubmit".
        1) Resubmit revised item, with review notations acknowledged and incorporated.
    b. "Rejected".
        1) Submit item complying with requirements of Contract Documents.

E. Architect's and consultants' actions on items submitted for information:
1. Items for which no action was taken:
    a. "Received" - to notify the Contractor that the submittal has been received for record only.
2. Items for which action was taken:
    a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.
B. Construction progress schedule, bar chart type.

1.02 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
C. Submit updated schedule with each Application for Payment.
D. Submit under transmittal letter form specified in Section 01 30 00 - Administrative Requirements.

1.03 SCHEDULE FORMAT

A. Diagram Sheet Size: Maximum 11x17 inches.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
B. Provide sub-schedules to define critical portions of the entire schedule.
C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
D. Provide separate schedule of submittal dates for shop drawings, product data, and samples, products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.
E. Indicate delivery dates for products identified under Allowances.
F. Coordinate content with schedule of values specified in Section 01 20 00 - Price and Payment Procedures.
G. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.
B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect at each submittal.
B. Evaluate project status to determine work behind schedule and work ahead of schedule.
C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
C. Annotate diagrams to graphically depict current status of Work.
D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
E. Indicate changes required to maintain Date of Substantial Completion.
F. Submit reports required to support recommended changes.
G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.
B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.
B. Quality assurance.
C. References and standards.
D. Testing and inspection agencies and services.
E. Control of installation.
F. Tolerances.
G. Manufacturers' field services.
H. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Document 00 31 00 - Available Project Information: Soil investigation data.
B. Section 01 30 00 - Administrative Requirements: Submittal procedures.
C. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

A. IAS AC89 - Accreditation Criteria for Testing Laboratories 2018.

1.04 DEFINITIONS

A. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the Architect. Provide these services as part of the Contract for Construction.
    1. Design Services Types Required:
        a. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor’s sole responsibilities for construction means, methods, techniques, sequences, and procedures.
        b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.
B. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
    1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
    2. Include required product data and shop drawings.
    3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
    4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Compliance with Contract Documents.
      k. When requested by Architect, provide interpretation of results.
   2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

G. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
   2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.06 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirements. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numberic values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision

before proceeding.

1.07 QUALITY ASSURANCE

A. Testing Agency Qualifications:
   1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

C. Quality-Control Personnel Qualifications. Engage a person with requisite training and experience to implement and manage quality assurance (QA) and quality control (QC) for the project.

1.08 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.09 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Contractor shall employ and pay for services of an independent testing agency to perform code required testing and inspection.

B. Owner may employ and pay for services of an independent testing agency (at its discretion) to perform additional testing and inspection.

C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents, code and other regulatory requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Have work performed by persons qualified to produce required and specified quality.
F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
C. Adjust products to appropriate dimensions; position before securing products in place.

3.03 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.
B. Contractor Responsibilities:
    1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
    2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
    3. Provide incidental labor and facilities:
        a. To provide access to Work to be tested/inspected.
        b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
        c. To facilitate tests/inspections.
        d. To provide storage and curing of test samples.
    4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
C. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.04 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.05 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.
B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 45 33 - CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Code-required special inspections.
B. Testing services incidental to special inspections.
C. Submittals.
D. Manufacturers' field services.
E. Fabricators' field services.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
B. Section 01 40 00 - Quality Requirements.

1.03 ABBREVIATIONS AND ACRONYMS

A. AHJ: Authority having jurisdiction.
B. IAS: International Accreditation Service, Inc.
C. NIST: National Institute of Standards and Technology.

1.04 DEFINITIONS

A. Code or Building Code: ICC (IBC)-2018, Edition of the International Building Code and specifically, Chapter 17 - Special Inspections and Tests.
B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
C. Special Inspection:
    1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
    2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.05 REFERENCE STANDARDS

A. ICC (IBC)-2018 - International Building Code 2018.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

END OF SECTION

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SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Temporary utilities.
B. Temporary telecommunications services.
C. Temporary sanitary facilities.
D. Temporary Controls: Barriers, enclosures, and fencing.
E. Security requirements.
F. Vehicular access and parking.
G. Waste removal facilities and services.
H. Project identification sign.
I. Field offices.

1.03 TEMPORARY UTILITIES

A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
B. Existing facilities may not be used.
C. New permanent facilities may be used.
D. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.04 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

1.05 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
B. Maintain daily in clean and sanitary condition.

1.06 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public and to protect existing facilities and adjacent properties from damage from construction operations.
B. Provide protection for plants designated to remain. Replace damaged plants.
C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.07 FENCING

A. Construction: Contractor's option.

1.08 EXTERIOR ENCLOSURES

A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.09 SECURITY

A. Provide security and facilities to protect Work, and Owner's operations from unauthorized entry, vandalism, or theft.

1.10 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
B. Coordinate access and haul routes with governing authorities and Owner.
C. Provide and maintain access to fire hydrants, free of obstructions.
D. Provide means of removing mud from vehicle wheels before entering streets.
E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
F. Designate one parking space for Owner and Architect use.

1.11 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
B. Provide containers with lids. Remove trash from site periodically.
C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 PROJECT IDENTIFICATION

A. Provide project identification sign of design and construction indicated on drawings.
B. Erect on site at location indicated.
C. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    1. Provide temporary, directional signs for construction personnel and visitors.
D. Maintain and touch up signs so they are legible at all times.
E. No other signs are allowed without Owner permission except those required by law.

1.13 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.
B. Provide electrical power service and 120v ac duplex receptacles, with no fewer than one receptacle on each wall.
C. Provide space for Project meetings, with table and chairs to accommodate 10 persons.
D. Heating and cooling equipment capable of maintaining a uniform indoor temperature of 68 to 72 deg. F.
E. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

1.14 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

1.15 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
C. Clean and repair damage caused by installation or use of temporary work.
D. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

3.02 INSTALLATION, GENERAL

A. Locate facilities where they serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.03 SUPPORT FACILITIES INSTALLATION

A. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
B. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
    1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
C. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
    1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
B. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
C. Tree and plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
D. Pest Control: Engage pest-control services to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar

activities.

3.05 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
   1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
   2. Indicate sequencing work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
   3. Indicate methods to be used to avoid trapping water in finished work.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
   1. Protect porous materials from water damage.
   2. Protect stored and installed material from flowing or standing water.
   3. Keep porous and organic materials from coming into prolonged contact with concrete.
   4. Remove standing water from decks.
   5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   2. Keep interior spaces reasonably clean and protected from water damage.
   3. Periodically collect and remove waste containing cellulose or other organic matter.
   4. Dicard or replace water-damaged material.
   5. Do not install material that is wet.
   6. Discard and replace stored or installed material that begins to grow mold.
   7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure by prior to the full operation of permanent HVAC systems, maintain as follows:
   1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
   2. Use temporary or permanent HVAC system to control humiditiy within ranges specified for installed and stored materials.
   3. Comply with manufacturer's written installation instructions for temperature, relative humidity, and exposure to water limits.

END OF SECTION

SECTION 01 51 00 - TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Provision of electricity, lighting, heat, ventilation, and water.

1.02 RELATED REQUIREMENTS

A. Section 01 50 00 - Temporary Facilities and Controls:

1.03 USE CHARGES

A. General: Installation and removal of temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

1.04 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

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

1.05 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage installers of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

B. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1.06 TEMPORARY ELECTRICITY

A. Cost: By Contractor.

B. Provide power service required from utility source.

C. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.

D. Provide main service disconnect and over-current protection at convenient location and meter.

E. Permanent convenience receptacles may be utilized during construction.

F. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.07 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft .

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lighting and provide routine repairs.

1.08 TEMPORARY HEATING

A. Cost of Energy: By Contractor.

B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.

C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
D. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic controls.

1.09 TEMPORARY COOLING

A. Cost of Energy: By Contractor.
B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
C. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.10 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Contractor.
B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.
C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.11 TEMPORARY FIRE PROTECTION

A. Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
    1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
    2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
    3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods adn procedures. Post warnings and information.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
    1. Arrange with utility company, owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
    1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
D. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
    1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes

and their proper curing or drying.

E. Electric Power Service: Provide electric power service and distribution of sufficient size, capacity, and power characteristics required for construction operations.
   1. Install electric power service underground unless otherwise indicated.
F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

END OF SECTION

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SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.
B. Re-use of existing products.
C. Transportation, handling, storage and protection.
D. Product option requirements.
E. Substitution limitations.
F. Procedures for Owner-supplied products.
G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
B. Section 01 40 00 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Notice to Proceed.
   2. For products specified only by reference standards, list applicable reference standards.
B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.04 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.

3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 70 00 - Execution and Closeout Requirements.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.

1. See Section 01 10 00 for list of items required to be salvaged for reuse and relocation.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Where products are accompanied by the term "as selected," Architect will make a selection.
3. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
4. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.

C. Use of products having any of the following characteristics is not permitted:

1. Made outside the United States, its territories, Canada, or Mexico.
2. Made using or containing CFC's or HCFC's.
3. Containing lead, cadmium, or asbestos.

D. Where other criteria are met, Contractor shall give preference to products that:

1. If used on interior, have lower emissions.
2. If wet-applied, have lower VOC content.
3. Are extracted, harvested, and/or manufactured closer to the location of the project.
4. Have longer documented life span under normal use.

2.03 PRODUCT SELECTION PROCEDURES

A. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements.

B. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.

C. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
D. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
E. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.04 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
   1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
      a. Evidence that proposed product provides specified warranty.
   2. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

2.05 PRODUCT OPTIONS

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

2.06 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 25 00 - Substitution Procedures.

3.02 OWNER-SUPPLIED PRODUCTS

A. See Section 01 10 00 - Summary for identification of Owner-supplied products.

B. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.
C. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
D. Transport and handle products in accordance with manufacturer's instructions.
E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.
B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
C. Store and protect products in accordance with manufacturers' instructions.
D. Store with seals and labels intact and legible.
E. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts.
F. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
G. For exterior storage of fabricated products, place on sloped supports above ground.
H. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
I. Comply with manufacturer's warranty conditions, if any.
J. Do not store products directly on the ground.

K. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
L. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
M. Prevent contact with material that may cause corrosion, discoloration, or staining.
N. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
O. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

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SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.
B. Pre-installation meetings.
C. Cutting and patching.
D. Surveying for laying out the work.
E. Cleaning and protection.
F. Starting of systems and equipment.
G. Demonstration and instruction of Owner personnel.
H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
I. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
B. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.
C. Section 01 50 00 - Temporary Facilities and Controls: Temporary exterior enclosures.
D. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
    1. On request, submit documentation verifying accuracy of survey work.
    2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
    3. Submit surveys and survey logs for the project record.
C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
    1. Structural integrity of any element of Project.
    2. Integrity of weather exposed or moisture resistant element.
    3. Efficiency, maintenance, or safety of any operational element.
    4. Visual qualities of sight exposed elements.
    5. Work of Owner or separate Contractor.
D. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
    1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
    2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.

3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
5. Submit testing, adjusting, and balancing records.

E. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 01 20 00 - Price and Payment Procedures.
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

F. Submittal of Project Warranties
1. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
2. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
3. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
4. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
5. Warranties in Paper Form:
a. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

G. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.06 PROJECT CONDITIONS

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
F. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
G. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.07 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
B. Notify affected utility companies and comply with their requirements.
C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
F. Coordinate completion and clean-up of work of separate sections.
G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
C. Product Substitution: For any proposed change in materials, submit request for substitution described in Sections 01 25 00 - Substitution Procedures and 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
C. Examine and verify specific conditions described in individual specification sections.
D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

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

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
B. Require attendance of parties directly affecting, or affected by, work of the specific section.
C. Notify Architect four days in advance of meeting date.
D. Prepare agenda and preside at meeting:
    1. Review conditions of examination, preparation and installation procedures.
    2. Review coordination with related work.
E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.
B. Promptly notify Architect of any discrepancies discovered.
C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
F. Utilize recognized engineering survey practices.
G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
    1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
    2. Grid or axis for structures.
    3. Building foundation, column locations, ground floor elevations.
    4. Controlling lines and levels required for mechanical and electrical trades.
H. Periodically verify layouts by same means.
I. Maintain a complete and accurate log of control and survey work as it progresses.

J. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.
B. Perform whatever cutting and patching is necessary to:
    1. Complete the work.
    2. Fit products together to integrate with other work.
    3. Provide openings for penetration of mechanical, electrical, and other services.
    4. Match work that has been cut to adjacent work.
    5. Repair areas adjacent to cuts to required condition.
    6. Repair new work damaged by subsequent work.
    7. Remove samples of installed work for testing when requested.
    8. Remove and replace defective and non-complying work.
C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
F. Restore work with new products in accordance with requirements of Contract Documents.
G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material , to full thickness of the penetrated element.
I. Patching:
    1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
    2. Match color, texture, and appearance.
    3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.
B. Provide special protection where specified in individual specification sections.
C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
F. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.
G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
H. Prohibit traffic from landscaped areas.
I. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 SYSTEM STARTUP

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

3.10 GENERAL INSPECTION REQUIREMENTS

A. Cooperation by Contractor: Do not perform work or furnish materials without obtaining inspection by the Architect. Furnish the Architect with every reasonable facility for ascertaining whether the work performed and materials used are in accordance with the requirements and intent of the Contract Documents. If the Architect so requests at any time before final acceptance of the work, remove or uncover such portions of the finished work as directed. After examination, restore the uncovered portions of the work to the standard required by the Contract Documents. If the Architect determines that the work so exposed or examined is unacceptable, perform the uncovering or removal, and the replacing of the covering or making good of the parts removed, at no expense to the Owner. However, if the Architect determines that the work thus exposed or examined is acceptable, the Owner will pay for the uncovering or removing, and the replacing of the covering or making good of the parts removed.

B. Failure of Architect to Reject Work During Construction: If, during or prior to construction operations, the Architect fails to reject defective work or materials, whether from lack of discovery of such defect or for any other reason, such initial failure to reject in no way prevents the later rejection when such defect is discovered, or obligates the Owner to final acceptance. The Owner is not responsible for losses suffered due to any necessary removals or repairs of such defects.

C. Failure to Remove and Renew Defective Materials and Work: If the Contractor fails or refuses to remove and renew any defective materials used or work performed, or to make any necessary repairs in an acceptable manner and in accordance with the requirements of the Contract within the time indicated in writing, the Architect has the authority to repair, remove, or renew the unacceptable or defective materials or work as necessary, all at the Contractor's expense. The Owner will obtain payment for any expense it incurs in making these repairs, removals, or renewals, that the Contractor fails or refuses to make, by deducting such expenses from any moneys due or which may become due the Contractor, or by charging such amounts against the Contract bond.

3.11 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.

B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.12 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.13 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean filters of operating equipment.

G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 SUBSTANTIAL COMPLETION PROCEDURES

A. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Advise Owner of pending insurance changeover requirements.
   2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   3. Complete startup and testing of systems and equipment.
   4. Perform preventive maintenance on equipment used prior to Substantial Completion.
   5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
   6. Advise Owner of changeover in utility services.
   7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
   8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   9. Complete final cleaning requirements.
   10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
   1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
   2. Results of completed inspection will form the basis of requirements for final completion.

3.15 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect and Owner.

B. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

D. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

E. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

F. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

G. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.16 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

3.17 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

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SECTION 01 78 00 - CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.
B. Operation and Maintenance Data.
C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
C. Individual Product Sections: Specific requirements for operation and maintenance data.
D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
B. Operation and Maintenance Data:
    1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
    2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
    3. Submit two sets of revised final documents in final form within 10 days after final inspection.
C. Warranties and Bonds:
    1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
    2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
    3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
    1. Drawings.
    2. Specifications.
    3. Addenda.
    4. Change Orders and other modifications to the Contract.
    5. Reviewed shop drawings, product data, and samples.
    6. Manufacturer's instruction for assembly, installation, and adjusting.
B. Ensure entries are complete and accurate, enabling future reference by Owner.
C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.
E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.
F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   3. Field changes of dimension and detail.
   4. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
B. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
C. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
B. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
C. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
D. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
E. Include test and balancing reports.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
B. Verify that documents are in proper form, contain full information, and are notarized.
C. Co-execute submittals when required.
D. Retain warranties and bonds until time specified for submittal.
E. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

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SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.
B. Concrete for composite floor construction.
C. Elevated concrete slabs.
D. Floors and slabs on grade.
E. Concrete foundation walls.
F. Concrete foundations and anchor bolts for pre-engineered building.
G. Concrete reinforcement.
H. Joint devices associated with concrete work.
I. Miscellaneous concrete elements, including equipment pads, thrust blocks, and manholes.
J. Concrete curing.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

1.03 REFERENCE STANDARDS

A. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).
B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete 1991 (Reapproved 2009).
C. ACI 301 - Specifications for Structural Concrete 2016.
D. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.
E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
F. ACI 305R - Guide to Hot Weather Concreting 2010.
G. ACI 306R - Guide to Cold Weather Concreting 2016.
H. ACI 308R - Guide to External Curing of Concrete 2016.
I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary 2014 (Errata 2018).
J. ACI 347R - Guide to Formwork for Concrete 2014, with Errata (2017).
K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2020.
L. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
M. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2020.
N. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2020.
O. ASTM C150/C150M - Standard Specification for Portland Cement 2020.
P. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete 2016.
Q. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
R. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019.
S. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2019.

T. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2017.
U. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.
V. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.
W. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers 2020.
X. ASTM E1155M - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers (Metric) 2014.
Y. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs 2018a.
Z. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs 2017.
AA. COE CRD-C 513 - COE Specifications for Rubber Waterstops 1974.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
C. Mix Design: Submit proposed concrete mix design.
    1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
D. Test Reports: Submit report for each test or series of tests specified.
E. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
F. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.
B. Follow recommendations of ACI 305R when concreting during hot weather.
C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
    1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
    2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
    3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
    4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.
B. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.
   1. Form: Flat Sheets.
   2. WWR Style: As indicated on drawings.
C. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
   3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
B. Fine and Coarse Aggregates: ASTM C33/C33M.
   1. Acquire aggregates for entire project from same source.
C. Fly Ash: ASTM C618, Class C or F.
D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
B. Air Entrainment Admixture: ASTM C260/C260M.
C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.
F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
G. Accelerating Admixture: ASTM C494/C494M Type C.
H. Water Reducing Admixture: ASTM C494/C494M Type A.

2.05 ACCESSORY MATERIALS

A. Underslab Vapor Retarder: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E1745, Class C; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.
   1. Installation: Comply with ASTM E1643.
      a. Single layer, 15 mil minimum.
   2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.

2.06 BONDING AND JOINTING PRODUCTS

A. Epoxy Bonding System:
   1. Complying with ASTM C881/C881M and of Type required for specific application.
B. Waterstops: Rubber, complying with COE CRD-C 513.
C. Slab Isolation Joint Filler (cellulose fiber): 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

1. Material: ASTM D1751, cellulose fiber, at door locations, exterior walls and column piers, unless otherwise noted.

2.07 CURING MATERIALS

A. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309. If products used are other than listed below, coordinate final product selection with concrete sealer and ensure compatibility.
   1. Product dissipation rate varies depending on application rate, moisture level in concrete and the amount of exposure to UV light..
   2. Manufacturers:
      a. Euclid Chemical Company; KUREZ DR VOX: www.euclidchemical.com/#sle.

B. Concrete Sealer: Solvent-based, Siloxane Water and Chloride Repellent
   1. Apply after surface is well cured a minimum of 3 days using water, wet burlap, polyethylene, curing paper, or a dissipating curing compound such as Euclid KUREZ DR VOX.
   2. All joint sealents and caulks should be in place before applying sealer.
      a. Manufacturers:
         1) Euclid Chemical Company; EUCO-GUARD 100: www.euclidchemical.com/#sle.

C. Alternate Curing Methods
   1. Moisture-Retaining Sheet: ASTM C171.
      a. Curing paper, regular.
      b. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

D. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

D. Normal Weight Concrete:
   1. All Concrete: Proportion normal-weight air entrained concrete mix as follows:
      a. Minimum Compressive Strength: 4000 psi at 28 days.
      b. Maximum W/C Ratio: 0.50.
      c. Slump Limit: 4 inches, plus or minus 1 inch.
   2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
   3. Maximum Aggregate Size: See drawings.

2.09 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
B. Verify that forms are clean and free of rust before applying release agent.
C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
    1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
E. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
    1. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.
B. Place concrete for floor slabs in accordance with ACI 302.1R.
C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
F. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

A. Locate joints as indicated on drawings.
B. Anchor joint fillers and devices to prevent movement during concrete placement.
C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
D. Load Transfer Construction and Contraction Joints: Install load transfer devices as indicated; saw cut joint at surface as indicated for contraction joints.
E. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one

quarter (1/4) the depth of the slab.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
   1. Exposed to View and Foot Traffic: F(F) of 20; F(L) of 15, on-grade only.
B. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155 (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.
C. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.
D. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.
B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, thin set quarry tile, and thin set ceramic tile.
   2. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.08 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
C. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Final Curing: Begin after initial curing but before surface is dry.

3.09 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
B. Provide free access to concrete operations at project site and cooperate with appointed firm.
C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure four concrete test cylinders. Obtain test samples for every 100 cubic yards 100 cubic yards or less of each class of each class of concrete placed.
F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.11 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

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SECTION 03 41 13 - PRECAST CONCRETE HOLLOW CORE PLANKS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Precast floor and roof planks.
B. Connection plates with brackets and hangers.
C. Grouting plank joint keys.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

A. ACI 301 - Specifications for Structural Concrete 2016.
B. ACI 318 - Building Code Requirements for Structural Concrete and Commentary 2014 (Errata 2018).
C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
D. ASTM A416/A416M - Standard Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete 2018.
E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2020.
F. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2014 (Amended 2015).
G. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
H. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel 2018.
I. IAS AC157 - Accreditation Criteria for Fabricator Inspection Programs for Reinforced and Precast/Prestressed Concrete 2017.
J. PCI MNL-116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products 1999.
K. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete 2017.
L. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete 1988.
M. PCI MNL-124 - Design for Fire Resistance of Precast Prestressed Concrete 1989.
N. PCI MNL-126 - Manual For The Design of Hollow Core Slabs 2015.
O. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction 2000.
P. PCI (CERT) - PCI Plant Certification Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate location of hanger tabs and devices for mechanical and electrical work and cutting of field openings.
B. Preinstallation Meeting: Convene one week before starting work of this section.
    1. Discuss anchor and weld plate locations, sleeve locations, and cautions regarding cutting or core drilling.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Indicate standard component configuration, design loads, deflections, and cambers.

C. Shop Drawings: Indicate plank locations, unit identification marks, connection details, edge conditions, bearing requirements, support conditions, dimensions, openings, openings intended to be field cut, and relationship to adjacent materials.
D. Designer's Qualification Statement.
E. Manufacturer's Qualification Statement.
F. Fabricator's Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.
G. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design precast concrete hollow core planks under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
C. Fabricator Qualifications: Precast concrete fabricator accredited by IAS according to IAS AC157.
D. Welding Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M and no more than 12 months before start of scheduled welding work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.
B. Mark each member with date of production and final position in structure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Precast Concrete Hollow Core Planks:
    1. Any manufacturer with PCI Plant Certification.
    2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PRECAST UNITS

A. Precast Hollow Core Planks: Comply with PCI MNL-120, PCI MNL-126, PCI MNL-124 ACI 318, and ACI 301.
    1. Dimensions as indicated on drawings.
    2. Design components to withstand dead loads and design loads in the configuration indicated on drawings.
        a. Maximum Allowable Deflection of Roof Planks: 1/240 of span , cambered to achieve slope to drain.
        b. Maximum Allowable Deflection of Floor Planks: 1/360 of span , cambered to achieve flat surface under dead load.
    3. Design connections in accordance with PCI MNL-123.
    4. Design components to accommodate construction tolerances, deflection of other building structural members and clearances of intended openings.

2.03 MATERIALS

A. Concrete Materials: ACI 301.

B. Tensioning Steel Tendons: ASTM A416/A416M, Grade 250 - 250K psi; seven-wire stranded steel cable; low-relaxation type; full length without splices; weldless; uncoated.
C. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) deformed steel bars.
D. Non-Shrink Grout: Non-metallic, minimum compressive strength of 10,000 psi at 28 days.
E. Cement Grout: Minimum compressive strength of 3,000 psi at 28 days.

2.04 ACCESSORIES

A. Connecting and Supporting Devices: Plates, angles, items cast into concrete, items connected to steel framing members, and inserts: ASTM A36/A36M carbon steel; prime painted.
B. Core Hole End Plugs: Cardboard insert with stiff concrete fill.
C. Bearing Pads: High density plastic, 1/8 inch thick, smooth on one side. Vulcanized elastomeric compound molded to size.
D. Sill Seal: Compressible glass fiber strips.

2.05 FABRICATION

A. Weld reinforcing in accordance with AWS D1.4/D1.4M.
B. Embed anchors, inserts, plates, angles, and other items at locations indicated.
C. Provide openings required by other sections, at locations indicated.
D. Cut exposed ends flush.
E. Plant Finish: Finish members to PCI MNL-116 Commercial Grade.
F. Connecting and Supporting Steel Devices: Do not paint surfaces in contact with concrete or surfaces requiring field welding.

2.06 FABRICATION TOLERANCES

A. Comply with PCI MNL-116 and PCI MNL-135.

2.07 SOURCE QUALITY CONTROL

A. See Section 03 30 00 for testing of concrete and grout, materials, and mix designs.
B. Produce planks in accordance with requirements of PCI MNL-116. Maintain plant records and quality control program during production of precast planks. Make records available upon request.
C. Inspect and test stressing tendons before delivery for compliance with specified standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that site conditions are ready to receive work and field measurements are as indicated on shop drawings.

3.02 PREPARATION

A. Prepare support devices for the erection procedure and temporary bracing.

3.03 ERECTION

A. Erect members without damage to structural capacity, shape, or finish. Replace or repair damaged members.
B. Install bearing pads and sill seal at bearing ends of planks as indicated.
C. Align and maintain uniform horizontal and end joints, as erection progresses.
D. Maintain temporary bracing in place until final connection is made. Protect members from staining.
E. Adjust differential camber between precast members to tolerance before final attachment and grouting.

F. Secure units in place. Perform welding in accordance with AWS D1.1/D1.1M.
G. Grout longitudinal keys as indicated.
H. Tape seal underside of plank joints to prevent grout leakage.
I. Make plank-to-plank joints smooth using grout, troweled smooth. Transition differential elevation of adjoining planks with grout to a maximum slope of 1:12.

3.04 TOLERANCES

A. Erect members level and plumb within allowable tolerances. Comply with PCI MNL-135.

3.05 PROTECTION

A. Protect members from damage caused by field welding or erection operations.
B. Provide non-combustible shields during welding operations.

3.06 CLEANING

A. Clean weld marks, dirt, and blemishes from surface of exposed members.

END OF SECTION

SECTION 04 20 00 - UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.
B. Mortar and Grout.
C. Reinforcement and anchorage.
D. Flashings.
E. Lintels.
F. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Installation of dovetail slots for masonry anchors.
B. Section 04 72 00 - Cast Stone Masonry.
C. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2020.
D. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement 2016, with Editorial Revision (2018).
E. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2016a.
F. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units 2017.
G. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar 2018.
H. ASTM C150/C150M - Standard Specification for Portland Cement 2020.
I. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2018.
J. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019.
K. ASTM C404 - Standard Specification for Aggregates for Masonry Grout 2018.
L. ASTM C476 - Standard Specification for Grout for Masonry 2020.
M. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength 2019.
N. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar 1992a (Reapproved 2014).
O. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms 2018.
P. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry 2016.
Q. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry 2014a.
R. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.
S. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls 2017.
T. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls 2005.
U. BIA Technical Notes No. 46 - Maintenance of Brick Masonry 2017.
V. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for support system.
D. Samples: Submit two samples of decorative block and colored mortar to illustrate color, texture, and extremes of color range.
E. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
F. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.

1.06 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.
C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
B. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.08 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
    1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 PRODUCTS

2.01 UNIT MASONRY, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do no use units where such defects are exposed in the completed work.

B. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

2.02 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 4 inches and 8 inches.
   2. Load-Bearing Units: ASTM C90, normal weight.
      a. Hollow block, as indicated.
      b. Exposed Faces: Manufacturer's standard color and texture.
   3. Non-Loadbearing Units: ASTM C129.
      a. Hollow block, as indicated.
      b. Normal weight.
   4. Units with Integral Water Repellent (Exterior Block): Concrete block units as specified in this section with polymeric liquid or powder admixture added to concrete masonry units at the time of manufacture.
      a. Performance of Units with Integral Water Repellent:
         1) Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours.
            (a) No water visible on back of wall above flashing at the end of 24 hours.
            (b) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
            (c) No more than 25 percent of wall area above flashing visibly damp at end of test.
         2) Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
         3) Compressive Strength: ASTM C1314; maximum 5 percent decrease.
         4) Drying Shrinkage: ASTM C1148; maximum 5 percent increase in shrinkage.
      b. Use only in combination with mortar that also has integral water repellent admixture.
      c. Use water repellent admixtures for masonry units and mortar by a single manufacturer.
      d. Basis of Design Product:
         1) Echelon Masonry, Split Face.
         2) Cemex, Split Face.
         3) DZ Block.

2.03 MORTARAND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
   1. Not more than 0.60 percent alkali.

B. Hydrated Lime: ASTM C207, Type S.

C. Mortar Aggregate: ASTM C144.
D. Grout Aggregate: ASTM C404.
E. Leveling Grout: Non-Shrink, ASTM C1107, 5,000psi Minimum 2-day compressive strength.
   1. Color(s): As selected by Architect from manufacturer's full range.
F. Water: Clean and potable.
G. Integral Water Repellent Admixture for Mortar: Polymeric liquid or powder admixture added to mortar at the time of manufacture.
   1. Use only in combination with masonry units manufactured with integral water repellent admixture.
   2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
   3. Meet or exceed performance specified for water repellent admixture used in masonry units.
H. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Type: Type S.
   2. Color (Exterior Block): Color as Selected by Architect
   3. Color (all other block): Standard gray.
   4. Water-repellent mortar for use with water repellent masonry units.
I. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.

2.04 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; uncoated.
B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
C. Single Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Ladder.
   2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
   3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.
D. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Tab, with adjustable ties spaced at 16 in on center.
   2. Material: stainless steel complying with ASTM A580/A580M Type 304.
   3. Vertical adjustment: Not more than 1 1/4 inches.
   4. Insulation Clips: Provide clips at tabs or ties designed to secure insulation against outer face of inner wythe of masonry.
   5. Basis of Design: Hohmann & Barnard, Inc., Thermal 2-Seal Wing Nut Anchor.
E. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153/A153M.

2.05 FLASHINGS

A. Stainless Steel/Polymer Fabric Flashing: ASTM A240/A240M; 2 mil type 304 stainless steel sheet bonded on one side to one sheet of polymer fabric.
B. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to

type of flashing used.

C. Termination Bars: Stainless steel; compatible with membrane and adhesives.

D. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.

2.06 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.

B. Joint Filler: Closed cell polyethylene; oversized 50 percent to joint width; self expanding; in maximum lengths available.

C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.

D. Weeps:

1. Type: Polyester mesh.

E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 LINTELS

A. Concrete Lintels: ASTM C 1623, matching CMU's in color, texture, and density classification; and with reinforcing bars indicated.

2.08 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.

1. Masonry below grade and in contact with earth: Type S.
2. Exterior, loadbearing masonry: Type S.
3. Exterior, non-loadbearing masonry: Type N.
4. Interior, loadbearing masonry: Type S.
5. Interior, non-loadbearing masonry: Type N.

B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.
B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

A. Lay hollow masonry units with face shell bedding on head and bed joints.
B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
C. Remove excess mortar and mortar smears as work progresses.
D. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
E. Interlock intersections and external corners.
F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.06 WEEPS/CAVITY VENTS

A. Install weeps in veneer walls at 32 inches on center horizontally above through-wall flashing and at bottom of walls.

3.07 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

3.08 REINFORCEMENT AND ANCHORAGE - GENERAL AND GENERAL

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 8 inches on center.
B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
C. Place continuous joint reinforcement in first and second joint below top of walls.
D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.
E. Lap joint reinforcement ends minimum 6 inches.

3.09 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up flashing ends at least 1 inch, minimum, to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.
B. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.
C. Extend metal flashings to within 1/2 inch of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.

D. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.10 LINTELS

A. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
   1. Openings: Reinforced as indicated on drawings.
   2. Do not splice reinforcing bars.
   3. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
   4. Place and consolidate grout fill without displacing reinforcing.
   5. Allow masonry lintels to attain specified strength before removing temporary supports.
B. Maintain minimum 8 inch bearing on each side of opening.

3.11 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.
B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.

3.12 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and anchor bolts and other items to be built into the work and furnished under other sections.
B. Install built-in items plumb, level, and true to line.
C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
D. Do not build into masonry construction organic materials that are subject to deterioration.

3.13 TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.
B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.14 CUTTING AND FITTING

A. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.15 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

3.16 CLEANING

A. Remove excess mortar and mortar droppings.
B. Replace defective mortar. Match adjacent work.
C. Clean soiled surfaces with cleaning solution.
D. Use non-metallic tools in cleaning operations.

3.17 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

3.18 SCHEDULES

A. Exterior Wall: Split Face CMU with with integral water repellent.
B. Interior: Single wythe concrete block units.

END OF SECTION

SECTION 04 72 00 - CAST STONE MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Architectural cast stone.
B. Units required are:
   1. Exterior wall units, including sills and water tables.

1.02 RELATED REQUIREMENTS

A. Section 04 20 00 - Unit Masonry: Installation of cast stone in conjunction with masonry.
B. Section 07 92 00 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.03 SUBMITTALS

A. Product Data: Test results of cast stone components made previously by the manufacturer.
B. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
C. Mortar Color Selection Samples.
D. Verification Samples: Pieces of actual cast stone components not less than 6 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.
E. Source Quality Control Test Reports.
F. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
   2. Current producer member of the Cast Stone Institute or the Architectural Precast Association.
   3. Manufacturer's production facility currently holds a Plant Certification from the Cast Stone Institute or the Architectural Precast Association.
   4. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
B. Number each piece individually to match shop drawings and schedule.
C. Store cast stone components and installation materials in accordance with manufacturer's instructions.
D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
F. Store mortar materials where contamination can be avoided.
G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Architectural Cast Stone:
   1. Any current producer member of the Architectural Precast Association.
   2. Any current producer member of the Cast Stone Institute.

2.02 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural sandstone, complying with ASTM C1364.
   1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
   2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
   3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
   4. Color: Selected by Architect from manufacturer's full range.
   5. Remove cement film from exposed surfaces before packaging for shipment.

B. Shapes: Provide shapes indicated on drawings.
   1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
   2. Unless otherwise indicated on drawings, provide:
      a. Wash or slope of 1:12 on exterior horizontal surfaces.
      b. Drips on projecting components, wherever possible.
      c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.
   1. Pieces More than 24 inches in Any Dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.

2.03 MATERIALS

A. Portland Cement: ASTM C150/C150M.
   1. For Units: Type I or III, white or gray as required to match Architect 's sample.
   2. For Mortar: Type I or II, except Type III may be used in cold weather.

B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.

C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.

D. Pigments: ASTM C979, inorganic iron oxides; do not use carbon black.

E. Admixtures: ASTM C494/C494M.
   1. ASTM C 260 for air-entraining admixtures.
   2. ASTM C 494/C 495M Types A - G for water reducing, retarding, accelerating and high range admixtures.
   3. Other admixtures: Integral water repellents and other chemicals, for which no ASTM Standard exists, shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.
   4. ASTM C 618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.

5. ASTM C 989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features.

F. Water: Potable.

G. Reinforcing Bars: ASTM A615/A615M deformed bars, galvanized.

H. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.

I. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.

J. Mortar: Portland cement-lime, as specified in Section 04 05 11 ; do not use masonry cement.

K. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.04 SOURCE QUALITY CONTROL

A. Test compressive strength and absorption of specimens selected at random from plant production.
   1. Test in accordance with ASTM C642.
   2. Select specimens at rate of 3 per 500 cubic feet, with a minimum of 3 per production week.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.

B. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 20 00.

C. Setting:
   1. Drench cast stone components with clear, running water immediately before installation.
   2. Set units in a full bed of mortar unless otherwise indicated.
   3. Fill vertical joints with mortar.
   4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.03 TOLERANCES

A. Joints: Make all joints 3/8 inch, except as otherwise detailed.
   1. Rake mortar joints 3/4 inch for pointing.
   2. Remove excess mortar from face of stone before pointing joints.
   3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
   4. Leave the following joints open for sealant:
      a. Head joints in top courses, including sills and watertables.
      b. Joints labeled "expansion joint".

B. Installation Tolerances:
   1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
   2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.

3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.04 REPAIR

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet.
   1. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.
   2. Repair methods and results subject to Architect 's approval.

3.05 INSPECTION AND ACCEPTANCE

A. Inspect finished installation according to Cast Stone Institute Technical Bulletin #36.
B. Do not apply field water repellent until repair, cleaning, inspection and acceptance is completed.

3.06 WATER REPELLENT

A. Apply water repellent in accordance with Cast Stone Institute Technical Bulletin #35 or water repellent manufacturer's directions.

3.07 CLEANING

A. Keep cast stone components clean as work progresses.

3.08 PROTECTION

A. Protect completed work from damage.
B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural steel framing members.
B. Grouting under base plates.

1.02 RELATED REQUIREMENTS

A. Section 05 31 00 - Steel Decking: Support framing for small openings in deck.

1.03 REFERENCE STANDARDS

A. AISC (MAN) - Steel Construction Manual 2017.
B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges 2016.
C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2020.
E. ASTM A449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use 2014 (Reapproved 2020).
F. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021.
G. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts 2015.
H. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric) 2007 (Reapproved 2013).
I. ASTM A992/A992M - Standard Specification for Structural Steel Shapes 2020.
J. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2019, with Editorial Revision (2020).
K. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions 2019.
L. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength 2020.
M. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.
N. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2014 (Amended 2015).
O. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
P. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel 2018.
Q. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections 2014, with Errata (2015).

1.04 SUBMITTALS

A. Shop Drawings:
   1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
   2. Connections not detailed.
   3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
B. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

C. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.
D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
E. Fabricator's Qualification Statement.
F. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."
B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.
C. Fabricator Qualifications: A qualified steel fabricator that is certified by AISC - BU Certification.
D. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel Angles and Plates: ASTM A36/A36M.
B. Steel W Shapes and Tees: ASTM A992/A992M.
C. Rolled Steel Structural Shapes: ASTM A992/A992M.
D. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.
E. Pipe: ASTM A53/A53M, Grade B, Finish black.
F. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436/F436M washers.
G. Unheaded Anchor Rods: ASTM F1554, Grade 55, plain, with matching ASTM A563 or ASTM A563M nuts and ASTM F436/F436M Type 1 washers.
H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
I. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
    1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
    2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
J. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
K. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Shop fabricate to greatest extent possible.
B. Fabricate connections for bolt, nut, and washer connectors.

2.03 FINISH

A. Prepare structural component surfaces in accordance with SSPC-SP 3.
B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

A. Erect structural steel in compliance with AISC 303.
B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
C. Field weld components and shear studs indicated on shop drawings.
D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
E. Do not field cut or alter structural members without approval of Architect.
F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.03 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.

3.04 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts," testing at least [____] percent of bolts at each connection.

END OF SECTION

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SECTION 05 31 00 - STEEL DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof deck.
B. Supplementary framing for openings up to and including 18 inches.
C. Bearing plates and angles.
D. Acoustical insulation in roof deck flutes.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete topping over metal deck.
B. Section 04 20 00 - Unit Masonry: Placement of anchors for bearing plates embedded in unit masonry assemblies.
C. Section 05 12 00 - Structural Steel Framing: Support framing for openings larger than 18 inches and shear stud connectors.
D. Section 05 12 00 - Structural Steel Framing: Placement of embedded steel anchors for bearing plates in cast-in-place concrete.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
C. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2014 (Amended 2015).
D. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
E. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel 2018.
F. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel 2018.
G. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks 2007.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.
B. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.
C. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
D. Certificates: Certify that products furnished meet or exceed specified requirements.
E. Submit manufacturer's installation instructions.
F. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
G. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

A. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M and dated no more than 12 months before start of scheduled welding work.
B. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with

IAS AC172.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Cut plastic wrap to encourage ventilation.
B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Deck:
   1. Nucor-Vulcraft Group: www.vulcraft.com/#sle.
   2. New Millennium Building Systems: www.newmill.com

2.02 STEEL DECK

A. Roof Deck: Non-composite type, fluted steel sheet:
   1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
   2. Structural Properties:
   3. Minimum Base Metal Thickness: As indicated.
   4. Nominal Height: 1-1/2 inch.
   5. Profile: Fluted; SDI WR.
   6. Formed Sheet Width: 36 inch.
   7. Side Joints: Lapped, mechanically fastened.
   8. End Joints: Lapped, mechanically fastened.

2.03 ACCESSORY MATERIALS

A. Bearing Plates and Angles: ASTM A36/A36M steel, galvanized per ASTM A123/A123M.
B. Fasteners: Galvanized hardened steel, self tapping.
C. Mechanical Fasteners: Steel; hex washer head, self-drilling, self-tapping.
D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.
E. Acoustical Insulation: Glass fiber type, minimum 1.1 lb/cu ft density; profiled to suit deck.

2.04 FABRICATED DECK ACCESSORIES

A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gauge, 0.0299 inch thick sheet steel; of profile and size as indicated; finished same as deck.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.02 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
B. On steel supports provide minimum 1-1/2 inch bearing.
C. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute and at each transverse flute using methods specified.
D. At mechanically fastened male/female side laps fasten at 24 inches on center maximum.
E. Drive mechanical sidelap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.
F. Weld deck in accordance with AWS D1.3/D1.3M.

G. At deck openings from 6 inches to 18 inches in size, provide 2 by 2 by 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.
H. At deck openings greater than 18 inches in size, provide steel angle reinforcement. as specified in Section 05 12 00.
I. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary without distortion.
J. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.
K. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.
L. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

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SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formed steel stud miscellaneous exterior wall framing.
B. Formed steel joist and purlin framing and bridging.

1.02 RELATED REQUIREMENTS

A. Section 05 31 00 - Steel Decking.

1.03 REFERENCE STANDARDS

A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members 2016, with Supplement (2018).
B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
C. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
    1. Design data:
        a. Shop drawings signed and sealed by a professional structural engineer.
D. SSMA Manufacturer Qualification: Submit documentation of manufacturer association membership.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M and dated no more than 12 months before start fo scheduled welding work.
C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Framing:
    1. CEMCO; [_____]: www.cemcosteel.com/#sle.
    2. ClarkDietrich; [_____]: www.clarkdietrich.com/#sle.
    3. Marino; [____]: www.marinoware.com/#sle.
    4. The Steel Network, Inc; [_____]: www.SteelNetwork.com/#sle.

B. Framing Connectors and Accessories:
   1. Same manufacturer as metal framing.

2.02 FRAMING SYSTEM

A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.
B. Design Requirements: Provide completed framing system having the following characteristics:
   1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI S100.
   2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
   3. Design Loads: As indicated on the drawings.
   4. Live load deflection meeting the following, unless otherwise indicated:
      a. Exterior Walls: Maximum horizontal deflection under wind load of l/600 of span.
   5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
   6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 FRAMING MATERIALS

A. Joists and Purlins: Fabricated from ASTM A653/A653M steel sheet, with G90/Z275 hot dipped galvanized coating.
   1. Base Metal: Structural Steel (SS), Grade 50/340, Class 1.
   2. Gauge and Depth: As indicated on drawings.
B. Framing Connectors: Factory-made, formed steel sheet.
   1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gauge, 0.1345 inch, and factory punched holes and slots.
   2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100.
   3. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.
B. Verify field measurements and adjust installation as required.

3.02 INSTALLATION OF JOISTS AND PURLINS

A. Install framing components in accordance with manufacturer's instructions.
B. Make provisions for erection stresses. Provide temporary alignment and bracing.
C. Provide web stiffeners at reaction points.
D. Touch-up field welds and damaged galvanized surfaces with primer.

END OF SECTION

SECTION 05 44 00 - COLD-FORMED METAL TRUSSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Light gauge cold-formed steel roof trusses.
B. Anchorages, bracing, and bridging.

1.02 RELATED REQUIREMENTS

A. Section 05 40 00 - Cold-Formed Metal Framing: Light gauge structural metal studs, joists, and rafters.

1.03 REFERENCE STANDARDS

A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members 2016, with Supplement (2018).
B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
C. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings 2009 (Reapproved 2015).
D. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2014 (Amended 2015).
E. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
F. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel 2018.
G. CFSEI 5000 - Field Installation Guide for Cold-Formed Steel Roof Trusses May 2000.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Meet at project site prior to beginning of installation to review requirements. Require attendance by representatives of the following:
    1. Truss fabricator.
    2. Truss installer.
    3. Other entities affected by the work of this section, including but not limited to truss support framing installer, mechanical systems installer, and electrical systems installer.

1.05 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. Span charts.
    2. Storage and handling requirements and recommendations.
    3. Installation methods.
C. Shop Drawings:
    1. Include detailed roof truss layout.
    2. Show member type, location, spacing, size and gauge, methods of attachment, and erection details. Indicate supplemental bracing, strapping, splices, bridging, and accessories.
    3. Include truss design drawings, signed and sealed by a qualified professional engineer registered in the State in which the Project is located, verifying ability of each truss design to meet applicable code and design requirements.
        a. Include the following:
            1) Design criteria.
            2) Engineering analysis depicting member stresses and deflections.

3) Member sizes and gauges.
4) Details of connections at truss joints.
5) Truss support reactions.
6) Bracing requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.
E. Designer's Qualification Statement.
F. Fabricator's Qualification Statement.
G. Installer's Qualification Statement.
H. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated within the previous 12 months.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design trusses under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
B. Fabricator Qualifications: Steel truss fabricator with minimum 10 years of experience designing and fabricating truss systems equivalent to those required for this project and licensed by an acceptable manufacturer.
C. Installer Qualifications: Experienced installer approved by truss system fabricator.
D. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months in accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver trusses and other materials in manufacturer’s unopened bundles or containers, each marked with manufacturer’s name, brand, type, and grade. Exercise care to avoid damage during unloading, storing, and erection.
B. Store trusses on blocking, pallets, platforms, or other supports, off the ground and in an upright position, sufficiently braced to avoid damage from excessive bending. Gently slope stored trusses to avoid accumulation of water on interior of truss chord members.
C. Protect trusses and accessories from contact with earth, corrosion, deformation, mechanical damage, or other deterioration when stored at project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cold-Formed Steel Trusses:
1. Aegis Metal Framing, a Division of MiTek Industries; [_____]: www.aegismetalframing.com/#sle.
2. Alpine TrusSteel, an ITW Company Inc; [_____]: www.trussteel.com/#sle.
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 TRUSS DESIGN REQUIREMENTS

A. Design: Calculate structural characteristics of cold-formed steel truss members according to AISI S100.
B. Structural Performance: Design, engineer, fabricate, and erect trusses to withstand specified design loads for project conditions within required limits.
1. Design Loads: In accordance with applicable codes.
2. Deflections: Live load deflection meeting the following, unless otherwise indicated:
a. Roofs: Maximum vertical deflection under live load of 1/240 of span.

3. Design trusses to accommodate movement attributable to temperature changes within a range of 120 degrees F without damage or overstressing, sheathing failure, undue strain on fasteners and anchors, or other deleterious effects.

2.03 COMPONENTS

A. Trusses: Light gauge steel assemblies providing a complete horizontal framing system for locations indicated, ready for deck installation.
   1. Truss Type, Span, and Height: As indicated on drawings.
   2. Chord and Web Members: Fabricate required shapes from commercial quality galvanized steel sheet complying with ASTM A653/A653M, with minimum yield strength of 40,000 psi; minimum G60/Z180 coating; gauges as required for load conditions; all edges rolled or closed.

B. Fasteners: Self-drilling, self-tapping screw fasteners with corrosion-resistant plated finish, as recommended by steel truss manufacturer and marked for easy identification.
   1. Welding: Comply with applicable provisions of AWS D1.1/D1.1M and AWS D1.3/D1.3M.

C. Bracing, Bridging, and Blocking Members: Fabricate required shapes from commercial quality galvanized steel sheet complying with ASTM A653/A653M, with minimum yield strength of 33,000 psi; minimum G60/Z180 coating; gauges as required for load conditions.

2.04 FABRICATION

A. Factory fabricate cold-formed steel trusses plumb, square, true to line, and with secure connections, complying with manufacturer's recommendations and project requirements.
   1. Fabricate trusses using jig templates.
   2. Cut truss members by sawing, shearing, or plasma cutting.
   3. Fasten members in full compliance with instructions of manufacturer. Wire tying of framing members is not permitted.

B. Tolerances: Fabricate trusses to maximum allowable tolerance variation from plumb, level and true line of 1/8 inch in 10 feet.
   1. Up to 30 feet Long: Maximum plus or minus 1/2 inch from design length.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine structure, substrates, and installation conditions. Notify Architect of unsatisfactory preparation. Do not begin installation until substrates have been properly prepared and unsatisfactory conditions have been corrected.

B. Proceeding with installation indicates installer's acceptance of substrate conditions.

3.02 INSTALLATION

A. Install cold-formed steel trusses in strict accordance with manufacturer's instructions and approved shop drawings, using approved fastening methods.

B. Install temporary erection bracing and permanent bracing and bridging before application of any loads. Erect trusses with plane of truss webs vertical and parallel to each other, accurately located at spacing indicated. Anchor trusses securely at bearing points.

C. Adequately distribute applied loads to avoid exceeding the carrying capacity of any one joint, truss, or other component.

D. Exercise care to avoid damaging truss members during lifting and erection and to minimize horizontal bending of trusses.

E. Removal, cutting, or alteration of any truss chord, web, or bracing member in the field is prohibited, unless approved in advance by Architect or the engineer of record and the truss

manufacturer.

F. Repair or replace damaged members and complete trusses as directed and approved in writing by Architect or the engineer of record and the truss manufacturer.

G. Galvanizing Repair: Touch up bare steel with zinc-rich paint in compliance with ASTM A780/A780M.

H. Field Welding: In accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M, as applicable, and as follows:
   1. Connections: Provide fillet, flat, plug, or butt welds, as indicated.
   2. Minimum steel thickness for welded connections, 18 gauge, 0.0478 inch.

I. Roof Trusses:
   1. Comply with recommendations of CFSEI 5000.
   2. Align truss bottom chords with load-bearing studs or continuously reinforce track as required to transfer loads to structure.
   3. Install continuous bridging and permanent truss bracing as indicated.
   4. Install roof cross bracing and diagonal bracing as indicated.

3.03 TOLERANCES

A. Install trusses to maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet.

B. Space individual trusses not more than plus or minus 1/8 inch from plan location. Cumulative error in placement may not exceed minimum fastening requirements of sheathing or other material fastened to trusses.

3.04 FIELD QUALITY CONTROL

A. Owner will provide inspection service for inspection of field connections, in accordance with requirements of Section 01 40 00 - Quality Requirements.

3.05 PROTECTION

A. Protect trusses from damage by subsequent construction activities.

B. Repair or replace damaged trusses, truss members, and bracing members; obtain approval in advance by Architect or the engineer of record and the truss manufacturer for all cutting, repairs, and replacements.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and aluminum items.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
B. Section 03 41 00 - Precast Structural Concrete: Placement of metal fabrication in precast structural concrete.
C. Section 04 20 00 - Unit Masonry: Placement of metal fabrications in masonry.
D. Section 05 12 00 - Structural Steel Framing: Structural steel column anchor bolts.
E. Section 05 31 00 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.
F. Section 05 51 00 - Metal Stairs.
G. Section 05 51 33 - Metal Ladders.
H. Section 05 52 13 - Pipe and Tube Railings.
I. Section 09 91 13 - Exterior Painting: Paint finish.
J. Section 09 91 23 - Interior Painting: Paint finish.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
    1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.04 QUALITY ASSURANCE

A. Design under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.
C. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.
B. Plates: ASTM A283/A283M.
C. Pipe: ASTM A53/A53M, Grade B Schedule 40, hot-dip galvanized finish.
D. Slotted Channel Framing: ASTM A653/A653M, Grade 33.
E. Slotted Channel Fittings: ASTM A1011/A1011M.
F. Bolts, Nuts, and Washers: ASTM A307, Grade A, galvanized to ASTM A153/A153M where connecting galvanized components.
G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.
B. Fabricate items with joints tightly fitted and secured.
C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

A. Bumper Posts and Guard Rails: As detailed; galvanized finish.
B. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
C. Door Frames for Overhead Door Openings and Wall Openings: Channel sections; galvanized finish.
D. Support framing in exterior wall is to be provided by metal building supplier. Canopy framing is noted on drawings, including basis of design as detailed; steel, glavanized finish.

2.04 FINISHES - STEEL

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
B. Prime Painting: One coat.
C. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
D. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.
B. Maximum Offset Between Faces: 1/16 inch.
C. Maximum Misalignment of Adjacent Members: 1/16 inch.
D. Maximum Bow: 1/8 inch in 48 inches.
E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.
B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.
B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
C. Field weld components as indicated on drawings.

D. Perform field welding in accordance with AWS D1.1/D1.1M.
E. Obtain approval prior to site cutting or making adjustments not scheduled.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.
C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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SECTION 05 51 00 - METAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prefabricated stairs.
B. Structural steel stair framing and supports.
C. Handrails and guards.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal anchors in concrete.
B. Section 04 20 00 - Unit Masonry: Placement of metal fabrications in masonry.
C. Section 05 50 00 - Metal Fabrications.
D. Section 05 52 13 - Pipe and Tube Railings: Metal handrails for the stairs specified in this section.
E. Section 09 91 13 - Exterior Painting: Paint finish.
F. Section 09 91 23 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
B. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures 2006.
C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
D. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.
E. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2014 (Amended 2015).
F. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide [_____].
C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
    1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
    2. Include the design engineer's seal and signature on each sheet of shop drawings.
D. Design Data: As required by authorities having jurisdiction.
E. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
F. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.

1.05 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work.
C. Fabricator Qualifications:

1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
2. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Prefabricated Metal Stairs:
   1. Lapeyre Stair, Inc: www.lapeyrestair.com/#sle.

2.02 METAL STAIRS - GENERAL

A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
   1. Regulatory Requirements: Provide stairs and railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
   2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
   3. Structural Design: Provide complete stair and railing assemblies that comply with the applicable local code.
   4. Dimensions: As indicated on drawings.
   5. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
   6. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
   7. Separate dissimilar metals using paint or permanent tape.
B. Metal Jointing and Finish Quality Levels:
   1. Commercial: Exposed joints as inconspicuous as possible, whether welded or mechanical; underside of stair not covered by soffit IS considered exposed to view.
      a. Welded Joints: Intermittently welded on back side, filled with body putty, and sanded smooth and flush.
      b. Welds Exposed to View: Ground smooth and flush.
      c. Mechanical Joints: Butted tight, flush, and hairline.
      d. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts.
      e. Exposed Edges and Corners: Eased to small uniform radius.
      f. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for satin or matte finish.
C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.03 PREFABRICATED STAIRS

A. Prefabricated Egress Stairs: Welded unit, factory fabricated to greatest degree practical and in the largest components possible.
   1. Design Requirements: Comply with structural design criteria stated elsewhere in this section and applicable local code.
      a. Comply with ADA Standards.

2. Materials: Manufacturer's standard steel tubes, plates, bars, shapes, sheets, wire and mesh that comply with requirements of MATERIALS article of this section.
    a. Rails: Manufacturer's standard rails.
        1) Guardrails: 42 inches high.
        2) Handrails: 30 inches to 38 inches high.
    b. Treads: Manufacturer's standard concrete pan.
    c. Finish: Hot-dipped galvanizing; comply with ASTM A153/A153M.
3. Manufacturers:
    a. Lapeyre Stair, Inc; 10AA: www.lapeyrestair.com/#sle.

2.04 HANDRAILS AND GUARDS

A. Wall-Mounted Rails: See Section 05 52 13.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. When field welding is required, clean and strip primed steel items to bare metal.
B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.03 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.
B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
F. Obtain approval prior to site cutting or creating adjustments not scheduled.
G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

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SECTION 05 51 33 - METAL LADDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prefabricated ladders.

1.02 RELATED REQUIREMENTS

A. Section 05 51 00 - Metal Stairs.
B. Section 05 52 13 - Pipe and Tube Railings.
C. Section 09 91 13 - Exterior Painting: Paint finish.
D. Section 09 91 23 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

A. 29 CFR 1910.28 - Duty to have Fall Protection and Falling Object Protection Current Edition.
B. 29 CFR 1910.29 - Fall Protection Systems and Falling Object Protection - Criteria and Practices Current Edition.
C. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements 2018.
D. ANSI/ASSP Z359.16 - Safety Requirements for Climbing Ladder Fall Arrest Systems 2016.
E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2020.
H. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
I. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.
J. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2014, with Editorial Revision (2017).
K. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2014.
L. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.
M. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
N. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel 2018.
O. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 1999 (Ed. 2004).
P. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic") 2002 (Ed. 2004).
Q. SSPC-SP 2 - Hand Tool Cleaning 2018.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.
B. Shop Drawings:
    1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
    2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Certificate: Provide documentation that ladder safety system products of this section meet or exceed cited 29 CFR 1910.28, 29 CFR 1910.29, ANSI/ASSP Z359.16, and ANSI A14.3 requirements.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.
B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
C. Plates: ASTM A283/A283M.
D. Pipe: ASTM A53/A53M, Grade B Schedule 40, hot-dip galvanized finish.
E. Mechanical Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
F. Bolts, Nuts, and Washers: ASTM A307, galvanized to ASTM A153/A153M where connecting galvanized components.
G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.
B. Fabricate items with joints tightly fitted and secured.
C. Continuously seal joined members by intermittent welds and plastic filler.
D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED LADDERS

A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; galvanized finish.
   1. Side Rails: 3/8 by 2 inches members spaced at 20 inches.
   2. Rungs: One inch diameter solid round bar spaced 12 inches on center.
   3. Space rungs 8 inches from wall surface.

2.04 LANDING PLATFORM

A. 1-1/2 inch diameter, tubular aluminum guardrails with deck of serrated aluminum treads. Coordinate platform size with roof access door. Provide mounting hardware and brackets, as required.

2.05 FINISHES - STEEL

A. Prime paint steel items.
B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
D. Prime Painting: One coat.
E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.
B. Maximum Offset Between Faces: 1/16 inch.
C. Maximum Misalignment of Adjacent Members: 1/16 inch.
D. Maximum Bow: 1/8 inch in 48 inches.
E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.
B. Confirm that the ladder structure to which the ladder safety system is installed is capable of withstanding the loads applied by the system in the event of a fall.

3.02 PREPARATION

A. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.
B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
C. Obtain approval prior to site cutting or making adjustments not scheduled.
D. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.
C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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SECTION 05 52 13 - PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stair railings and guardrails.
B. Railings and guardrails.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Placement of anchors in concrete.
B. Section 04 20 00 - Unit Masonry: Placement of anchors in masonry.
C. Section 05 51 00 - Metal Stairs: Handrails other than those specified in this section.
D. Section 05 51 00 - Metal Stairs: Attachment plates for handrails specified in this section.
E. Section 09 91 13 - Exterior Painting: Paint finish.
F. Section 09 91 23 - Interior Painting: Paint finish.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
    1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
    2. Include the design engineer's seal and signature on each sheet of shop drawings.

1.04 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
B. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months.
C. Fabricator Qualifications:
    1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
    2. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.
B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
D. Allow for expansion and contraction of members and building movement without damage to connections or members.
E. Dimensions: See drawings for configurations and heights.

1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
2. Intermediate Rails: 1-1/2 inches diameter, round.
3. Posts: 1-1/2 inches diameter, round.

F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
   1. For anchorage to masonry, provide brackets to be embedded in masonry, for bolting anchors.

G. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 STEEL RAILING SYSTEM

A. Steel Pipe: ASTM A53/A53M Grade B Schedule 80, galvanized finish.
B. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.
C. Exposed Fasteners: No exposed bolts or screws.
D. Straight Splice Connectors: Steel concealed spigots.
E. Galvanizing: In accordance with requirements of ASTM A123/A123M.
   1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic.

2.03 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.
B. Fit and shop assemble components in largest practical sizes for delivery to site.
C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
D. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
   3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.
B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.
C. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
D. Anchor railings securely to structure.
E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.
C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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SECTION 06 41 00 - ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Specially fabricated cabinet units.
B. Countertops.
C. Hardware.

1.02 RELATED REQUIREMENTS

A. Section 12 36 00 - Countertops.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014, with Errata (2018).
B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1 2017, with Errata (2019).
C. BHMA A156.9 - American National Standard for Cabinet Hardware 2015.
D. NEMA LD 3 - High-Pressure Decorative Laminates 2005.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
C. Product Data: Provide data for hardware accessories.
D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

1.08 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

A. Quality Standard: Premium Grade, in accordance with {\rs\#1} or {\rs\#1}, unless noted otherwise.
B. Plastic Laminate Faced Cabinets: Premium grade.
C. Cabinets:
    1. Finish - Exposed Exterior Surfaces: decorative laminate.

2. Finish - Exposed Interior Surfaces: low pressure melamine overlay.
3. Finish - Semi-Exposed Surfaces: low pressure melamine overlay.
4. Finish - Concealed Surfaces: Manufacturer's option.
5. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
6. Door and Drawer Front Retention Profiles: Fixed panel.
7. Casework Construction Type: Type A - Frameless.
8. Interface Style for Cabinet and Door: Style 2 - Finish Inset; reveal overlay.
9. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
    a. Premium Grade:
        1) Provide vertical run and match for doors, drawer fronts and false fronts within each cabinet unit.
        2) Provide well-matched doors, drawer fronts and false fronts across multiple cabinet faces in one elevation.
10. Adjustable Shelf Loading: 50 lbs. per sq. ft.
11. Cabinet Style: Flush overlay.
12. Cabinet Doors and Drawer Fronts: Flush style.
13. Drawer Side Construction: Multiple-dovetailed.
14. Drawer Construction Technique: Dovetail joints.

2.02 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.03 LAMINATE MATERIALS

A. Manufacturers:
    1. Formica Corporation: www.formica.com.
    2. Wilsonart: www.wilsonart.com.
B. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.
C. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
D. Provide specific types as follows:
    1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, color as selected, finish as indicated.
    2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, color as selected, finish as indicated.
    3. Post-Formed Horizontal Surfaces: HGP, 0.039 inch nominal thickness, through color, color as selected, finish as indicated.
    4. Post-Formed Vertical Surfaces: VGP, 0.028 inch nominal thickness, through color, color as selected, finish as indicated.
E. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range. Finish noted on drawings is basis of design.

2.04 COUNTERTOPS

A. Countertops are specified in Section 12 36 00.

2.05 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.
B. Edge Banding: PVC or ABS, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
C. Fasteners: Size and type to suit application.

D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
E. Grommets: Standard plastic grommets for cut-outs, in color to blend with adjacent surface.

2.06 HARDWARE

A. Hardware: {\rs\#1}, types as indicated for quality grade specified.
B. Adjustable Shelf Supports: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, satin chrome finish, for nominal 1 inch spacing adjustments.
C. Fixed Specialty Workstation and Countertop Brackets:
    1. Material: Steel.
    2. Finish: Manufacturer's standard, factory-applied powder coat.
    3. Color: Selected by Architect from manufacturer's standard range.
D. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers.
E. Catches: Magnetic.
F. Drawer Slides:
    1. Type: Full extension.
    2. Static Load Capacity: Commercial grade.
    3. Mounting: Side mounted.
    4. Stops: Integral type.
    5. Features: Provide self closing/stay closed type.
G. Hinges: European style concealed self-closing type, steel with satin finish.
H. Door and Drawer Silencers: BHMA A156.16, L03011.

2.07 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
E. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
    1. Provide sequence matching across each elevation.

2.08 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.
B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.
C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
D. Finish work in accordance with {\rs\#1} or {\rs\#1}, Section 5 - Finishing for grade specified.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.
B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
C. Use fixture attachments in concealed locations for wall mounted components.
D. Use concealed joint fasteners to align and secure adjoining cabinet units.
E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
F. Secure cabinets to floor using appropriate angles and anchorages.
G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING & TOUCH UP

A. Before completion of the installation, the installer shall adjust all moving and operating parts to function smoothly and correctly.
B. All nicks, chips and scratches in the finish shall be filled and retouched. Damaged items that cannot be repaired shall be replaced.

3.04 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

3.05 SCHEDULES

END OF SECTION

SECTION 07 21 19 - FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Foamed-in-place insulation.

1.02 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2017.
B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics 2019.
C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide product description, insulation properties, and preparation requirements.
C. Certificates: Certify that products of this section meet or exceed specified requirements.
D. Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
E. Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience, and approved by manufacturer.

1.06 FIELD CONDITIONS

A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.
B. Do not apply foam when temperature is within 5 degrees F of dew point.

PART 2 PRODUCTS

2.01 MATERIALS

A. Foamed-In-Place Insulation: Medium-density, closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
    1. Regulatory Requirements: Comply with applicable code for flame and smoke and concealment limitations.
    2. Thermal Resistance: R-value of 7.0, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
    3. Water Vapor Permeance: Vapor retarder; 1.0 perms, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.

4. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
5. Closed Cell Content: At least 90 percent.
6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
7. Basis of Design:
   a. Icynene-Lapolla; Icynene ProSeal LE: www.icynene.com/#sle.
8. Other Acceptable Manufacturers:
   a. BASF Corporation: www.spf.basf.com/#sle.
   b. Carlisle Spray Foam Insulation: www.carlislesfi.com/#sle.
   c. Gaco Western: www.gaco.com/#sle.
   d. Henry Company: www.henry.com/#sle.
   e. Johns Manville: www.jm.com/#sle.
   f. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORIES

A. Primer: As required by insulation manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify work within construction spaces or crevices is complete prior to insulation application.
B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.

3.02 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.
B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

A. Apply insulation in accordance with manufacturer's instructions.
B. Apply insulation by spray method, to a uniform monolithic density without voids.
C. Apply to achieve a thermal resistance R-value of 13.
D. Patch damaged areas.
E. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
F. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.04 FIELD QUALITY CONTROL

A. Field inspections and tests will be performed by an independent testing agency under provisions of Section 01 40 00 - Quality Requirements.
B. Inspection will include verification of insulation thickness and density.

3.05 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

SECTION 07 22 00

ROOF INSULATION

PART 1 GENERAL

1.01 SUMMARY

A. Work shall include, but is not limited to, the following:
   1. Preparation of new roof deck and all flashing substrates.
   2. Insulation
   3. SBS Modified Bitumen Laminated Cover-board
   4. All related materials and labor required to complete specified roofing necessary to receive specified manufacturer's warranty.

1.02 RELATED SECTIONS

A. Section 01 30 00 – Administrative Requirements for Submittal Procedures
B. Section 07 52 16 – Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing
C. Section 07 62 00 – Sheet Metal Flashing and Trim

1.03 DEFINITIONS

A. ASTM D 1079-Definitions of Term Relating to Roofing and Waterproofing.
B. The National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition Glossary.

1.04 REFERENCES

A. AMERICAN SOCIETY OF CIVIL ENGINEERS - Reference Document ASCE 7, Minimum Design Loads for Buildings and Other Structures.
B. AMERICAN STANDARD OF TESTING METHODS (ASTM):
   1. ASTM C 726 - Standard Specification for Mineral Wool Roof Insulation Board.
   2. ASTM C 728 - Standard Specification for Perlite Thermal Insulation Board.

3. ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
4. ASTM C 1278 - Standard Specification for Fiber-Reinforced Gypsum Panel.
5. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Insulation Board.
6. ASTM C 1325 – Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.
7. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Damp proofing, and Waterproofing.

C. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)::
1. ANSI/SPRI FX-1, Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
2. ANSI/SPRI IA-1, Standard Field Test Procedure for Determining the Mechanical Uplift Resistance of Insulation Adhesives over Various Substrates.
3. ANSI/FM 4474- American National Standard for Evaluating the Simulated Wind Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures.

D. CANADIAN GENERAL STANDARDS BOARD (CGSB):
1. CGSB 37-GP 56M- Standard for: Modified Bituminous, Prefabricated, and Reinforced for Roofing.

E. FACTORY MUTUAL (FM):
1. FM 4450 - Approval Standard - Class I Insulated Steel Roof Decks.
2. FM 4470 - Approval Standard - Class I Roof Covers.

F. FLORIDA BUILDING CODE (FBC)

G. INTERNATIONAL CODES COUNCIL (ICC)

H. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA).

I. UNDERWRITERS LABORATORY (UL):
1. UL 790 Standard Test Methods for Fire Tests of Roof Coverings.
2. UL 1256 – Fire Test of Roof Deck Constructions.

1.05 ACTION SUBMITTALS

A. Product Data Sheets: Submit manufacturer's product data sheets, installation instructions and/or general requirements for each component.

B. Safety Data Sheets: Submit manufacturer's Safety Data Sheets (SDS) for each component.

C. Sample/Specimen Warranty from the manufacturer and contractor.
D. Shop Drawings: Provide roof plan and applicable roof system detail drawings.

1.06 INFORMATIONAL SUBMITTALS

A. Contractor Certification: Submit written certification from roofing system manufacturer certifying that the applicator is authorized by the manufacturer to install the specified materials and system.

1.07 CLOSEOUT SUBMITTALS

A. Warranty: Provide manufacturer's and contractor's warranties upon substantial completion of the roofing system.

1.08 QUALITY ASSURANCE

A. MANUFACTURER QUALIFICATIONS:
   1. Manufacture shall have 20 years of experience manufacturing roofing materials.
   2. Trained Technical Field Representatives, employed by the manufacturer, independent of sales.
   3. Provide reports in a timely manner of all site visit reports.
   4. Provide specified warranty upon satisfactory project completion.
B. CONTRACTOR QUALIFICATIONS:
   1. Contractor shall be authorized by the manufacturer to install specified materials prior to the bidding period through satisfactory project completion.
   2. Applicators shall have completed projects of similar scope using same materials as specified herein.
   3. Contractor shall provide full time, on-site superintendent or foreman experienced with the specified roof system through satisfactory project completion.
   4. Applicators shall be skilled in the application methods for all materials.
   5. Contractor shall maintain a daily record, on-site, documenting material installation and related project conditions.

6. Contractor shall maintain a copy of all submittal documents, on-site, available at all times for reference.

1.09 DELIVERY, STORAGE AND HANDLING

A. Refer to each product data sheet or other published literature for specific requirements.
B. Deliver materials and store them in their unopened, original packaging, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard.
C. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the same day shall be removed from this location.
D. When materials are to be stored outdoors, store away from standing water, stacked on raised pallets or dunnage, at least 4 in or more above ground level. Carefully cover storage with “breathable” tarpaulins to protect materials from precipitation and to prevent exposure to condensation.
E. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged materials shall be removed from job site and replaced with new, suitable materials.

1.10 SITE CONDITIONS

A. SAFETY:
1. The contractor shall be responsible for complying with all project-related safety and environmental requirements.
2. Refer to NRCA CERTA recommendations, local codes and building owner’s requirements for hot work operations.
3. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified liquid-applied, or semi-solid roofing materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.

4. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified hot asphalt-applied materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.
5. The contractor shall refer to product Safety Data Sheets (SDS) for health, safety, and environment related hazards, and take all necessary measures and precautions to comply with exposure requirements.

B. ENVIRONMENTAL CONDITIONS:

1. Monitor substrate temperature and material temperature, as well as all environmental conditions such as ambient temperature, moisture, sun, cloud cover, wind, humidity, and shade. Ensure conditions are satisfactory to begin work and ensure conditions remain satisfactory during the installation of specified materials. Materials and methods shall be adjusted as necessary to accommodate varying project conditions. Materials shall not be installed when conditions are unacceptable to achieve the specified results.
2. Precipitation and dew point: Monitor weather to ensure the project environment is dry before, and will remain dry, during the application of roofing materials. Ensure all roofing materials and substrates remain above the dew point temperature as required to prevent condensation and maintain dry conditions.

1.11 PERFORMANCE REQUIREMENTS

A. FIRE CLASSIFICATION:

1. Roof construction performance testing shall be in accordance with UL 1256, FM 4450 or FM 4470 to meet the specified requirements for interior flame spread and fuel contribution.
    a. Roof construction meets requirements of UL 1256, or FM Class 1.

B. ROOF SLOPE:

1. Finished roof slope shall be ¼ inch per foot (2 percent) minimum for roof drainage.

C. ENERGY CONSERVATION REQUIREMENTS:
1. Thermal Resistance 'R' for the specified roof insulation system shall include the continuous insulation (ci) above the roof deck.
a. Total Thermal Resistance R Value, continuous insulation (ci) above-deck: R25

PART 2 PRODUCTS

2.01 MANUFACTURER

A. SINGLE SOURCE MANUFACTURER: All roofing materials shall be provided by a single supplier with 20 years or more manufacturing history in the US.
1. Comply with the Manufacturer's requirements as necessary to provide the specified warranty.

B. PRODUCT QUALITY ASSURANCE PROGRAM: Manufacturer shall be an ISO 9001 registered company.

C. ACCEPTABLE MANUFACTURER:
1. SOPREMA, located at: 310 Quadral Dr.; Wadsworth, OH 44281; Tel: 800-356-3521; Tel: 330-334-0066; Website: www.soprema.us.
2. Acceptable Alternate Manufacturers: Hunter Panels, Atlas Insulation Co.

2.02 ROOFING SYSTEM

A. ROOFING SYSTEM BASIS OF DESIGN: SOPREMA

B. RIGID INSULATION
1. POLYISOCYANURATE INSULATION:
a. SOPREMA SOPRA-ISO: Closed cell polyisocyanurate foam core bonded on each side to a glass fiber-reinforced felt facer.
i. Thickness: Total thickness to meet specified insulation system thermal resistance 'R' value
ii. Dimensions: 4 x 4 ft boards
iii. Meets or exceeds ASTM C1289, Type II, Class 1, Grade 3 (25 psi).

b. SOPREMA SOPRA-ISO Tapered: Closed cell polyisocyanurate foam core bonded on each side to a glass fiber-reinforced felt facer, tapered to provide slope.
   i. Taper: ¼, in per foot. Insulation, crickets and saddles provided with taper as required for positive roof slope.
   ii. Dimensions: 4 x 4 ft boards
   iii. Meets or exceeds ASTM C1289, Type II, Class 1, Grade 3 (25 psi).

C. COVER-BOARD
   1. ASPHALTIC ROOF BOARD
      a. SOPREMA SOPRABOARD: Mineral fortified, asphaltic roof substrate board with glass fiber facers. For use as roof cover-board and for vertical flashing substrate. ASPHALTIC ROOF BOARD shall be manufactured by the membrane supplier.
         i. Thickness: 1/8 in
         ii. Dimensions: 4 x 8 ft acceptable for insulation adhesive application.
         iii. Water absorption: Less than 1 percent per ASTM D994.
         iv. Impact resistance: Included in FM Approvals per 4450/4470 for FM Severe Hail (SH) rating.
         v. Compressive strength, psi (kPa) measured at 50 percent compression, per ASTM C472:
            a) 1/8 in board: 1,610 (11,100)
         vi. Puncture resistance, lbf (N) per ASTM E154:
            a) 1/8 in board: 90 (400)

   2. GYPSUM ROOF BOARD
      a. National Gypsum Company, DEXcell FA Glass Mat Roof Board:
         i. Gypsum core, glass fiber-faced, roof board:
         ii. Thickness: 1/4 in
         iii. Dimensions: 4 x 4 ft boards
         iv. Facer: Glass fiber.
         v. Meets or exceeds ASTM C1177/C1177M.
      b. Georgia Pacific Gypsum LLC, DensDeck Prime Roof Board: Gypsum core, glass fiber-faced, factory primed, roof Cover-board.

i. Thickness: 1/4 in
ii. Dimensions: 4 x 4 ft boards.
iii. Facer: Factory primed, glass fiber.
iv. Meets or exceeds ASTM C1177/C1177M.

D. INSULATION CANT AND TAPERED STRIP
1. CANT STRIP, MODIFIED BITUMEN
a. SOPREMA SOPRACANT MB: Modified bitumen cant strips
i. Length: 39.4 in sections.
ii. Size as required for flashing conditions.

E. INSULATION ADHESIVE
1. POLYURETHANE FOAM INSULATION ADHESIVE
a. SOPREMA DUOTACK SPF: Two-component, polyurethane foam insulation adhesive, applied in ribbons from two-component compressed cylinders.
i. Ribbon size: 2 1/2 in wide.
ii. Ribbon spacing: As required to meet specified wind uplift resistance performance.

2.03 ACCESSORIES

A. PRIMERS:
1. SOPREMA ELASTOCOL 500 PRIMER: Asphalt cut-back primer. Primer for the preparation of substrates for asphalt applications.
a. Meets or exceeds ASTM D41
b. VOC content: 350 g/L or less.
c. in Table I.
d. Meets or exceeds ASTM D6152.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination includes visual observations, qualitative analysis, and quantitative testing measures as necessary to ensure conditions remain satisfactory throughout the project.

B. Conduct qualitative insulation adhesive adhesion tests, or quantitative bonded pull tests as necessary to ensure satisfactory adhesion is achieved.
C. The contractor shall examine all roofing substrates including, but not limited to: insulation materials, roof decks, walls, curbs, rooftop equipment, fixtures, and wood blocking.
D. The applicator shall not begin installation until conditions have been properly examined and determined to be clean, dry and, otherwise satisfactory to receive specified roofing materials.
E. During the application of specified materials, the applicator shall continue to examine all project conditions to ensure conditions remain satisfactory to complete the specified roofing system.

3.02 PREPARATION

A. Before commencing work each day, the contractor shall prepare all roofing substrates to ensure conditions are satisfactory to proceed with the installation of specified roofing materials. Preparation of substrates includes, but is not limited to, substrate repairs, securement of substrates, eliminating all incompatible materials, and cleaning.
B. Where conditions are found to be unsatisfactory, work shall not begin until conditions are made satisfactory to begin work. Commencing of work shall indicate contractor's acceptance of conditions.

3.03 PRIMER APPLICATION

A. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified roofing materials.
B. Apply primer using brush, roller, or sprayer at the rate published on the product data sheet.
C. Asphalt Primer: Apply SOPREMA ELASTOCOL 500 primer to dry compatible masonry, metal, wood, and other required substrates before applying asphalt.
D. Project conditions vary throughout the day. Monitor changing conditions, monitor the drying time of primers, and monitor the adhesion of the membrane plies. Adjust primer and membrane application methods as necessary to achieve the desired results.

3.04 INSULATION ADHESIVE APPLICATION

A. DUOTACK SPF
   1. Apply the specified two-component insulation adhesive to adhere Insulation Layers and Cover Board to the deck and insulation substrate(s).
   2. Follow insulation adhesive product data sheets and published general requirements for installation requirements.
   3. Apply insulation adhesive in uniform ribbons, 2 1/2 in wide.
   4. Immediately install insulation components into insulation adhesive, and apply weight to ensure the materials maintain full contact with all ribbons for complete adhesion. Do not allow insulation adhesive to skin-over before placing the insulation materials into the adhesive.
   5. Adhere the insulation system to meet the specified wind uplift resistance performance and specified warranty requirements.

3.05 INSULATION SYSTEM APPLICATION

A. Follow insulation system component product data sheets, published general requirements and, approvals.
B. Install all insulation system components on clean, dry, uniform and, properly prepared substrates.
C. All insulation system boards shall be carefully installed and fitted against adjoining sheets to form tight joints.
D. Insulation system boards that must be cut to fit shall be saw-cut or knife-cut in a straight line, not broken. Chalk lines shall be used to cut insulation components. Uneven or broken edges shall not be accepted. Remove dust and debris that develops during cutting operations.
E. Stagger successive layers of insulation 12 in vertically and laterally to ensure board joints do not coincide with joints from the layers above and below.
F. Crickets, saddles, and tapered edge strips shall be installed before installing Cover-boards.
G. Install tapered insulation, saddles and crickets as required to ensure positive slope for complete roof drainage.
H. Cover-boards shall be installed to fit tight against adjacent boards. When required by the Cover Board manufacturer, a uniform gap shall be

provided between Cover Boards using a uniform guide placed between board joints to form a gap between all boards during installation.

I. The finished insulation system surface shall be tight to, and flush with, adjacent substrates to form a satisfactory substrate to install specified roof membrane and flashings.

J. Install specified cants where required for membrane flashing transitions.

3.06 CLEAN-UP

A. Clean-up and properly dispose of waste and debris resulting from these operations each day as required to prevent damages and disruptions to operations.

END OF SECTION

SECTION 07 41 13 - METAL ROOF PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Architectural roofing system of preformed aluminum panels.

1.02 RELATED REQUIREMENTS

A. Section 05 12 00 - Structural Steel Framing: Roof framing and purlins.
B. Section 07 42 13 - Metal Wall Panels: Preformed wall panels.
C. Section 07 92 00 - Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2017a.
B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
C. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.
D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
F. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference 2005 (Reapproved 2017).
G. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems 2018.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
    1. Show work to be field-fabricated or field-assembled.
C. Manufacturer's qualification statement.
D. Installer's qualification statement.
E. Test Reports: Indicate compliance of metal roofing system to specified requirements.
F. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
B. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of twenty years from Date of Substantial Completion.
C. Waterproofing Warranty: Provide manufacturer's warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of five years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Architectural Metal Roof Panels:
B. Metal Soffit Panels:
C. Metal Roof Underlayment:

2.02 PERFORMANCE REQUIREMENTS

A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
   1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length(L) when tested in accordance with ASTM E1592.
   2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
   3. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.

2.03 ARCHITECTURAL METAL ROOF PANELS

A. Architectural Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
B. Architectural Metal Panels: Factory-formed panels with factory-applied finish.
   1. Aluminum Panels:
      a. Alloy and Temper: Aluminum complying with ASTM B209 (ASTM B209M); temper as required for forming.
      b. Thickness: Minimum 20 gauge, 0.032 inch.
   2. Profile: Standing seam, with minimum 1.0 inch seam height; concealed fastener system for field seaming with special tool.
   3. Texture: Smooth.
   4. Width: Maximum panel coverage of 24 inches.
C. Metal Soffit Panels:
   1. Profile: Style as indicated, with venting not provided.
   2. Material: Precoated aluminum sheet, 20 gauge, 0.032 inch minimum thickness.
   3. Color: As selected by Architect from manufacturer's full line.
D. Metal Roof Underlayment:
   1. Material: Lastobond Sheild HT, 40 mils minimum thickness, SBS modified Bitumen, top surfacing - trilaminate woven polyethylene, back surfacing shelf adhesive with release film.

2.04 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.05 SECONDARY FRAMING

A. Miscellaneous Secondary Framing: Light gauge steel framing incidental to structural supports; fabricated from steel sheet.
B. Framing Material: ASTM A 1011/A 1011M, Designation SS steel sheet.
   1. Profile: Manufacturer's standard cee, zee, asymmetrical zee, hat channel, plain channel, single slope eave strut, double slope eave strut, and angle.
   2. Thickness: 12 gauge, 0.1046 inch.
   3. Finish: Galvanized per ASTM A653/A653M, G90.

2.06 FINISHES

A. Fluoropolymer Coil Coating System: Manufacturer's standard multi-coat aluminum coil coating system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss to match sample.

2.07 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.
C. Sealants:
   1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
   2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.
B. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.
C. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions.

Anchor all components of roofing system securely in place while allowing for thermal and structural movement.

1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

C. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.

3.04 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.05 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 07 52 16

STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 GENERAL

1.01 SUMMARY

A. Work shall include, but is not limited to, the following:
   1. Preparation of new, concrete roof deck, and all flashing substrates.
   2. SBS-modified bitumen base plies (heat-welded).
   3. SBS-modified bitumen cap sheet (heat-welded).
      a. Granule surfacing: Highly reflective, bright white mineral granule surfacing, listed by the Cool Roof Rating Council (CRRC).
   4. SBS-modified bitumen membrane flashings.
   5. Liquid-applied, reinforced flashings.
   6. Refer to related Sections for Insulation, Coverboard and Roof Edge Systems
   7. All related materials and labor required to complete specified roofing necessary to receive specified manufacturer's warranty.

1.02 RELATED SECTIONS

A. Section 01 30 00 – Administrative Requirements for Submittal Procedures
B. Section 07 22 00 – Roof Insulation

1.03 DEFINITIONS

A. ASTM D 1079-Definitions of Term Relating to Roofing and Waterproofing.
B. The National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition Glossary.

1.04 REFERENCES

A. AMERICAN SOCIETY OF CIVIL ENGINEERS - Reference Document ASCE 7, Minimum Design Loads for Buildings and Other Structures.
B. AMERICAN STANDARD OF TESTING METHODS (ASTM):

1. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants
2. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Damp proofing, and Waterproofing.
3. ASTM D 3746 - Standard Test Method for Impact Resistance of Bituminous Roofing System.
4. ASTM D 4434 - Standard for Polyvinyl Chloride Sheet Roofing.
5. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
6. ASTM D 5147 - Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
7. ASTM D 5849 - Standard Test Method for Evaluating Resistance of Modified Bituminous Roofing Membrane to Cyclic Fatigue (Joint Displacement)
8. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

C. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)::
1. ANSI/SPRI/FM 4435/ES-1 Wind Design Standard for Edge System Used with Low Slope Roofing System.
2. ANSI/SPRI IA-1, Standard Field Test Procedure for Determining the Mechanical Uplift Resistance of Insulation Adhesives over Various Substrates.
3. ANSI/FM 4474- American National Standard for Evaluating the Simulated Wind Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures.

D. COOL ROOF RATING COUNCIL (CRRC)

E. FACTORY MUTUAL (FM):
1. FM 4470 - Approval Standard - Class I Roof Covers.

F. FLORIDA BUILDING CODE (FBC)

G. INTERNATIONAL CODES COUNCIL (ICC)

1.05 ACTION SUBMITTALS

A. Product Data Sheets: Submit manufacturer's product data sheets, installation instructions and/or general requirements for each component.

B. Safety Data Sheets: Submit manufacturer's Safety Data Sheets (SDS) for each component.

C. Sample warranty from the manufacturer and contractor.

D. Provide roof plan and representative detail drawings.

1.06 INFORMATIONAL SUBMITTALS

A. Submit a letter from the roofing manufacturer indicating the contractor is an authorized applicator.

1.07 CLOSEOUT SUBMITTALS

A. Warranty: Provide manufacturer's and contractor's warranties upon project completion.

1.08 QUALITY ASSURANCE

A. MANUFACTURER QUALIFICATIONS:
   1. Manufacturer shall have 20 years of manufacturing experience.
   2. Manufacturer shall have trained technical service representatives employed by the manufacturer, independent of sales.
   3. Manufacturer shall provide site visit reports in a timely manner.

B. CONTRACTOR QUALIFICATIONS:
   1. Contractor shall be authorized by the manufacturer to install specified materials prior to the bidding period through satisfactory project completion.
   2. Applicators shall have completed projects of similar scope using same or similar materials specified.
   3. Contractor shall provide full time, on-site superintendent or foreman experienced with the specified roofing from beginning through satisfactory project completion.
   4. Applicators shall be skilled in the application methods for all materials.
   5. Contractor shall maintain a daily record, on-site, documenting material installation and related project conditions.
   6. Contractor shall maintain a copy of all submittal documents, on-site, available at all times for reference.

1.09 DELIVERY, STORAGE AND HANDLING

A. Refer to each product data sheet or other published literature for specific requirements.
B. Deliver materials and store them in their unopened, original packaging, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard.
C. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the same day shall be removed from this location. During cold weather, store materials in a heated location, removed only as needed for immediate use.
D. When materials are to be stored outdoors, store away from standing water, stacked on raised pallets or dunnage, at least 4 in or more above ground level. Carefully cover storage with “breathable” tarpaulins to protect materials from precipitation and to prevent exposure to condensation.
E. Carefully store roof membrane materials delivered in rolls on-end with selvage edges up. Store and protect roll storage to prevent damage.
F. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged materials shall be removed from job site and replaced with new, suitable materials.

1.10 SITE CONDITIONS

A. SAFETY:
1. The contractor shall be responsible for complying with all project-related safety and environmental requirements.
2. Heat-welding shall include heating the specified membrane ply using propane roof torches or electric hot-air welding equipment. The contractor shall determine when and where conditions are appropriate to utilize heat-welding equipment. When conditions are determined by the contractor to be unsafe to proceed, equivalent SBS-modified bitumen materials and methods shall be utilized to accommodate requirements and conditions.
3. Refer to NRCA CERTA recommendations, local codes and building owner’s requirements for hot work operations.
4. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified liquid-applied, or semi-solid roofing materials. When conditions are determined by the contractor to be unsafe or undesirable to

proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.

5. The contractor shall refer to product Safety Data Sheets (SDS) for health, safety, and environment related hazards, and take all necessary measures and precautions to comply with exposure requirements.

B. ENVIRONMENTAL CONDITIONS:

1. Monitor substrate temperature and material temperature, as well as all environmental conditions such as ambient temperature, moisture, sun, cloud cover, wind, humidity, and shade. Ensure conditions are satisfactory to begin work and ensure conditions remain satisfactory during the installation of specified materials. Materials and methods shall be adjusted as necessary to accommodate varying project conditions. Materials shall not be installed when conditions are unacceptable to achieve the specified results.
2. Precipitation and dew point: Monitor weather to ensure the project environment is dry before, and will remain dry, during the application of roofing materials. Ensure all roofing materials and substrates remain above the dew point temperature as required to prevent condensation and maintain dry conditions.
3. Take all necessary precautions and measures to monitor conditions to ensure all environmental conditions are safe to use roof torches and hot-air welding equipment. Combustibles, flammable liquids and solvent vapors that represent a hazard shall be eliminated. Flammable primers and cleaners shall be fully dry before proceeding with heat-welding operations. Prevent or protect wood, paper, plastics and other such combustible materials from direct exposure to open flames from roof torches. Refer to NRCA CERTA recommendations.

1.11 PERFORMANCE REQUIREMENTS

A. WIND UPLIFT RESISTANCE:

1. Performance testing shall be in accordance with ANSI/FM 4474, FM 4450, FM 4470, UL 580 or UL 1897.

a. Roof System Design Pressures: Calculated in accordance with ASCE 7, or applicable standard, for the specified roof system attachment requirements.

B. ROOF SLOPE:
1. Finished roof slope for SBS modified bitumen surfaces shall be ¼ inch per foot (2 percent) minimum for roof drainage.

C. IMPACT RESISTANCE:
1. Performance testing for impact resistance shall be in accordance with FM 4450, FM 4470, ASTM D3746 or CGSB 37-GP 56M to meet the specified impact resistance requirements.
a. Meets requirements for FM-SH (Severe Hail), ASTM D3746, or CGSB 37-GP 56M.

D. CYCLIC FATIGUE:
1. The roof system shall pass ASTM D5849 Standard Test Method for Evaluating Resistance of Modified Bituminous Roofing Membrane to Cyclic Fatigue (Joint Displacement). Passing results shall show no signs of cracking, splitting or tearing over the joint.

a. Roof system shall pass Test Condition 5, tested at -4°F (-20°C) in accordance with ASTM D5849

E. COOL ROOF RATING COUNCIL (CRRC):
1. The cap sheet shall be granule-surfaced. Cap sheet shall be listed by the Cool Roof Rating Council (CRRC) with the following minimum published values, including CRRC 3-year Rapid Ratings:

a.	Solar Reflectance:	Initial: 0.7	3-year: 0.62
b.	Thermal Emittance:	Initial: 0.9	3-year: 0.9
c.	Solar Reflectance Index (SRI):	Initial: 86	3-year: 75

1.12 WARRANTY

A. Manufacturer's No Dollar Limit (NDL) Warranty. The manufacturer shall provide the owner with the manufacturer's warranty providing labor and materials for 30 years from the date the warranty is issued.

B. The contractor shall guarantee the workmanship and shall provide the owner with the contractor's warranty covering workmanship for a period of 2 years from completion date.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. SINGLE SOURCE MANUFACTURER: All SBS modified bitumen membrane and flashing sheets shall be manufactured by a single supplier with 20 years or more manufacturing history in the US.
   1. Comply with the Manufacturer's requirements as necessary to provide the specified warranty.

B. PRODUCT QUALITY ASSURANCE PROGRAM: Manufacturer shall be an ISO 9001 registered company. A 'Quality Compliance Certificate (QCC) for reporting/confirming the tested values of the SBS-Modified Bitumen Membrane Materials will be supplied upon request.

C. ACCEPTABLE MANUFACTURER:
   1. SOPREMA, located at: 310 Quadral Dr.; Wadsworth, OH 44281; Tel: 800-356-3521; Tel: 330-334-0066; Website: www.soprema.us.
   2. Acceptable Alternate Manufacturers: Siplast, Tremco

2.02 ROOFING SYSTEM

A. ROOFING SYSTEM BASIS OF DESIGN: SOPREMA
   1. The roof membrane assembly shall consist of a multi-ply, prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) block copolymer modified asphalt membrane, secured to a prepared substrate. Reinforcement mats shall be impregnated (saturated) and coated with a high quality SBS modified bitumen blend. The cross section of the the sheet material shall contain no oxidized or non-SBS modified bitumen.

2.03 SBS-MODIFIED BITUMEN MEMBRANES

A. BASE PLY:
   1. FIELD BASE PLY AND INTERPLY, HEAT-WELDED:
      a. SOPREMA SOPRALENE FLAM 180: SBS-modified bitumen membrane with plastic burn-off film on top and bottom surfaces. Non-woven polyester reinforcement. Meets or exceeds ASTM D6164, Type I, Grade S, per ASTM D5147 test methods:

i. Thickness: 118 mils (3.0 mm)
ii. Width: 39.4 in (1 m)
iii. Length: 32.8 ft (10 m)
iv. Roll weight: 81 lb (36.7 kg)
v. Net mass per unit area, lb/100 sq ft (g/sq m):
  a) 75 lb (3662 g)
vi. Peak load @ 0°F (-18°C), lbf/in (kN/m).
  a) MD 115 lbf/in (20.1 kN/m), XMD 90 lbf/in (15.8 kN/m)
vii. Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
  a) MD 35%, XMD 40%
viii. Peak load @ 73.4°F (23°C), lbf/in (kN/m):
  a) MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)
ix. Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
  a) MD 55%, XMD 60%
x. Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
  a) MD 65%, XMD 80%
xi. Tear Strength @ 73.4°F (23°C), lbf (N):
  a) MD 125 lbf (556 N), XMD 85 lbf (378 N)
xii. Low temperature flexibility, °F (°C):
  a) MD/XMD: -15°F (-26°C)
xiii. Dimensional stability, %:
  a) MD/XMD: Less than 0.5%
xiv. Compound stability, °F (°C):
  a) MD/XMD: 240°F (116°C)

B. SBS MODIFIED FLASHING BASE PLY

1. FLASHING BASE PLY, HEAT-WELDED:

a. SOPREMA SOPRALENE FLAM 180: SBS-modified bitumen membrane with plastic burn-off film on top and bottom surfaces. Non-woven polyester reinforcement. Meets or exceeds ASTM D6164, Type I, Grade S, per ASTM D5147 test methods:

i. Thickness: 118 mils (3.0 mm)
ii. Width: 39.4 in (1 m)
iii. Length: 32.8 ft (10 m)

iv. Roll weight: 81 lb (36.7 kg)
v. Net mass per unit area, lb/100 sq ft (g/sq m):
a) 75 lb (3662 g)
vi. Peak load @ 0°F (-18°C), lbf/in (kN/m).
a) MD 115 lbf/in (20.1 kN/m), XMD 90 lbf/in (15.8 kN/m)
vii. Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
a) MD 35%, XMD 40%
viii. Peak load @ 73.4°F (23°C), lbf/in (kN/m):
a) MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)
ix. Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
a) MD 55%, XMD 60%
x. Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
a) MD 65%, XMD 80%
xi. Tear Strength @ 73.4°F (23°C), lbf (N):
a) MD 125 lbf (556 N), XMD 85 lbf (378 N)
xii. Low temperature flexibility, °F (°C):
a) MD/XMD: -15°F (-26°C)
xiii. Dimensional stability, %:
a) MD/XMD: Less than 0.5%
xiv. Compound stability, °F (°C):
a) MD/XMD: 240°F (116°C)

C. CAP SHEET:
1. FIELD CAP SHEET, HEAT-WELDED:
a. SOPREMA SOPRALENE FLAM 180 FR GR: SBS-modified bitumen membrane Cap Sheet with a burn-off film bottom surface and mineral granule top surface. Non-woven polyester reinforced. UL Class A for specified roof slope requirements. Meets or exceeds ASTM D6164, Type I, Grade G, per ASTM D5147 test methods:
i. Thickness: 157 mils (4.0 mm)
ii. Width: 39.4 in (1 m)
iii. Length: 32.8 ft (10 m)
iv. Roll weight: 118 lb (53.5 kg)
v. Net mass per unit area, lb/100 sq ft (g/sq m):

a) 110 lb (5371 g)

vi. Peak load @ 0°F (-18°C), lbf/in (kN/m).
   a) MD 115 lbf/in (20.1 kN/m), XMD 90 lbf/in (15.8 kN/m)

vii. Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
   a) MD 35%, XMD 40%

viii. Peak load @ 73.4°F (23°C), lbf/in (kN/m):
   a) MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)

ix. Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
   a) MD 55%, XMD 60%

x. Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
   a) MD 65%, XMD 80%

xi. Tear Strength @ 73.4°F (23°C), lbf (N):
   a) MD 125 lbf (556 N), XMD 85 lbf (378 N)

xii. Low temperature flexibility, °F (°C):
   a) MD/XMD: -15°F (-26°C)

xiii. Dimensional stability, %:
   a) MD/XMD: Less than 0.5%

xiv. Compound stability, °F (°C):
   a) MD/XMD: 240°F (116°C)

xv. Granule Surfacing:
   a) SOPREMA SG GRANULE: Highly reflective, bright white mineral granule surfacing, listed by the Cool Roof Rating Council (CRRC).

D. FLASHING CAP SHEET

1. FLASHING CAP SHEET, HEAT-WELDED:

a. SOPREMA SOPRALENE FLAM 180 FR GR: SBS-modified bitumen membrane Cap Sheet with a burn-off film bottom surface and mineral granule top surface. Non-woven polyester reinforced. UL Class A for specified roof slope requirements. Meets or exceeds ASTM D6164, Type I, Grade G

i. Thickness: 157 mils (4.0 mm)

ii. Width: 39.4 in (1 m)

iii. Length: 32.8 ft (10 m)

iv. Roll weight: 118 lb (53.5 kg)
v. Net mass per unit area, lb/100 sq ft (g/sq m):
  a) 110 lb (5371 g)
vi. Peak load @ 0°F (-18°C), lbf/in (kN/m).
  a) MD 115 lbf/in (20.1 kN/m), XMD 90 lbf/in (15.8 kN/m)
vii. Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
  a) MD 35%, XMD 40%
viii. Peak load @ 73.4°F (23°C), lbf/in (kN/m):
  a) MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)
ix. Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
  a) MD 55%, XMD 60%
x. Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
  a) MD 65%, XMD 80%
xi. Tear Strength @ 73.4°F (23°C), lbf (N):
  a) MD 125 lbf (556 N), XMD 85 lbf (378 N)
xii. Low temperature flexibility, °F (°C):
  a) MD/XMD: -15°F (-26°C)
xiii. Dimensional stability, %:
  a) MD/XMD: Less than 0.5%
xiv. Compound stability, °F (°C):
  a) MD/XMD: 240°F (116°C)
xv. Granule Surfacing:
  a) SOPREMA SG GRANULE: Highly reflective, bright white mineral granule surfacing, listed by the Cool Roof Rating Council (CRRC).

2. PVC FLASHING, ADHERED:
  a. SOPREMA® SENTINEL® PVC P150: Polyester reinforced, thermoplastic polyvinyl chloride membrane with a smooth back underside. Mechanically fastened in 6 in (minimum) side-laps. Overall Thickness ASTM D4434 (ASTM D638): 60 mils minimum
    a) Manufacturer shall provide membrane at specified minimum 60 mils

b) ASTM D4434 +/- tolerance for membrane thickness will not be accepted.

ii. Thickness over Scrim (ASTM D7635): 30 mils minimum
a) Manufacturer shall provide membrane with minimum 30 mils compound thickness above reinforcement/scrim

iii. Width: 10 ft (3.0 m)

iv. Length: 100 ft (30.5 m)

v. Physical Properties ASTM D4434.
a) Breaking Strength, lbf/in
i) 430 (MD) 300 (XMD
b) Elongation at Break - %
i) 25 (MD) 25(XMD)
c) Tear Strength, lbf
i) 150 (MD) 80 (XMD)
d) Linear Dimensional Change - %
i) <0.1%

vi. Color: white

2.04 ACCESSORIES

A. PRIMERS:
1. SOPREMA ELASTOCOL 500 Primer: Asphalt cut-back primer. Primer for the preparation of membrane substrates for asphalt, heat-welded, hot asphalt and COLPLY ADHESIVE, solvent-based, cold adhesive-applied and cement applications.
a. Meets or exceeds ASTM D41
b. VOC content: 350 g/L or less.

B. PVC FLASHING MEMBRANE ADHESIVE:
1. SOPREMA® SENTINEL® S BONDING ADHESIVE: Solvent-based adhesive. Formulated to adhere smooth back PVC membranes.
a. VOC Content: 199.5 g/L or less.

C. GENERAL PURPOSE ROOFING CEMENT AND MASTIC
1. SOPREMA SOPRAMASTIC: SBS Mastic. Fiber-reinforced, roofing cement. General purpose roofing cement for low-slope roofing used for sealing membrane T-joints and membrane edges along terminations, transitions and at roof penetrations.
a. VOC Content: 190 g/L or less.

b. Meets or exceeds ASTM D4586, Type I, Class II.

2. SOPREMA SBL ROOF CEMENT: Asbestos-free, trowel grade elastomeric utility cement.
   a. VOC Content: 226 g/L or less.
   b. Meets or exceeds ASTM D4586, Type I, Class II.
3. SOPREMA SBL HP FLASHING CEMENT: Asbestos-free, trowel grade roof flashing cement.
   a. VOC Content: 223g/L or less.
   b. Meets or exceeds ASTM D4586, Type I, Class II.

D. GENERAL PURPOSE SEALANT
1. SOPREMA SOPRAMASTIC SP1: General purpose, paintable, gun-grade, elastomeric, polyether moisture curing sealant for sealing SBS membrane terminations, Kynar 500 PVDF, horizontal and vertical construction joints.
   a. VOC Content: 20 g/L or less.
   b. Meets or exceeds ASTM C920, Type S, Grade NS, Class 50.
   c. Standard color.
2. SOPREMA SOPRAMASTIC ALU: Modified bitumen mastic, aluminum hued for application to membrane edge and perimeter metal.
   a. VOC Content: 270 g/L or less.
   b. Standard color.

E. LIQUID-APPLIED REINFORCED FLASHING SYSTEM:
1. SOPREMA ALSAN FLASHING: Single-component, polyurethane-bitumen resin with polyester reinforcing fleece fabric fully embedded into the resin to form roof system flashings.
   a. VOC Content: 250 g/L.
   b. SOPREMA ALSAN FLASHING: Liquid resin, Meets or exceeds ASTM C836.
   c. SOPREMA ALSAN POLYFLEECE: Non-woven polyester reinforcement.
   d. Surfacing: SOPREMA ALSAN FLASHING with mineral granules broadcast into wet SOPREMA ALSAN FLASHING to match adjacent SBS-modified bitumen cap sheet.

F. MINERAL GRANULES:

1. SOPREMA Granules: No. 11, mineral coated colored granules, color to match cap sheet, supplied by membrane cap sheet manufacturer.
   a. SOPREMA SG GRANULES

G. EXPANSION JOINT:
1. SOPREMA SOPRAJOINT: Low-profile, polyester knit-reinforced, SBS-modified bitumen expansion joint membrane. Top surface consists of an aluminum-clad bond-breaker, with plastic burn-off film on the bottom surface for torch or hot air welding.
   a. Thickness: 160 mils (4.0 mm)
   b. Width: 18 in (457 mm)
   c. Roll Length: 32.8 ft (10 m)
   d. Expansion joint, maximum unsupported span: 2 in (51 mm)
   e. Expansion joint, maximum displacement: 5/8 in (16 mm)

H. WALKWAY PROTECTION:
1. SOPREMA SOPRAWALK: Polyester reinforced SBS modified bitumen walkway protection with a granule surface and sanded underside.
   a. Thickness: 200 mils (5.0 mm)
   b. Width: 39.4 in (1 m)
   c. Roll Length: 26 ft (7.9 m)
   d. Granule Surfacing:
      i. Color: grey

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination includes visual observations, qualitative analysis, and quantitative testing measures as necessary to ensure conditions remain satisfactory throughout the project.

B. The contractor shall examine all roofing substrates including, but not limited to: insulation materials, roof decks, walls, curbs, rooftop equipment, fixtures, and wood blocking.

C. The applicator shall not begin installation until conditions have been properly examined and determined to be clean, dry and, otherwise satisfactory to receive specified roofing materials.

D. During the application of specified materials, the applicator shall continue to examine all project conditions to ensure conditions remain satisfactory to complete the specified roofing system.

3.02 PREPARATION

A. Before commencing work each day, the contractor shall prepare all roofing substrates to ensure conditions are satisfactory to proceed with the installation of specified roofing materials. Preparation of substrates includes, but is not limited to, substrate repairs, securement of substrates, eliminating all incompatible materials, and cleaning.
B. Where conditions are found to be unsatisfactory, work shall not begin until conditions are made satisfactory to begin work. Commencing of work shall indicate contractor's acceptance of conditions.

3.03 PRIMER APPLICATION

A. Examine all substrates, and conduct adhesion peel tests as necessary, to ensure satisfactory adhesion is achieved.
B. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified roofing materials.
C. Apply primer using brush, roller, or sprayer at the rate published on the product data sheet. Lightly prime for uniform coverage, do not apply heavy or thick coats of primer.
D. Asphalt Primer: Apply SOPREMA ELASTOCOL primer to dry compatible masonry, metal, wood and other required substrates before applying asphalt and heat-welded membrane plies. Primer is optional for solvent based solvent-based SBS adhesives and cements. Refer to product data sheets.
E. Project conditions vary throughout the day. Monitor changing conditions, monitor the drying time of primers, and monitor the adhesion of the membrane plies. Adjust primer and membrane application methods as necessary to achieve the desired results.

3.04 HEAT WELDING

A. The Contractor is responsible for project safety. Where conditions are deemed unsafe to use open flames, manufacturer's alternate membrane

application methods shall be used to install SBS modified bitumen membrane and flashings. Acceptable alternate installation methods include hot asphalt, cold adhesive-applied, self-adhered membranes and mechanically fastened plies. Hot-air welding equipment may be used in lieu of roof torches to seal membrane side and end laps where heat welding the laps is necessary. Refer to NRCA CERTA, local codes and building owner's requirements for hot work operations.

B. Single or multi-nozzle, hand-held propane roof torches shall be used to install heat-welded membrane and flashing plies. Multi-nozzle carts (dragon wagons) may also be utilized to install membrane plies. Seven (7) nozzle carts are recommended for more uniform heat application in lieu of five (5) nozzle carts.

3.05 SBS MASTIC AND GENERAL PURPOSE ROOFING CEMENT APPLICATION

A. Apply SOPREMA SOPRAMASTIC general purpose SBS mastic and roofing cement to seal drain leads, metal flanges, seal along membrane edge at terminations, and where specified and required in detail drawings.

B. Do not use general purpose SBS mastics and roofing cement where flashing cement applications are required. Do not use SBS mastics and roofing cement beneath SBS-modified bitumen membrane and flashing plies.

C. Apply general purpose SBS mastic and elastic roofing cement using caulk gun, or notched trowel at 2.0 – 2.5 gallons per square on each surface. Application rates vary based on substrate porosity and roughness. Tool-in as necessary to seal laps

D. Embed matching granules into wet cement where exposed.

3.06 HEAT-WELDED, FULLY ADHERED MEMBRANE APPLICATION

A. Follow material product data sheets and published general requirements for installation instructions.

B. Ensure environmental conditions are safe and satisfactory, and will remain safe and satisfactory, during the application of the heat-welded membrane and flashings.

C. Ensure all primers are fully dry before beginning heat-welding operations.

D. Unroll membrane onto the roof surface and allow time to relax prior to heat welding.
E. Starting at the low point of the roof, lay out the membrane to ensure the plies are installed perpendicular to the roof slope, shingled to prevent back-water laps.
F. Ensure all roofing and flashing substrates are prepared and acceptable to receive the heat-welded membrane.
G. Cut membrane to working lengths and widths to conform to rooftop conditions, and lay out to always work to a selvage edge.
H. Ensure specified side-laps and end-laps are maintained. End-laps should be staggered 3 ft apart.
I. Direct roof torch on the roll as necessary to prevent overheating and damaging the membrane and substrates.
J. As the membrane is unrolled, apply heat to the underside of the membrane until the plastic burn-off film melts away. Continuously move the torch side-to-side across the underside of the roll to melt the bitumen on the underside of the sheet, while continuously unrolling membrane.
K. While unrolling and heating the sheet, ensure approximately ¼ to 1/2 in of hot bitumen flows ahead of the roll as it is unrolled, and there is 1/8 to 1/4 in bleed out at all laps.
L. Adjust the application of heat to the underside of the membrane and to substrate as required for varying substrates and environmental conditions.
M. At the 6 in end-laps, melt the plastic burn-off film from the top surface or embed granules and remove surfacing, where present, using a torch or hot-air welder.
N. At end-laps where T-Joints exist, cut a 45 degree dog-ear away from the selvage edge, or otherwise ensure the membrane is fully heat-welded watertight at all T-joints.
O. Each day, physically inspect all side and end-laps, and ensure the membrane is sealed watertight. Where necessary, use a torch or hot-air welder and a clean trowel to ensure all laps are fully sealed.
P. Inspect the installation each day to ensure the plies are fully adhered. Repair all voids, wrinkles, open laps and all other deficiencies.
Q. Offset cap sheet side and end-laps away from the base ply laps so that cap sheet laps are not located within 18 in of base ply laps.

3.07 FLASHING APPLICATION, HEAT WELDED

A. Refer to SBS manufacturer's membrane application instructions, flashing detail drawings, and follow product data sheets and other published requirements for installation instructions. Refer to manufacturer's membrane flashing detail drawings.
B. The contractor is responsible for project safety. Refer to NRCA CERTA recommendations and building owner requirements for hot work operations.
C. Where required to seal substrates for fire safety, install specified adhered, self-adhered or fastened backer ply to the substrate. Ensure backer-ply covers and seals all substrates requiring protection from exposure to torch operations.
D. Ensure all flashing substrates that require primer are primed, and the primer is fully dry.
E. Unroll the flashing base ply and flashing cap sheet onto the roof surface to their complete length. Once relaxed, cut the membrane to the required working lengths to accommodate the flashing height, cants and the required over-lap onto the horizontal roof surface.
F. Cut the flashing membrane from the end of the roll in order to always install flashings to the side-lap line or selvage edge line.
G. Lay out the flashing base ply and flashing Cap Sheet to offset all side-laps a minimum of 12 inches so that side-laps are never aligned on top of the ply beneath. Shingle the flashing ply laps to prevent back-water laps.
H. Install non-combustible cant strips at transitions where required.
I. Ensure correct membrane and flashing sequencing to achieve redundant, multi-ply, watertight flashings.
J. Terminate SBS modified bituminous flashing at 12" height.
K. ROOF MEMBRANE BASE PLY:
    1. Before installing flashings, install the roof membrane base ply in the horizontal field of the roof, and extend the base ply up to the top of the cant, where present, at roof terminations, transitions and penetrations.
L. FLASHING BASE PLY:
    1. Install the flashing base ply starting at the top leading edge of the vertical flashing substrate, down over the cant and onto the horizontal surface of the roof a minimum of 3 inches beyond the of base of the cant onto the roof. Cut the base ply at corners to form 3 inch side-laps. Install gussets to seal corner transitions.

2. Install one or more flashing base ply(s) at all roof terminations, transitions and penetrations.

M. ROOF MEMBRANE CAP SHEET:
1. Install the roof membrane Cap Sheet in the horizontal field of the roof over the flashing base ply up to the roof termination, transition or penetration, and up to the top of cants where present.
2. Using a chalk line, mark a line on the membrane cap sheet a minimum of 4 inches from the base of the cant onto the roof. Where granules are present, embed the cap sheet granules using a torch and trowel or granule embedder to prepare the surface to receive the flashing cap sheet.

N. FLASHING CAP SHEET:
1. Install the flashing Cap Sheet starting at the top leading edge on the vertical substrate, over the cant and onto the roof surface 4 inches from the base of the cant onto the roof.
2. Install the flashing Cap Sheet to ensure a minimum two (2) ply flashing system is present at all roof terminations, transitions and penetrations.

O. During the membrane and flashing installation, ensure all plies are completely adhered into place, with no bridging, voids or openings. Ensure bitumen or flashing cement bleed-out is present at all flashing side and end-laps.

P. Use a damp sponge float or damp rag to press-in the heat-welded flashing plies during installation.

Q. Where sufficient bitumen bleed-out is not present, and for all self-adhered plies, apply specified gun-grade sealant or mastic to seal the membrane termination along all roof terminations, transitions and penetrations. These include gravel stop edge metal, pipe penetrations, along the top edge of curb and wall flashing, and all other flashing terminations where necessary to seal flashings watertight.

R. Fasten the top leading edge of the flashing 8 in on-centers with appropriate 1 in metal cap nails or other specified fasteners and plates. Seal fastener penetrations watertight using specified sealant or mastic.

S. Manufacturer's liquid-applied, reinforced flashing systems shall be installed where conditions are not favorable to install SBS modified bitumen flashings. Such conditions include irregular shapes penetrating roof surfaces (I-beams), confined areas and low flashing heights.

Manufacturer's liquid-applied, reinforced flashing systems are recommended in lieu of pitch pans and lead pipe flashings.

3.08 PVC FLASHING MEMBRANE APPLICATION

A. Follow material product data sheets and published general requirements for installation instructions.
B. Ensure field membrane is fastened and secure to the substrate at all membrane terminations before PVC flashing is installed.
C. Ensure PVC membrane and substrates are dry, clean and free of asphalt and all bitumen-based products. Do not allow bare PVC to come in contact with asphalt or bitumen-based products.
D. Where required, cover walls and other flashing substrates using specified wood, gypsum or cement roof boards securely fastened in place.
E. The ambient temperature shall be above 40°F (4.4°C) during adhesive application. Ensure temperature is well above the dew point temperature to prevent condensation during adhesive application.
F. Apply bonding adhesive using 3/8 in nap solvent resistant rollers to clean, dry and prepared flashing substrates, and onto the underside of the bare PVC membrane. Refer to product data sheet for application rate.
G. Prevent adhesive from contacting the membrane at the side and end-laps that are to be hot-air welded.
H. Allow the adhesive on both surfaces to dry to the touch. Adhesive may be tacky to-the-touch, but not wet. Adhesive should not transfer to the finger tips when touched.
I. Mate the PVC flashing membrane to the flashing substrate. Prevent air entrapment and wrinkles. Apply pressure with hands, roller or broom to ensure complete adhesion.
J. Hot-air weld all laps with minimum 1-1/2 in welds.
K. Probe all seams/laps once the hot air welds have thoroughly cooled.
L. Repair all seam deficiencies the same day they are discovered
M. Fasten top leading edge of vertical PVC flashings. Refer to detail drawings.

3.09 LIQUID-APPLIED, SINGLE-COMPONENT, BITUMEN-URETHANE FLASHING SYSTEM APPLICATION:

A. Refer to manufacturer's details drawings, product data sheets and published general requirements for application rates and specific installation instructions
B. Pre-cut polyester reinforcing fleece to conform to roof terminations, transitions and penetrations being flashed. Ensure a minimum 2 in overlap of fleece at side and end-laps. Ensure the completed liquid-applied flashing membrane is fully reinforced.
C. Apply the base coat of liquid-applied flashing resin onto the substrate using a brush or roller, working the material into the surface for complete coverage and full adhesion at 2.0 gallons per square.
D. Immediately apply the polyester reinforcing fleece into the wet base coat of resin. Using a brush or roller, work the polyester reinforcing fleece into the wet resin while applying the second coat of flashing resin to completely encapsulate the fleece at 2.0 gallons per square, and extend the liquid-applied flashing resin 1 inch beyond the fleece.
E. Apply a finish coat of liquid-applied flashing resin at 2.0 gallons per square within 2-3 hours. When applying the finish coat more than 24 hours, the surface may need to be cleaned using acetone or MEK to ensure satisfactory adhesion.
F. Broadcast mineral granules into the wet finish coat as required to match the adjacent cap sheet.

3.10 WALKWAYS

A. At areas outlined on the drawings, and around the perimeter of all rooftop equipment and at all door and stair landings, install walkway protection.
B. Cut walkway from end of rolls. No piece shall be less than 24 in and no more than 60 in.
C. Remove foil/film or embed granules where present on cap sheet.
D. Provide a 4 in space between sheets for drainage.
E. Locate walkway membranes a minimum of 2 in from side-laps, end-laps and flashing membranes.
F. Fully adhere walkway protection by heat heat welding or adhering the field with cold adhesive and heat welding a 3 in perimeter.

3.11 AGGREGATE SURFACING

A. Apply 400 to 600 pounds per square of aggregate in nominal 60 pounds per square flood coat of hot asphalt.
B. The aggregate shall be fully embedded into hot asphalt. Loose gravel shall be broomed and embedded or removed to meet the 400 pounds per square requirement.
C. Hold asphalt and gravel back from all SBS modified bitumen flashings.

3.12 CLEAN-UP

A. Clean-up and properly dispose of waste and debris resulting from these operations each day as required to prevent damages and disruptions to operations.

END OF SECTION

SECTION 07 71 23 - MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pre-finished aluminum gutters and downspouts.
B. Precast concrete splash pads.

1.02 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2017a.
B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Comply with applicable code for size and method of rain water discharge.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
B. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.032 inch thick.
   1. Finish: Plain, shop pre-coated with PVDF (polyvinylidene fluoride) coating.
   2. Color: as selected from manufacturer's full range.

2.02 COMPONENTS

A. Anchors and Supports: Profiled to suit gutters and downspouts.
   1. Gutter Supports: Brackets.
   2. Downspout Supports: Brackets.
B. Fasteners: Galvanized steel , with soft neoprene washers.

2.03 ACCESSORIES

A. Downspout Boots: Plastic.

2.04 FABRICATION

A. Form gutters and downspouts of profiles and size indicated.
B. Fabricate with required connection pieces.
C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
D. Hem exposed edges of metal.
E. Fabricate gutter and downspout accessories; seal watertight.

2.05 FINISHES

A. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as selected from manufacturer's standard colors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
C. Slope gutters 1/16 inch per foot .
D. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.
E. Set splash pans under downspouts.

END OF SECTION

SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Curbs.
B. Equipment rails.
C. Roof penetrations mounting curbs.

1.02 RELATED REQUIREMENTS

A. Section 07 71 23 - Manufactured Gutters and Downspouts.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

PART 2 PRODUCTS

2.01 ROOF CURBS

A. Roof Curbs Mounting Assemblies: Factory fabricated hollow sheet metal construction, internally reinforced, and capable of supporting superimposed live and dead loads and designated equipment load with fully mitered and sealed corner joints welded or mechanically fastened, and integral counterflashing with top and edges formed to shed water.
    1. Roof Curb Mounting Substrate: Curb substrate consists of standing seam metal roof panel system.
    2. Sheet Metal Material:
        a. Aluminum: 0.080 inch minimum thickness, with 3003 alloy, and H14 temper.
    3. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing system at 1:1 slope; minimum cant height 4 inches.
    4. Fabricate curb bottom and mounting flanges for installation directly on metal roof panel system to match slope and configuration of system.
        a. Extend side flange to next adjacent roof panel seam and comply with seam configurations and seal connection, providing at least 6 inch clearance between curb and metal roof panel flange allowing water to properly flow past curb.
        b. Where side of curb aligns with metal roof panel flange, attach fasteners on upper slope of flange to curb connection allowing water to flow past below fasteners, and seal connection.
        c. Maintain at least 12 inch clearance from curb, and lap upper curb flange on underside of down sloping metal roof panel, and seal connection.
        d. Lap lower curb flange overtop of down sloping metal roof panel and seal connection.
    5. Provide layouts and configurations indicated on drawings.
B. Equipment Rail Curbs: Straight curbs on each side of equipment, with top of curbs horizontal and level with each other for equipment mounting.
C. Pipe, Duct, or Conduit Mounting Curbs: Vertical posts, minimum 8 inches square unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

A. Clean installed work to like-new condition.

3.05 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.
B. Self-leveling pourable joint sealants.
C. Joint backings and accessories.
D. Owner-provided field quality control.

1.02 RELATED REQUIREMENTS

A. Section 08 80 00 - Glazing: Glazing sealants and accessories.
B. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
C. Section 09 30 00 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
    1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
    2. List of backing materials approved for use with the specific product.
    3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
    4. Substrates the product should not be used on.
    5. Substrates for which use of primer is required.
    6. Substrates for which laboratory adhesion and/or compatibility testing is required.
    7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
    8. Sample product warranty.
    9. Certification by manufacturer indicating that product complies with specification requirements.
C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
F. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
G. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
H. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.

I. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least five years of documented experience.

C. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
   1. Adhesion Testing: In accordance with ASTM C794.
   2. Compatibility Testing: In accordance with ASTM C1087.
   3. Stain Testing: In accordance with ASTM C1248; required only for stone substrates.
   4. Allow sufficient time for testing to avoid delaying the work.
   5. Deliver to manufacturer sufficient samples for testing.
   6. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
   7. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

D. Installation Plan: Include schedule of sealed joints, including the following.
   1. Joint width indicated in Contract Documents.
   2. Joint depth indicated in Contract Documents; to face of backing material at centerline of joint.
   3. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgement that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
   4. Approximate date of installation, for evaluation of thermal movement influence.
   5. Installation Log Form: Include the following data fields, with known information filled out.
      a. Location on project.
      b. Substrates.
      c. Sealant used.
      d. Stated movement capability of sealant.
      e. Primer to be used, or indicate as "No primer" used.
      f. Size and actual backing material used.

E. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
   1. Identification of testing agency.
   2. Name(s) of sealant manufacturers' field representatives who will be observing
   3. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
      a. Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.
      b. Test date.
      c. Location on project.
      d. Sealant used.
      e. Test method used.

f. Date of test.
g. Copy of test method documents.
h. Age of sealant upon date of testing.
i. Test results, modeled after the sample form in the test method document.
j. Indicate use of photographic record of test.

F. Owner will employ an independent testing agency to perform the field quality control inspection and testing as referenced in PART 3 of this section and as follows, to prepare and submit the field quality control plan and log, and to provide recommendations of remedies in the case of failure.
1. Contractor shall cooperate with testing agency and repair failures discovered and destructive test location damage.

G. Field Quality Control Plan:
1. Visual inspection of entire length of sealant joints.
2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
a. For each different sealant and substrate combination, allow for one test every 12 inches in the first 10 linear feet of joint and one test every 24 inches thereafter.
b. If any failures occur in the first 10 linear feet, continue testing at 12 inches intervals at no extra cost to Owner.
3. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.
a. For each different sealant and substrate combination, allow for one test every 100 feet in the first 1000 linear feet, and one test per 1000 linear feet thereafter, or once per floor on each elevation.
b. If any failures occur in the first 1000 linear feet, continue testing at frequency of one test per 500 linear feet at no extra cost to Owner.
4. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.

H. Field Adhesion Test Procedures:
1. Allow sealants to fully cure as recommended by manufacturer before testing.
2. Have a copy of the test method document available during tests.
3. Take photographs or make video records of each test, with joint identification provided in the photos/videos; for example, provide small erasable whiteboard positioned next to joint.
4. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
5. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
6. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
7. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.

I. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
1. Record results on Field Quality Control Log.
2. Repair failed portions of joints.

J. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
   1. Sample: At least 18 inches long.
   2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
   3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.
   4. Record results on Field Quality Control Log.
   5. Repair failed portions of joints.

K. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or other applicable method as recommended by manufacturer.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Correct defective work within a five year period after Date of Substantial Completion.
C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.
D. Twenty (20) year weatherseal and structural warranty where DowSil Specified as Basis of Design.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
   1. ADCO; BP-300.
   2. Dow Chemical Company; Dowsil 790, 756, 795: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
   3. Pecora Corporation; AC-20, AC20-FTR, AIS-919: www.pecora.com/#sle.
   4. Soudal, Inc.; LTX-1, Acoustical.
   5. Sika Corporation; [_____]: www.usa-sika.com/#sle.
   6. M-1, Durasil or DuraLink 35 by Chemlink: www.chemlink.com.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.
      b. Joints between door, window, and other frames and adjacent construction.
      c. Joints between different exposed materials.
      d. Openings below ledge angles in masonry.
      e. Other joints indicated below.
   2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.

b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
c. Other joints indicated below.

3. Do not seal the following types of joints.
a. Intentional weepholes in masonry.
b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
d. Joints where installation of sealant is specified in another section.
e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
2. Lap Joints between Manufactured Metal Panels: Butyl rubber, non-curing.
3. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.

C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
2. Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion.
3. Floor Joints in Wet Areas: Non-sag polyurethane "traffic-grade" sealant suitable for continuous liquid immersion.
4. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
5. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
6. Narrow Control Joints in Interior Concrete Slabs: Self-leveling polyurethane sealant.
7. Other Floor Joints: Non-sag polyurethane "traffic-grade" sealant.

D. Interior Wet Areas: restrooms; fixtures in wet areas include plumbing fixtures and other similar items.

E. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.03 JOINT SEALANTS - GENERAL

A. Colors: As selected by Architect.

2.04 NONSAG JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: 50, minimum.
2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
5. Color: To be selected by Architect from manufacturer's standard range.
6. Cure Type: Single-component, neutral moisture curing.
7. Service Temperature Range: Minus 20 to 180 degrees F.

B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
   1. Color: Clear.
C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 35 percent, minimum.
   2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
D. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface .
   1. Movement Capability: Plus and minus 35 percent, minimum.
   2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
E. Non-Sag "Traffic-Grade" Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 40 to 50, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
F. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
   1. Color: To be selected by Architect from manufacturer's standard range.
G. Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, non-sag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.

2.05 SELF-LEVELING SEALANTS

A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.
B. Rigid Self-Leveling Polyurethane Joint Filler: Two part, low viscosity, fast setting; intended for cracks and control joints not subject to significant movement.
   1. Hardness Range: Greater than 100, Shore A, and 50 to 80, Shore D, when tested in accordance with ASTM C661.

2.06 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
   1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
   2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.

3. Open Cell: 40 to 50 percent larger in diameter than joint width.
4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.
B. Verify that backing materials are compatible with sealants.
C. Verify that backer rods are of the correct size.
D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
   1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
   2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
   3. Arrange for sealant manufacturer's technical representative to be present during tests.
   4. Record each test on Preinstallation Adhesion Test Log as indicated.
   5. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
   6. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.
B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
B. Perform installation in accordance with ASTM C1193.
C. Perform acoustical sealant application work in accordance with ASTM C919.
D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
E. Install bond breaker backing tape where backer rod cannot be used.
F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
H. Nonsag Sealants: Dry tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

A. Owner will employ an independent testing agency to perform field quality control inspection and testing as specified in PART 1 under QUALITY ASSURANCE article.
B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.
C. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet, notify Architect immediately.
D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.
E. Repair destructive test location damage immediately after evaluation and recording of results.

3.05 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

END OF SECTION

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.
B. Hollow metal frames for wood doors.
C. Fire-rated hollow metal doors and frames.
D. Thermally insulated hollow metal doors with frames.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.
B. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.
C. Section 09 91 13 - Exterior Painting: Field painting.
D. Section 09 91 23 - Interior Painting: Field painting.

1.03 SUBMITTALS

A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
C. Samples: Submit two samples of metal, 2 by 2 inches in size, showing factory finishes, colors, and surface texture.
D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
F. Manufacturer's Qualification Statement.
G. Installer's Qualification Statement.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
C. Maintain at project site copies of reference standards relating to installation of products specified.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
   2. Steelcraft, an Allegion brand: www.allegion.com/#sle.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
   4. Door Edge Profile: Manufacturers standard for application indicated.
   5. Typical Door Face Sheets: Flush.
   6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Security.
   7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
   8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Exterior Doors: Thermally insulated.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 3 - Extra Heavy-duty.
      b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 2 - Seamless.
      d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
      e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
   2. Core Material: Polyurethane, 1.8 lbs/cu ft minimum density.
      a. Foam Plastic Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
   3. Door Thermal Resistance: R-Value of 8.7, minimum, for installed thickness of polyurethane
   4. Door Thickness: 1-3/4 inches, nominal.
   5. Weatherstripping: Refer to Section 08 71 00.

C. Interior Doors, Non-Fire Rated:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 2 - Heavy-duty.
      b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.

2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
3. Door Thickness: 1-3/4 inches, nominal.

D. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 2 - Heavy-duty.
b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 1 - Full Flush.
d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
a. Attach fire rating label to each fire rated unit.
4. Smoke and Draft Control Doors: Self-closing or automatic closing doors in accordance with NFPA 80 and NFPA 105, with fire-resistance-rated wall construction rated the same or greater than the fire-rated doors, and the following;
a. Maximum Air Leakage: 3.0 cfm/sq ft of door opening at 0.10 inch w.g. pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
b. Gasketing: Provide gasketing or edge sealing as necessary to achieve leakage limit.
c. Label: Include the "S" label on fire-rating label of door.
5. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
B. Frame Finish: Factory primed and field finished.
C. Exterior Door Frames: Full profile/continuously welded type.
1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
2. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
3. Weatherstripping: Separate, see Section 08 71 00.
D. Interior Door Frames, Non-Fire Rated: Knock-down type.
1. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch, maximum, above floor at 45 degree angle.
2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
E. Door Frames, Fire-Rated: Knock-down type.
1. Fire Rating: Same as door, labeled.
2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
G. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
H. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
I. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.06 ACCESSORIES

A. Louvers: Extruded aluminum with concealed frame; finish same as door components; factory-installed.
   1. In Fire-Rated Doors: UL (DIR) or ITS (DIR) listed fusible link louver, same rating as door.
   2. Style: Sightproof inverted Y blade.
   3. Fasteners: Concealed fasteners.
B. Door Window Frames: Door window frames with glazing securely fastened within door opening.
   1. Size: As indicated on drawings.
   2. Frame Material: 18 gauge, 0.0478 inch, galvanized steel.
C. Glazing: As specified in Section 08 80 00.
D. Removable Stops: Formed sheet steel, mitered or butted corners; prepared for countersink style tamper proof screws.
E. Astragals and Edges for Double Doors: Pairs of door astragals, and door edge sealing and protection devices.
   1. Provide surface mounted astragal to cover or fill space for full door height between pair of doors or door and adjacent jamb.
   2. Astragal Type: Overlapping, flat-shaped, with coordinator for proper door closing sequence, and with sealing gasket.
   3. Material: Galvanized steel.
   4. Provide non-corroding fasteners at exterior locations.
F. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
G. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
H. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
I. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that opening sizes and tolerances are acceptable.
C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
B. Install fire rated units in accordance with NFPA 80.
C. Coordinate frame anchor placement with wall construction.
D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
E. Install door hardware as specified in Section 08 71 00.
F. Coordinate installation of electrical connections to electrical hardware items.
G. Touch up damaged factory finishes.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

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SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush and flush glazed configuration; fire-rated, non-rated, and acoustical.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames.
B. Section 08 71 00 - Door Hardware.
C. Section 08 80 00 - Glazing.
D. Section 09 91 23 - Interior Painting: Field finishing of doors.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
D. Samples: Submit two samples of door veneer, illustrating plastic laminate pattern and color.
E. Test Reports: Show compliance with specified requirements for the following:
    1. Sound-retardant doors and frames; sealed panel tests are not acceptable.
F. Manufacturer's Installation Instructions: Indicate special installation instructions.
G. Specimen warranty.
H. Warranty, executed in Owner's name.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.
B. Accept doors on site in manufacturer's packaging, and inspect for damage.
C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 DOORS

A. Doors: See drawings for locations and additional requirements.
    1. Quality Standard: Premium Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS), AWMAC/WI (NAAWS) or WDMA I.S. 1A.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at each location.
   2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
   3. Sound-Rated Doors: Minimum STC as indicated on drawings, calculated in accordance with ASTM E413, tested in accordance with ASTM E90.

2.02 DOOR AND PANEL CORES

A. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.
B. Sound-Rated Doors: Equivalent to type, with particleboard core (PC) construction as required to achieve STC rating specified; plies and faces as indicated above.

2.03 DOOR FACINGS

2.04 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.
B. Cores Constructed with stiles and rails:
C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
F. Provide edge clearances in accordance with the quality standard specified.

2.05 FINISHES - WOOD VENEER DOORS

A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:

2.06 ACCESSORIES

A. Hollow Metal Door Frames: See Section 08 11 13.
B. Metal Louvers: See Section 08 1113.
C. Glazing: See Section 08 80 00.
D. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.
E. Door Hardware: See Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that opening sizes and tolerances are acceptable.
C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.
B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.
D. Coordinate installation of doors with installation of frames and hardware.
E. Coordinate installation of glazing.
F. Install door louvers plumb and level.

3.03 TOLERANCES

A. Comply with specified quality standard for fit and clearance tolerances.
B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.
B. Adjust closers for full closure.

END OF SECTION

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SECTION 08 36 00 - FOUR-FOLD BAY DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Four-Fold Metal Doors tested and approved for High Velocity Hurricane Zones, Impacted Rated with Ultimate Design Wind Speed with 3-second gusts at 150mph, provide Florida Product Approval.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data: Provide data for each type of product specified consisting of manufacturer's technical Product Data and installation instructions for each type of door required, including data substantiating that products comply with specified requirements.
C. Submittal Drawings showing fabrication and installation of Four-Fold metal doors including plans, elevations, sections, details of components, hardware, operating mechanism, and attachments to the other units of Work. Include wiring diagrams.
D. Reference list including five (5) successful installations of this type of hurricane rated door within the past two (2) years.

1.03 QUALITY ASSURANCE

A. Doors shall be designed to withstand external or internal horizontal wind loads of 120 pounds minimum per square foot. The maximum allowable deflection shall not exceed 1/120 of the span. Fiber stresses in main members shall be limited to 27,000 pounds per square inch. Steel frames shall be designed in accordance with the AISC "Steel Construction Manual".
B. Installer Qualifications: Installer must be trained and approved by Four-Fold door manufacturer for both installation and maintenance of the specified type of door. Installer must have successfully completed at least five (5) similar jobs in the past two (2) years.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store delivered materials and equipment in dry locations with adequate ventilation, free from dust and water, and so as to permit access for inspection and handling.
B. Handle materials carefully to prevent damage.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
B. Correct defective Work within a five year period after Date of Substantial Completion.
C. The door manufacturer shall provide a written standard limited warranty for material and workmanship.

PART 2 PRODUCTS

2.01 BASE BID MANUFACTURER

A. Four-Fold industrial metal doors manufactured by Door Engineering and Manufacturing, 400 Cherry Street, Kasota, MN 56050, (800)-959-1352..
    1. Products:
        a. FF701 Series.
B. Other Acceptable Manufacturers:
    1. Electric Power Doors.

2.02 MATERIALS

A. Steel Tube: ASTM A513 and ASTM A500/A500M.

B. Steel Sheets: Steel sheets of commercial quality, complying with ASTM A1011/A1011M hot-rolled steel sheet.
C. Hardware: Manufacturer's standard components.
D. Fasteners: Zinc-coated steel.

2.03 FOUR-FOLD DOORS

A. Construction: Door framing shall be minimum 11-gauge structural steel tube with 14-gauge sheet steel on the exterior and interior faces. Sheeting shall be formed on the vertical edges with no visible welds or caulked sheet edges on the interior or exterior panel faces. All frames and framing members shall be true to dimension and square in all directions, and no door shall be bowed, warped, or out of line, in the vertical or horizontal plane of the door opening by more than 1/8 inch in 20 feet. Exposed welds and welds which interfere with the installation of various parts shall be ground smooth and flush.
B. Surface Mounted Tube Frame: Supply pre-hung tube frame system constructed of TS6x6x0.25, designed to anchor to masonry wall construction or weld to steel structure. All hinges, track supports and operator supports shall be factory attached.
C. Factory finish: Operator and operating hardware shall be powdercoated manufacturer's standard gray. Panels, frame and all other hardware shall be finished as follows:
    1. All exposed steel shall be finished with manufacturer's standard zinc rich primer and polyurethane top coat, PPG Spectracron or equal. Customer to select from Manufacturer's standard color chart or furnish color to match.
D. Operating Hardware: Hardware shall include guide tracks and brackets, trolleys, center guides, not less than three pairs of jamb and fold hinges per opening, and all bolts, nuts, fasteners, etc. necessary for complete installation and operation. Jamb hinges shall be dual shear and have two thrust bearings and two needle bearings. Jamb hinges shall be gusseted. Fold hinges shall be dual shear with two thrust bearings. Fold hinges shall be stainless steel. All bearings shall be completely sealed within the hinge barrel and include grease zerks. All hinge pins shall be minimum ¾" diameter hardened steel. All trolleys shall be equipped two (2) Nylatron rollers.
E. Hinge Guards: Provide plastic guards at jamb hinges to prevent access through hinge space.
F. Weatherstripping: Material shall be adjustable and readily replaceable and provide a substantially weather-tight installation. Weatherstripping at center shall be 1/16" cloth inserted neoprene. No exposed fasteners shall be required to attach the center bulb weatherseals. Weatherstripping at sill shall include two 1/16" cloth inserted neoprene sweeps with an aluminum retainer. The retainer shall be attached to the door with adhesive.
G. Perimeter Weatherstripping: Provide jamb and head weatherstipping of 1/16" cloth-inserted neoprene bulb (or closed cell neoprene).
H. Vision Panels: Provide 9/16" impact safety glass of the size, shape and location as noted on the drawings.
I. Hurricane Locking System: Locking bolts shall be completely concealed within the door panel. Locking bolts shall extend into the floor and into the header tube. A limit switch shall disable the operator when the locks are engaged.

2.04 OPERATOR

A. Each Four-Fold door shall be operated by an overhead mounted electro-mechanical drive unit designed for high cycle operation. Operator consists of an electric motor, gear reducer, and rotating drive arm. The door shall be operated with connecting rods attached to the rotating drive arm on the operator and to control arms attached to the jamb door section and to the door lintel. The connecting rods shall be positive drive, keeping the door under firm control at all times. The connecting rods shall be fitted with spherical bearings and control arms shall be

equipped with oil impregnated bronze bearings on polished shafts.

B. Operator shall be instantly reversible, open and close rapidly and start and stop gradually. Operator shall be adjustable to allow door to fully clear the opening. Operator shall automatically lock the door in the closed position. Operator shall be equipped with disengaging mechanism to convert to manual operation.

C. Electric motor shall be of sufficient size to operate doors under normal operating conditions at no more than 75 percent of rated capacity. The motor shall be wound for three phase 208/260/480 VAC, 60 Hertz operation.

D. Electric Controls: Controls shall be furnished by the door manufacturer and shall be complete for each door, and built in accordance with the latest NEMA standards. Incoming electrical shall be 208/230VAC 3-phase.
   1. Control panel assemblies shall be UL listed as per NFPA70.
   2. Controls shall include a programmable logic controller with digital message display. Controller shall include programmable close timers and programmable inputs/outputs
   3. Motor starters shall be magnetic reversing, factory wired with overload and under voltage protection, and equipped with mechanical interlocks. All control components shall be enclosed in one enclosure with a wiring diagram placed on the inside of the cover.
   4. If incoming voltage is single phase, control panel shall include a variable frequency drive to convert voltage to 3-phase for the motor
   5. Enclosures shall be NEMA 4 with disconnect switch.
   6. Pushbuttons (interior) for each door shall have one momentary pressure three-button push-button station marked “OPEN”, “CLOSE” and “STOP”. Push button enclosure shall be NEMA 4.

E. Limit switches shall be provided to stop the travel of the door in its fully open or fully closed position. Provide cremone bolt limit switch to be used for HVAC or exhaust removal system.
   1. Safety edges: Provide 4-wire fail-safe electric safety edges on leading edge of all doors to reverse door upon contact with obstruction.
   2. Photo eyes: Provide (1) exterior, jamb mounted, light Curtain type photo eyes, NEMA 4 rated. Photo eye shall cover from floor level to 72” above floor.
   3. Presence Sensor: Provide (1) interior, overhead mounted, presence sensor with pre-open and pre-close safety fields. Sensor shall be LZR-Widescan or equal.
   4. Timer Activation Loop Detectors (fire station applications): Provide “pulse on exit type” loop detector to activate auto close timer once loop has been activated and cleared, include hand/auto switch to deactivate timer. G.C. to coordinate installation of preformed loop with installer prior to exterior apron being poured.
   5. Wiring: Door manufacturer shall supply controls and components only. Electrical contractor shall install controls and furnish and install conduits and wiring for jobsite power and control wiring.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions, and as follows.

B. Install Four-Fold metal doors in strict accordance with the approved drawings by qualified door erection crews. All door openings shall be completely prepared by the general contractor prior to the installation of the doors. Permanent or temporary electric wiring shall be brought to the door opening before installation is started and shall be completed so as not to delay the inspection test.

C. Doors shall be set plumb, level, and square, and with all parts properly fastened and mounted. All moving parts shall be tested and adjusted and left in good operating condition.

3.02 ADJUSTING AND CLEANING

A. Inspection of the doors and a complete operating test will be made by the installer in the presence of the general contractor or architect as soon as the erection is complete. Any defects noted shall be corrected. After door approval in the above test, the general contractor must assume the responsibility for any damage or rough handling of the doors during construction until the building is turned over to the owner and final inspection is made.

B. Clean surfaces and repaint abraded or damaged finished surfaces to match factory-applied finish.

END OF SECTION

SECTION 08 36 13 - SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Overhead sectional doors, electrically operated.
B. Operating hardware and supports.
C. Electrical controls.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Steel channel opening frame.
B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
C. Section 26 05 83 - Wiring Connections.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
C. Product Data: Show component construction, anchorage method, and hardware.
D. Samples: Submit two panel finish samples illustrating color and finish.
E. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
F. Manufacturer's Qualification Statement.
G. Operation Data: Include normal operation, troubleshooting, and adjusting.
H. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
C. Comply with applicable code for motor and motor control requirements.
D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for warranty requirements.
B. Correct defective Work within a five year period after Date of Substantial Completion.
C. Warranty: Include coverage for electric motor and transmission.
D. Provide five year manufacturer warranty for electric operating equipment.
E. Special Finish Warranty: Manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sectional Doors:

1. C.H.I. Overhead Doors: www.chiohd.com/sle.
2. Clopay Building Products: www.clopaydoor.com/sle.
3. Raynor Garage Doors: www.raynor.com/#sle.
4. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com/#sle.

2.02 STEEL DOORS

A. Steel Doors: Flush steel, insulated; follow the roof pitch operating style with track and hardware; complying with DASMA 102, Commercial application.
   1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code or 20 lb/sq ft, whichever is higher, without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
   2. Operability Under Wind Load: Design overhead doors to remain operable under uniform pressure of 20 lbf/sq ft wind load, acting inward and outward.
   3. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. at 15 mph when tested according to ASTM E 283.
   4. Door Nominal Thickness: 2 inches thick, min..
   5. Exterior Finish: Factory finished with polyester baked enamel; color as selected by Architect.
   6. Interior Finish: Factory finished with polyester baked enamel; color as selected by Architect.
   7. Glazed Lights: Full panel width, one row; set in place with security glazing stops.
   8. Operation: Electric, connect to induction loop system.
   9. R-Value: R-15 min.
B. Door Panels: Steel construction; outer steel sheet of 20 gage, 0.0359 inch minimum thickness, flush profile; inner steel sheet of 20 gage, 0.0359 inch minimum thickness, flat profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; polyurethane insulation.
C. Window Frame: To match door panels, finish to match.
D. Glazing: Fully tempered glass; insulated; clear; 1 inch thick.

2.03 COMPONENTS

A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 3 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick. (provide high lift track)
B. Spring Counterbalance: Sized to weight of door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of die cast aluminum with high strength galvanized aircraft cable. Sized with a minimum 5 to 1 safety factor.
   1. High cycle spring: 100,000 cycles.
C. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
D. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
E. Head Weatherstripping: EPDM rubber seal, one piece full length.
F. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

2.04 MATERIALS

A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
B. Insulation: Foamed-in-place polyurethane, bonded to facing.

C. Metal Primer Paint: Zinc molybdate type.

2.05 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Conform to UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.

B. Electric Operators:
   1. Mounting: Side mounted on cross head shaft.
   2. Motor Enclosure:
   3. Motor Rating: 1/3 hp; continuous duty.
   4. 208 volts, three phase, 60 Hz.
   5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
   6. Controller Enclosure: NEMA 250, Type 1.
   7. Opening Speed: 12 inches per second.
   8. Brake: Adjustable friction clutch type, activated by motor controller.
   9. Manual override in case of power failure.
   10. Refer to Section 26 05 83 for electrical connections.

C. Motor: NEMA MG 1, Type 1.

D. Control Station: Provide 2 (Open-Close-Stop) continuous-contact control device for each operator complying with UL 325. All operators shall have the ability to control both sectional doors (4 total operators)
   1. 24 volt circuit.
   2. Surface mounted, at Interior and Exterior.
   3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
      a. Primary Device: Provide NEMA 1 photo eye sensors or NEMA 4X photo eye sensors as required with momentary-contact control device.

E. Disconnect Switch: Factory mount disconnect switch in control panel.

F. Electric Operator: Side mounted on cross head shaft, adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.
   1. Door Drive: Operator shall be equipped with roller chain and sprockets, an electrically interlocked, floor level disconnect, a chain hoist for manual operation and an electric solenoid-actuated brake to stop motor and hold the door in any position.
   2. Motor Control and Enclosure: LiftMaster Logic 5.0 motor control shall be UL- approved microprocessor solid-state type and shall include the capability to select one of 7 wiring types; additional features shall include a maintenance alert diagnostic system, built-in ports for two (2) plug-in loop detectors, programmable Timer-to-Close with timer defeat input, mid-stop programming capabilities and a maximum run timer to provide motor overrun protection; motor control shall be housed in a NEMA 1 enclosure integral to the operator and shall conform to ANSI/NEMA ICS 6. (5 HP motor does not have Logic control features.)

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

3.03 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.
B. Anchor assembly to wall construction and building framing without distortion or stress.
C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
D. Fit and align door assembly including hardware.
E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
F. Install perimeter trim and closures.

3.04 TOLERANCES

A. Maximum Variation from Plumb: 1/16 inch.
B. Maximum Variation from Level: 1/16 inch.
C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

A. Adjust door assembly for smooth operation and full contact with weatherstripping.
B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.06 CLEANING

A. Clean doors and frames.
B. Remove temporary labels and visible markings.

3.07 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.
B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 43 13 - ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Infill panels of glass.
B. Aluminum doors and frames.
C. Weatherstripping.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
B. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
C. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site 2015.
B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2014 (2015 Errata).
C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2020.
D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2013.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.
B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill,door hardware, internal drainage details.
C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
D. Samples: Submit two samples illustrating finished aluminum surface, glass, glazing materials.
E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
G. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.
B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a five year period after Date of Substantial Completion.
C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

A. Center-Set Style, Wind-Borne-Debris Resistance Tested:
   1. Basis of Design: EFCO Corporation; Series 526, Thermal Impact-Grade Storefront Framing: www.efcocorp.com/#sle.
   2. Vertical Mullion Dimensions: 2-1/2 inches wide by 5 inches deep.

2.02 BASIS OF DESIGN -- SWINGING DOORS

A. Wind-Borne-Debris Resistance Tested:
   1. Thickness: 1-3/4 inches.

2.03 MANUFACTURERS

A. Aluminum-Framed Storefront and Doors:
   1. EFCO Corporation; [_____]: www.efcocorp.com/#sle.

2.04 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Glazing Stops: Flush.
B. Glazing: As specified in Section 08 80 00.
C. Swing Doors: Glazed aluminum.
   1. Thickness: 1-3/4 inches.
   2. Top Rail: 4 inches wide.
   3. Vertical Stiles: 4-1/2 inches wide.
   4. Bottom Rail: 10 inches wide.
   5. Glazing Stops: Square.
   6. Finish: Same as storefront.

2.05 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).
B. Fasteners: Stainless steel.
C. Concealed Flashings: Sheet aluminum, 26 gage, 0.017 inch minimum thickness.

D. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
E. Sealant for Setting Thresholds: Non-curing butyl type.
F. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
G. Glazing Accessories: As specified in Section 08 80 00.

2.06 FINISHES

A. Class II Color Anodized Finish: AAMA 611 AA-M12C22A34 Electrolytically deposited colored anodic coating not less than 0.4 mils thick.
B. Color: As selected by Architect from manufacturer's standard range.
C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.07 HARDWARE

A. For each door, include weatherstripping, sill sweep strip, and threshold.
B. Other Door Hardware: As specified in Section 08 71 00.
C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
E. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all doors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.
B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.
B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
C. Provide alignment attachments and shims to permanently fasten system to building structure.
D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
E. Provide thermal isolation where components penetrate or disrupt building insulation.
F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
I. Set thresholds in bed of sealant and secure.
J. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.
K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.
B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

3.06 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes furnishing, installation, and commissioning of mechanical and electro-mechanical door hardware for doors specified in "Hardware Sets" and required by actual conditions: including screws, bolts, expansion shields, electrified door hardware, and other devices for proper application of hardware.

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

C. Related Divisions:
1. Section 06 41 00 – Architectural Wood Casework: Cabinet hardware.
2. Section 07 92 00 - Joint Sealants: Sealants for setting exterior door thresholds.
3. Section 08 11 13 – Hollow Metal Doors and Frames.
4. Section 08 14 16 - Flush Wood Doors.
5. Section 08 36 13 - Sectional Doors: Door hardware, except cylinders.
6. Section 08 43 13 - Aluminum-Framed Storefronts: Door hardware, except as noted in section.

1.02 REFERENCES

A. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI):
1. ANSI/BHMA A156.1 Butts & Hinges (2016)
2. ANSI/BHMA A156.3 Exit Devices (2014)
3. ANSI/BHMA A156.4 Door Controls – Closers (2013)
4. ANSI/BHMA A156.5 Cylinders and Input Devices for Locks (2014)
5. ANSI/BHMA A156.6 Architectural Door Trim (2015)
6. ANSI/BHMA A156.7 Template Hinge Dimensions (2016)
7. ANSI/BHMA A156.8 Door Controls – Overhead Stops and Holders (2015)
8. ANSI/BHMA A156.13 Mortise Locks & Latches (2012)
9. ANSI/BHMA A156.16 Auxiliary Hardware (2013)
10. ANSI/BHMA A156.18 Materials & Finishes (2016)
11. ANSI/BHMA A156.21 Thresholds (2014)
12. ANSI/BHMA A156.22 Door Gasketing Systems (2012)
13. ANSI/BHMA A156.26 Continuous Hinges (2012)
14. ANSI/BHMA A156.28 Keying Systems (2013)
15. ANSI/BHMA A156.115 Hardware Preparation in Steel Doors and Steel Frames (2014)
16. ANSI/BHMA A156.115W Hardware Preparation in Wood Doors with Wood or Steel Frames (2016)

B. International Code Council/American National Standards Institute (ICC/ANSI)/ADA:
1. ICC/ANSI A117.1 Standards for Accessible and Usable Buildings and Facilities.

C. Underwriters Laboratories, Inc. (UL):
1. UL 10C Positive Pressure Fire Test of Door Assemblies.
2. UL 1784 Air Leakage Test of Door Assemblies.
3. UL 294 Access Control System Units

D. Door and Hardware Institute (DHI):

1. DHI Publications – Keying Systems and Nomenclature (1989).
2. DHI Publication – Abbreviations and Symbols.
3. DHI Publication – Installation Guide for Doors and Hardware.
4. DHI Publication – Sequence and Format of Hardware Schedule (1996).

E. National Fire Protection Agency (NFPA):
1. NFPA 70 National Electrical Code.
2. NFPA 80 Standard for Fire Doors and Other Opening Protectives.
3. NFPA 101 Life Safety Code.
4. NFPA 105 Standard for the Installation of Smoke Door Assemblies.

1.03 SUBMITTALS

A. Submit in accordance with Conditions of the Contract and Division 1 Administrative Requirements and Submittal Procedures Section.

B. Shop Drawings:
1. Organize hardware schedule in vertical format as illustrated in DHI Publications Sequence and Formatting for the Hardware Schedule. Include abbreviations and symbols page according to DHI Publications Abbreviations and Symbols. Complete nomenclature of items required for each door opening as indicated.
2. Coordinate final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of hardware.
3. Architectural Hardware Consultant (AHC), as certified by DHI, who will affix seal attesting to completeness and correctness, including the review of the hardware schedule prior to submittal.

C. Submit manufacturer's catalog sheet on design, grade, and function of items listed in hardware schedule. Identify specific hardware item per sheet, provide an index, and cover sheet.

D. Templates:
1. Upon final approval of the architectural hardware schedules, submit one set of complete templates for each hardware item to the door manufacturers, frame manufacturers, and the installers. Date and index these 8-1/2 inch x 11 inch papers in a three-ring binder, including detailed lists of the hardware location requirements for mortised and surface applied hardware within fourteen days of receiving approved door hardware submittals.

E. Electrified Hardware: Provide electrical information to include voltage and amperage requirements for electrified door hardware and description of operation.
1. Description of operation for each electrified opening to include description of component functions including location, sequence of operation and interface with other building control systems.
2. Wiring Diagrams: Detail wiring for power, signal, and control system and differentiate between manufacturers installed and field-installed wiring. Include the following:
   a. System schematic.
   b. Point to point wiring diagram.
   c. Riser diagram.
   d. Elevation of each door.
3. Detail interface between electrified door hardware and fire alarm, access control, security, and building control systems.
4. Provide junction boxes, relays and terminal blocks as needed for proper door operations and connections.

F. Upon door hardware submittal approval, furnish for each electrified opening, three copies of point-to-point diagrams.

G. Closeout Submittals: Submit to Owner in a three-ring binder or CD if requested.
   1. Warranties.
   2. Maintenance and operating manual.
   3. Maintenance service agreement.
   4. Record documents.
   5. Copy of approved hardware schedule.
   6. Copy of approved keying schedule with bitting list.
   7. Door hardware supplier name, phone number, and fax number.

1.04 QUALITY ASSURANCE

A. Listed and Labeled electrified door hardware as defined in NFPA 70, Article 100, by a testing agency acceptable to authority having jurisdiction.

B. Hardware supplier will employ an Architectural Hardware Consultant (AHC) as certified by DHI and a member of the seal program who will be available at reasonable times during course of work for Project hardware consultation.
   1. Electrified Door Hardware Supplier Qualifications: Experienced door hardware supplier who has completed projects with electrified door hardware similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Door hardware conforming to ICC/ANSI A117.1: Handles pulls, latches locks and operating devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.

D. Fire Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and/or labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL 10C, unless otherwise indicated.

E. Fire Door Inspection: Prior to receiving certificate of occupancy have fire rated doors inspected by an independent Certified Fire and Egress Door Assembly Inspector (FDAI), as certified by Intertek (ITS), a written report be submitted to Owner and Contractor. Doors failing inspection must be adjusted, replaced or modified to be within appropriate code requirements.

F. Smoke and Draft Control Door Assemblies: Where smoke and draft control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

G. Door hardware certified to ANSI/BHMA standards as noted, participate, and be listed in BHMA Certified Products Directory.

H. Meetings: Comply with requirements in Division 1 Section “Project Meetings.”
   1. Low-voltage Coordination Meeting

a. Prior to furnishing door hardware submittals, convene a low-voltage coordination meeting. Participants required to attend: Contractor, installer, material supplier, manufacturer representatives, electrical contractor, security consultant, and fire alarm consultant.
b. Review sequence of operation for each opening with electrified hardware to ensure that every opening function in the proper manner for the Owner's use.
c. Discuss the types of electrified door hardware, inspection, and electrical roughing-in and other preparatory work performed by other trades.
d. Verify wire quantities, wire types, wire sizes, conduit sizes, and locations including if the power supplies will be centrally located or if they will be located near each opening.
e. Coordinate the door hardware, power supplies, back-up power requirements, access control components, fire alarm interfaces, elevator controls, and related building systems have all proper and necessary components to interface and operate correctly.

2. Keying Meeting
   a. Within fourteen days of receipt of approved door hardware submittals, contact Owner with representative from hardware supplier to establish a keying conference. Verify keyway, visual key identification, number of master keys and keys per lock. Provide keying system per Owner's instructions.
3. Pre-installation Meeting
   a. Convene meeting within fourteen days of receipt of approved door hardware submittals. Participants required to attend: Contractor, installer, material supplier, manufacturer representatives, electrical contractor, security consultant, and fire alarm consultant.
   b. Include in-conference decisions regarding proper installation methods and procedures for receiving and handling hardware.
   c. Review all system, elevation, and point-to-point drawings to ensure that all necessary components are provided and detailed.
   d. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

I. Installer Qualifications: Specialized in performing installation of this Section and have five years minimum documented experience.
   1. Electrified Door Hardware Supplier Qualifications: Experienced door hardware installer who has installed projects with electrified door hardware similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

J. Hardware listed in 3.07 – Hardware Schedule is intended to establish minimum level of design, type, function and grade of hardware to be used.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide clean, dry, and secure room for hardware delivered to Project but not yet installed. Shelve hardware off of the floor and with larger items of hardware being stored on wooden pallets. Arrange locksets and keyed cylinders by opening number. Organize the balance of hardware by brand, model of hardware, and hardware set number. Leave the door markings of the hardware visible for installers.

B. Furnish hardware that is not bulk packed with each unit marked and numbered in accordance with approved finish hardware schedule. Include architect's opening number, hardware set number, and item number for each type of hardware. Include keyset symbols and corresponding hardware component for keyed products.

C. Pack each item complete with necessary parts and fasteners in manufacturer's original packaging.

D. Deliver architectural hardware to the job site according to the phasing agreed upon in the pre-installation meeting. Inventory the delivery with the supplier's assistance. Immediately note shortages and damages on the shipping receipts and bill of ladings. Coordinate replacement or repair with the supplier.

E. Deliver permanent keys, cores, and related accessories directly to Owner via registered mail or overnight package service. Establish the instructions for delivery to Owner at "Keying Conference."

F. Waste Management and Disposal: Separate waste materials for use or recycling in accordance with Division 1.

1.06 WARRANTY

A. General Warranty: Owner may have under provisions of the Contract Documents and be an addition and run concurrently with other warranties made by Contractor under requirements of the Contract documents.

B. Special Warranty: Warranties specified in this article will not deprive Owner of other rights.
   1. Ten years for manual door closers.
   2. Five years for mortise, auxiliary and bored locks.
   3. Five years for exit devices.
   4. One year for electromechanical door hardware.

C. Replace or repair defective products during warranty period in accordance with manufacturer's warranty at no cost to Owner. There is no warranty against defects due to improper installation, abuse, and failure to exercise normal maintenance.

D. Maintenance Tool and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, removal and replacement of door hardware.

PART 2 – PRODUCTS

2.01 HINGES

A. Hinges, electric hinges, and self-closing hinges of one manufacturer as listed for continuity of design and consideration of warranty.

B. Standards: Products to be certified and listed by the following:
   1. Butts and Hinges: ANSI/BHMA A156.1.
   2. Template Hinge Dimensions: ANSI/BHMA A156.7.
   3. Self-Closing Hinges: ANSI/BHMA A156.17.

C. Butt Hinges:
   1. Hinge weight and size unless otherwise indicated in hardware sets:
      a. Doors up to 36" wide and up to 1-3/4" thick provide hinges with a minimum thickness of .134" and a minimum of 4-1/2" in height.
      b. Doors from 36" wide up to 42" wide and up to 1-3/4" thick provide hinges with a minimum thickness of .145" and a minimum of 4-1/2" in height.

c. For doors from 42” wide up to 48” wide and up to 1-3/4” thick provide hinges with a minimum thickness of .180” and a minimum of 5” in height.
d. Doors greater than 1-3/4” thick provide hinges with a minimum thickness of .180” and a minimum of 5” in height.
e. Width of hinge is to be minimum required to clear surrounding trim.

2. Base material unless otherwise indicated in hardware sets:
   a. Exterior Doors: 304 Stainless Steel, Brass or Bronze material.
   b. Interior Doors: Steel material.
   c. Fire Rated Doors: Steel or 304 Stainless Steel materials.
   d. Stainless Steel ball bearing hinges to have stainless steel ball bearings. Steel ball bearings are unacceptable.
3. Quantity of hinges per door unless otherwise stated in hardware sets:
   a. Doors up to 60” in height provide 2 hinges.
   b. Doors 60” up to 90” in height provide 3 hinges.
   c. Doors 90” up to 120” in height provide 4 hinges.
   d. Doors over 120” in height add 1 additional hinge per each additional 30” in height.
   e. Dutch doors provide 4 hinges.
4. Hinge design and options unless otherwise indicated in hardware sets:
   a. Hinges are to be of a square corner five-knuckle design, flat button tips and have ball bearings unless otherwise indicated in hardware sets.
   b. Out-swinging exterior and out-swinging access-controlled doors are required to have Non-Removable Pins (NRP) to prevent removal of pin while door is in closed position.
   c. When full width of opening is required, use hinges that are designed to swing door completely from opening when door is opened to 95 degrees.
   d. When shims are necessary to correct frame or door irregularities, provide metal shims only.

5. Acceptable Manufacturers:

	Standard Weight	Heavy Weight
Hager	BB1279/BB1191	BB1168/BB1199
Bommer		
McKinney		

2.02 CONTINUOUS HINGES

A. Continuous hinges of one manufacturer as listed for continuity of design and consideration of warranty.

B. Standards: Products to be certified and listed by ANSI/BHMA A156.26 Grade 1.

C. Continuous Geared Hinges:
   1. Determine model number by door and frame application, door thickness, frequency of use, and fire rating requirements according to manufacturer’s recommendations.
      a. Size length of hinge to equal the actual door height unless otherwise stated in hardware sets.

D. Material and Design:
   1. Base material: Anodized aluminum manufactured from 6063-T6 material; unexposed working metal surfaces be coated with TFE dry lubricant.
   2. Bearings:
      a. Vertical loads be carried on Lubriloy RL bearings for non-fire rated doors.

   b. Continuous hinges are to have a minimum spacing between bearings of 2-9/16". Typical door from 80" to 84" in height to have a minimum of 32 bearings.
3. Options:
   a. Provide factory-cut preparations for concealed electric power tranfers.
   b. Hinges to have Rounded Back Cover Channel (RBCC).
   c. When full width of opening is required, use hinges that are designed to swing door completely from opening when door is opened to 95 degrees.
   d. At fire rated openings provide hinges that carry a UL certification, up to and including 90-minute applications for wood doors and up to 3-hour applications for metal doors.

E. Acceptable Manufacturers:

Hager	780-111HD/780-112HD
Bommer	
Zero	

2.03 FLUSH BOLTS AND DUST PROOF STRIKES

A. Flush bolts of one manufacturer as listed for continuity of design and consideration of warranty.

B. Standards: Manufacturer to be listed by the following: Auxiliary Hardware: ANSI/BHMI A156.16.

C. Provide two flush bolts for inactive leaf of pairs of doors per hardware schedule. Provide extension rods so that the center line of the top flush bolt is not more than 78" above the finish floor. Provide dust proof strike from bottom bolt.

D. Acceptable Manufacturers:

	Manual Flush Bolt	Dust Proof Strike
Hager	283D	280X
Burns		
Trimco		

2.04 LOCKS AND LATCHES

A. Locks and latches of one manufacturer as listed for continuity of design and consideration of warranty.

B. Standards: Product to be certified and listed by following:
1. ANSI/BHMA A156.13 Series 1000 Certified to Grade 1 for Operational and Security.
2. UL/cUL Labeled and listed up to 3 hours for single doors up to 48" in width and up to 96" in height.
3. UL10C/UBC 7-2 Positive Pressure Rated.
4. ICC/ANSI A117.1.

C. Lock and latch function numbers and descriptions of manufacturer's series as listed in hardware sets.
D. Material and Design:
1. Lock cases from fully wrapped, 12-gauge steel, zinc dichromate for corrosion resistance.
2. Non-handed, field reversible without opening lock case.
3. Break-away spindles to prevent unlocking during forced entry or vandalism.
4. Levers, zinc cast, forged brass or stainless steel and plated to match finish designation in hardware sets.

5. Sectional Roses, solid brass or stainless-steel material and have a minimum diameter of 2-7/16".
6. Armor fronts, self-adjusting to accommodate a square edge door or a standard 1/8" beveled edge door.

E. Latch and Strike:
1. Stainless steel latch bolt with minimum of 3/4" throw and deadlocking for keyed and exterior functions.
2. Strike is to fit a standard ANSI A115 prep measuring 1-1/4" x 4-7/8" with proper lip length to protect surrounding trim.
3. Deadbolts to be 1-3/4" total length with a minimum of a 1" throw and 3/4" internal engagement when fully extended and made of stainless-steel material.

F. Acceptable Manufacturers:

Hager	3800 Series
Best	
Sargent	

2.05 EXIT DEVICES

A. Exit Devices of one manufacturer as listed for continuity of design and consideration of warranty. Touchpad type finish to match balance of door hardware.

B. Standards: Manufacturer to be certified and/or listed by the following:
1. BHMA Certified ANSI A156.3 Grade 1.
2. UL/cUL Listed for up to 3 hours for "A" labeled doors.
3. UL10C/UBC 7-2 Positive Pressure Rated.
4. UL10B Neutral Pressure Rated.
5. UL 305 Listed for Panic Hardware.

C. Material and Design:
1. Provide exit devices with actuators that extend a minimum of one-half of door width.
2. Where trim is indicated in hardware sets provide the lever design to match design of lock levers.
3. Exit device to mount flush with door.
4. Latchbolts:
   a. Rim device – 3/4" throw, Pullman type with automatic dead-latching, stainless steel
   b. Vertical rod device – Top 1/2" throw, Pullman type with automatic dead-latching, stainless steel. Bottom 1/2" throw, Pullman type, held retracted during door swing, stainless steel.
5. Fasteners: Wood screws, machine screws, and thru-bolts.

D. Lock and Latch Functions: Function numbers and descriptions of manufacturer's series and lever styles indicated in door hardware sets.

E. Acceptable Manufactures:

Hager	4500 Series
Von Duprin	
Sargent	

F. Electric Modifications:
   1. Motorized Latch Retraction (MLR): An electric motor retracts the latch bolt for momentary or maintained periods of time.
   2. Provide Request to Exit (REX) switches as scheduled.
   3. Electrified Trim: Outside trim locked (EL) or unlocked (EU) by electric current.
   4. Delayed Egress with Wall Mounted Controller (Hager Model 2-679-0630) (DE).

2.06 CYLINDERS AND KEYING

A. Cylinders of one manufacturer as listed for continuity of design and consideration of warranty.

B. Products to be certified and listed by the following:
   1. Auxiliary Locks: ANSI/BHMA A156.5

C. Cylinders:
   1. Provide cylinders matched to the types required for hardware that has a locking function and for keyed electronic functions. Furnish with appropriate collars, cams, and tailpieces to fit and operate associated hardware. Stacking collars is not acceptable, a single collar of proper size is required.
   2. Manufacturer's standard tumbler type, seven-pin IC core and seven-pin conventional core supported by the Hager H series keyway.
   3. Provide concealed key control (CKC) at cylinder by stamping or permanently marking the keyset symbol in a location on the cylinder that is concealed when installed.

D. Keying:
   1. Provide a new factory registered key system.
   2. Key into Owner's existing key system.
   3. Provide a bitting list to Owner of combinations as established, and expand to twenty-five percent for future use or as directed by Owner.
      a. Include all of the keysets and bittings of the original key system creating one clean version of the entire key system.
   4. Keys to be shipped directly to the Owner's Representative as established during the keying conference.
      a. Package the keys in individual envelopes, grouped by keyset symbol, and label envelopes with project name, factory registry number, and keyset symbol.
   5. Stamp large bow key blanks with visual key control (keyset symbol) and "Do Not Duplicate".
   6. Provide interchangeable cores with construction cores as required per the keying meeting.
   7. Single seven-pin key will operate both conventional cores and SFIC small format interchangeable cores.

E. Acceptable Manufacturers:

Hager
Schlage
Sargent

2.07 PUSH/PULL PLATES AND DOOR PULLS

A. Push/Pull plates and bars of one manufacturer as listed for continuity of design and consideration of warranty.

B. Standards: Manufacturer to be certified by the following:
   1. Architectural Door Trim: ANSI/BHMA A156.6.

2. Americans with Disabilities Act Accessibility Guidelines (ADAAG).

C. Push plates: .050" thick, square corner and beveled edges with countersunk screw holes. Width and height as stated in hardware sets.

D. Acceptable Manufacturers:

Hager	30S
Burns	
Trimco	

E. Pull Plates: .050" thick, square corner and beveled edges. Width and height as stated in hardware sets, 3/4" diameter pull, with clearance of 2-1/2" from face of door.

F. Acceptable Manufacturers:

Hager	H33G
Burns	
Trimco	

G. Door Pulls: 1" round bar stock with 2 –1/2" clearances from face of door.

H. Acceptable Manufacturers:

Hager	H12J
Burns	
Trimco	

2.08 CLOSERS

A. Closers of one manufacturer as listed for continuity of design and consideration of warranty. Unless otherwise indicated on hardware schedule, comply with manufacturer's recommendations for size of closer, depending on width of door, frequency of use, atmospheric pressure, ADAAG requirements, and fire rating.

B. Standards: Manufacturer to be certified by the following:
1. BHMA Certified ANSI A156.4 Grade 1.
2. ADA Complaint ANSI A117.1.
3. UL/cUL Listed up to 3 hours.
4. UL10C Positive Pressure Rated.
5. UL10B Neutral Pressure Rated.

C. Material and Design:
1. Provide aluminum non-handed bodies with full plastic covers.
2. Closers will have separate staked adjustable valve screws for latch speed, sweep speed, and backcheck.
3. Provide Tri-Pack arms and brackets for regular arm, top jamb, and parallel arm mounting.
4. Double heat-treated steel, tempered springs.
5. Precision machined heat-treated steel piston.
6. Triple heat-treated steel spindle.
7. Full rack and pinion operation.

D. Mounting:
   1. Out-swing doors surface parallel arm mount closers except as noted on hardware schedule.
   2. In-swing doors surface regular arm mount closers except as noted on hardware schedule.
   3. Provide brackets and shoe supports for aluminum doors and frames to mount fifth screw.
   4. Furnish drop plates where top rail conditions on door do not allow for mounting of closer and where backside of closer is exposed through glass.

E. Size closers in compliance with requirements for accessibility (ADAAG). Comply with following maximum opening force requirements.
   1. Interior hinged openings: 5.0 lbs.
   2. Fire-rated and exterior openings are to be adjusted to have minimum opening force allowable by authority having jurisdiction.

F. Fasteners: Provide self-reaming, self-tapping wood and machine screws, and sex nuts and bolts for each closer.

G. Acceptable manufacturers:

Hager	5200 Series
Norton	
Sargent	

2.09 PROTECTIVE TRIM

A. Protective trim of one manufacturer as listed for continuity of design and consideration of warranty.

B. Size of protection plate: single doors, size two inches less door width (LDW) on push side of door, and one inch less door width on pull side of door. For pairs of doors, size one inch less door width (LDW) on push side of door, and 1/2 inch on pull side of door. Adjust sizes to accommodate accompanying hardware, such as, edge guards, astragals, and others.
   1. Kick Plates 10” high or sized to door bottom rail height.
   2. Mop Plates 4” high.
   3. Armor Plates 36” high.

C. Products to be certified and listed by the following:
   1. Architectural Door Trim: ANSI/BHMA A156.6.
   2. UL.

D. Material and Design:
   1. 0.050” gage stainless steel.
   2. Corners square, polishing lines or dominant direction of surface pattern so they run across door width of plate.
   3. Bevel top, bottom, and sides uniformly leaving no sharp edges.
   4. Countersink holes for screws. Space screw holes so they are no more than eight inches CTC, along a centerline not over 1/2” in from edge around plate. End screws maximum of 0.53” from corners.

E. UL label stamp required on protection plates when top of plate is more than 16 inches above bottom of door on fire rated openings. Verify door manufacturer’s UL listing for maximum height and width of protection plate to be used.

F. Acceptable Manufacturers:

Hager	190S
Trimco	
Burns	

2.10 STOPS AND HOLDERS

A. Stops and holders of one manufacturer as listed for continuity of design and consideration of warranty.

B. Wall Stops: Provide door stops wherever necessary to prevent door or hardware from striking an adjacent partition or obstruction. Provide wall stops when possible. Door stops and holders mounted in concrete floor or masonry walls have stainless steel machine screws and lead expansion shields.

C. Products to be certified and listed by the following:
   1. Auxiliary Hardware: ANSI/BHMA A156.16.

D. Acceptable Manufacturers:

	Convex	Concave
Hager	232W	236W
Trimco		
Burns		

E. Overhead Stops and Holders: Provide overhead stops and holders for doors that open against equipment, casework sidelights and other objects that would make wall stops/holders and floor stops/holders inappropriate. Provide sex bolt attachments for mineral core wood door applications.

F. Products to be certified and listed by the following:
   1. Overhead Stops and Holders: ANSI/BHMA A156.8 Grade 1.

G. Acceptable Manufacturers:

	Heavy Duty Surface	Heavy Duty Concealed
Hager	7000 SRF Series	7000 CON Series
Glynn Johnson		
Sargent		

2.11 POWER TRANSFER

A. Power transfer of one manufacturer as listed for continuity of design and consideration of warranty.

B. Products to be certified and listed by the following:
   1. UL Listed Miscellaneous Fire Door Accessories.
   2. UL 10C Listed for up to 3 hours on fire-rated doors and frames.
   3. Classified according to Uniform Building Code (UBC) Standard 7-2, Fire Test of Door Assemblies (1997).

C. Design:
   1. Stainless steel tubular wire transfer and cast housing with steel back boxes to provide weather and tamper resistance when door is open or closed.
   2. Mortise door and frame installation
   3. Two 18 ga wires, 5 amps @ 12/24 VAC/DC.

D. Acceptable Manufacturers:

	2 conductors	10 conductors
Hager	2-679-0621 US28	2-679-0623 US28
SDC		

2.12 MODULAR ACCESS CONTROL POWER SUPPLIES

A. Power supplies of one manufacturer as listed for continuity of design and consideration of warranty.

B. Products to be certified and listed by the following:
   1. UL Listed.

C. Design:
   1. Use with modular access control systems.
   2. Field selectable filtered and regulated 12 VDC or 24 VDC constant voltage.
   3. 1-, 2-, 4-, and 6-AMP load capacities. Match the power supply amperage to the total load of the opening /system plus an additional thirty percent to cover line drop, as well as possible expansion.
   4. Circuit breaker protected AC input voltage; secondary output PTC protected.
   5. Fire alarm input provides simultaneous release of fail-safe locks and holders.
   6. Interface relay.
   7. LED status indicators provide information regarding AC input, DC output, and battery backup status.
   8. Separate inputs for activation switch on entry and egress and ingress side of opening.
   9. 5-amp hour battery backup.
   10. Input 115 VAC (230 VAC optional).
   11. Optional dual 12 VDC or 24 VDC output.
   12. Optional power supply monitor module to monitor power supply status, A/C power, and D/C output and battery status.

D. Include optional modules as required to properly interface, control, and sequence the hardware with the access control system.

E. Acceptable Manufacturer:

Hager	2908	1 Amp
	2909	2 Amp
	2910	4 Amp
	2911	6 Amp

2.13 THRESHOLDS

A. Thresholds of one manufacturer as listed for continuity of design and consideration of warranty.

B. Set thresholds for exterior and acoustical openings in full bed of sealant with lead expansion shields and stainless-steel machine screws complying with requirements specified in Division 7 Section “Joint Sealants: Notched in field to fit frame by hardware installer. Refer to Drawings for special details.

C. Standards: Manufacturer to be certified by the following:

1. Thresholds: ANSI/BHMA A156.21.
2. American with Disabilities Act Accessibility Guidelines (ADAAG).

D. Acceptable Manufacturers:

Hager	413S/520S
K.N. Crowder	
Reese	

2.14 DOOR GASKETING AND WEATHERSTRIP

A. Door gasketing and weatherstrip of one manufacturer as listed for continuity of design and consideration of warranty.

B. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing as indicated on hardware schedule. Provide noncorrosive fasteners for exterior applications.
   1. Perimeter gasketing: Apply to head and jamb, forming seal between door and frame.
   2. Meeting stile gasketing: Fasten to meeting stiles, forming seal when doors are in closed position.
   3. Door bottoms: Apply to bottom of door, forming seal with threshold or floor when door is in closed position.
   4. Sound Gasketing: Cutting or notching for stop mounted hardware not permitted.
   5. Drip Guard: Apply to exterior face of frame header. Lip length to extend 4" beyond width of door.

C. Products to be certified and listed by the following:
   1. Door Gasketing and Edge Seal Systems: ANSI/BHMA A156.22.
   2. BHMA certified for door sweeps, automatic door bottoms, and adhesive applied gasketing.

D. Smoke-Labeled Gasketing: Comply with NFPA 105 listed, labeled, and acceptable to Authorities Having Jurisdiction, for smoke control indicated.
   1. Provide smoke-labeled gasketing on 20-minute rated doors and on smoke rated doors.

E. Fire-Rated Gasketing: Comply with NFPA 80 listed, labeled, and acceptable to Authorities Having Jurisdiction, for fire ratings indicated.

F. Refer to Section 08 1416 Wood Doors for Category A or Category B. Comply with UBC 7-2 and UL10C positive pressure where frame applied intumescent seals are required.

G. Acceptable Manufacturers:
   1. Perimeter Gasketing:

	Stop Applied	Adhesive Applied
Hager	881S	726
K.N. Crowder		
Reese		

   2. Meeting Stile Weatherstrip:

Hager	872SN
K.N. Crowder	
Reese	

3. Door Bottom Sweeps:

Hager	750S / 770SV
K.N. Crowder	
Reese	

4. Automatic Door Bottoms:

Hager	743S
K.N. Crowder	
Reese	

2.15 DOOR POSITION SWITCHES

A. Provide door position switches for openings that require door monitoring.

B. Acceptable Manufacturers:

Hager	2-679-0626
GRI	

2.16 SILENCERS

A. Where smoke, light, or weather seal are not required, provide three silencers per single door frame, two per double door frame and four per Dutch door frame.

B. Products to be certified and listed by the following:
   1. Auxiliary Hardware: ANSI/BHMA A156.16

C. Acceptable Manufacturers:

Hager	307D
Burns	
Trimco	

2.17 KEY CABINET

A. Provide key cabinet; surface mounted to wall.
B. Key control system:
   1. Include two sets of key tags, hooks, labels, and envelopes.
   2. Contain system in metal cabinet with baked enamel finish.
   3. Capacity will be able to hold actual quantities of keys, plus 50 percent.
   4. Provide tools, instruction sheets, and accessories required to complete installation.

C. Acceptable Manufacturers:

Lund Equipment
Telkee Incorporated
Key Control

2.18 FIRE DEPARTMENT LOCK BOX

A. Heavy-duty, surface mounted, solid stainless-steel box with hinged door and interior gasket seal; single drill resistant lock with dust covers and tamper alarm.
B. Capacity: Holds 10 Keys
C. Finish: Manufacturer's standard dark bronze.

2.19 FINISHES

A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if within range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved samples.

B. Comply with base material and finish requirements indicated by ANSI/BHMA A156.18 designations in hardware schedule.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine doors and frames, with Installers present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Notify Architect via a prepared written report and endorsed by Installer of any discrepancies between the door schedule, door types, drawings, and scheduled hardware. Report will have a list of conditions detrimental to application, to the proper and timely completion of the work and performance of the hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 INSTALLATION

A. Install hardware using manufactures recommended fasteners and installation instructions, at height locations and clearance tolerances that comply with:
   1. NFPA 80
   2. NFPA 105
   3. ICC/ANSI A117.1
   4. ANSI/BHMA A156.115 Hardware Preparation in Steel Doors and Steel Frames
   5. ANSI/BHMA A156.115W hardware Preparation in Wood Doors with Wood or Steel Frames
   6. DHI Publication – Installation Guide for Doors and Hardware
   7. Approved shop drawings
   8. Approved finish hardware schedule

B. Install soffit mounted gaskets prior other soffit mounted hardware to provide a continuous seal around the perimeter of the opening without cutting or notching.

C. Install door closers so they are on the interior of the room side of the door. Stairwell doors will have closers mounted on the stair side and exterior doors will be mounted on the interior side of the building.

D. In drywall applications provide blocking material of sufficient type and size for hardware items that mount directly to the wall.

E. Locate wall mounted bumper to contact the trim of the operating trim.

F. Mount mop and kick plates flush with the bottom of the door and centered horizontally on the door.

G. Set thresholds for exterior, and acoustical doors at sound control openings in full bed of sealant complying with requirements specified in Division 07 Section “Joint Sealants” forming a tight seal between threshold and surface to which set.

H. Anchor all components firmly into position and use anchoring devices furnished with the hardware item, unless otherwise specified.

I. Do not install surface mounted items until finishes have been completed on substrates involved. Set unit level, plumb and true to line location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

J. Power Supplies: locate power supplies as indicated and verified in the low-voltage coordination meeting.

3.03 FIELD QUALITY CONTROL

A. Material supplier to schedule final walk through to inspect hardware installation ten (10) business days before final acceptance of Owner. Material supplier will provide a written report detailing discrepancies of each opening to General Contractor within seven (7) calendar days of walk through.

3.04 ADJUSTMENT, CLEANING, AND DEMONSTRATING

A. Adjustment: Adjust and check each opening to ensure proper operation of each item of finish hardware. Replace items that cannot be adjusted to operate freely and smoothly or as intended for application at no cost to Owner.

B. Cleaning: Clean adjacent surfaces soiled by hardware installation. Clean finish hardware per manufacturer’s instructions after final adjustments have been made. Replace items that cannot be cleaned to manufacturer’s level of finish quality at no cost to Owner.

C. Conduct a training class for building maintenance personnel demonstrating the adjustment, operation of mechanical and electrical hardware. Special tools for finish hardware to be turned over and explained usage at the meeting. Record all training and provide to the Owner for future reference.

3.05 PROTECTION

A. Leave manufacturer’s protective film intact and provide proper protection for all other finish hardware items that do not have protective material from the manufacture until Owner accepts project as complete.

3.06 HARDWARE SET SCHEDULE

A. Intent of Hardware Groups
   1. Should items of hardware not specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
   2. Where items of hardware are not correctly specified and are required for completion of the Work, a written statement of such omission, error, or other discrepancy is required to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or furnish such items in the type and quality established by this specification, and appropriate to the service intended.

B. Guide: Door hardware items have been placed in sets which are intended to be a guide of design, grade, quality, function, operation, performance, exposure, and like characteristics of door hardware, and may not be complete. Provide door hardware required to make each set complete and operational.

C. Hardware schedule does not reflect handing, backset, method of fastening, and like characteristics of door hardware and door operation.

D. Review door hardware sets with door types, frames, sizes, and details on drawings. Verify suitability and adaptability of items specified in relation to details and surrounding conditions.

3.07 HARDWARE SCHEDULE

SET #1

Doors: 100, 123

Each opening to have:

1	Continuous Hinge	780-112HD x LAR x EPT x RBCC	CLR	HA
1	Power Transfer	2-679-0623	ALM	HA
1	Exit Device	4501 RIM MLRX	US32D	HA
1	Rim Cylinder	3901 SFIC	US26D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Offset Door Pull	H 12J	US32D	HA
1	Closer	5200 HDCS	ALM	HA
1	Threshold	413S x LAR	MIL	HA
1	Gasketing	BY THE FRAME MFGR		BYOT
1	Door Sweep	750S N x LAR	CLR	HA
1	Magnetic Switch	2-679-0626		HA
1	Power Supply	2908/2909/2910/2911 As Required	USP	HA
1	Card Reader	ACCESS CONTROL READER (BY OTHERS)		BYOT
1	Wiring Diagrams	RISER/POINT TO POINT		BYOT

NOTE: Provide specified products to meet hurricane resistance level as shown on drawings.

DESCRIPTION OF OPERATION:
1) Door normally closed and locked.
2) Upon proper credential validation, entry is permitted.

3) Free egress at all times.
4) Upon loss of power, door to remain locked.
5) The doors are monitored with door position switches and the request to exit switch (integrated in the lock/exit) will signal a valid release.

SET #2

Doors: 109

Each opening to have:

2	Continuous Hinges	780-112HD x LAR x EPT x RBCC	CLR	HA
2	Power Transfers	2-679-0623	ALM	HA
1	Exit Device	4501 CVR MLRX	US32D	HA
1	Exit Device	4501 CVR RX	US32D	HA
1	Rim Cylinder	3901 SFIC	US26D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
2	Offset Door Pulls	H 12J	US32D	HA
2	Closers	5200 HDCS	ALM	HA
1	Gasketing	BY THE FRAME MFGR		BYOT
2	Door Sweeps	750S N x LAR	CLR	HA
1	Threshold	413S x LAR	MIL	HA
2	Magnetic Switches	2-679-0626		HA
1	Power Supply	2908/2909/2910/2911 As Required	USP	HA
1	Card Reader	ACCESS CONTROL READER (BY OTHERS)		BYOT
1	Wiring Diagrams	RISER/POINT TO POINT		BYOT

NOTE: Provide specified products to meet hurricane resistance level as shown on drawings.

DESCRIPTION OF OPERATION:
1) Door normally closed and locked.
2) Upon proper credential validation, entry is permitted.
3) Free egress at all times.
4) Upon loss of power, door to remain locked.
5) The doors are monitored with door position switches and the request to exit switch (integrated in the lock/exit) will signal a valid release.

SET #3

Doors: 125, 125I, 130

Each opening to have:

1	Continuous Hinge	780-224HD x LAR x EPT x RBCC	CLR	HA
1	Power Transfer	2-679-0623	ALM	HA
1	Exit Device	4501 RIM MLRX	US32D	HA
1	Rim Cylinder	3901 SFIC	US26D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Offset Door Pull	H 12J	US32D	HA
1	Closer	5200 HDCS	ALM	HA
1	Weatherstrip	881S N x LAR	MIL	HA
1	Door Sweeps	770S V x LAR	MIL	HA
1	Threshold	520S N x LAR	MIL	HA
1	Magnetic Switch	2-679-0626		HA
1	Power Supply	2908/2909/2910/2911 As Required	USP	HA
1	Card Reader	ACCESS CONTROL READER (BY OTHERS)		BYOT
1	Wiring Diagrams	RISER/POINT TO POINT		BYOT

NOTE: Provide specified products to meet hurricane resistance level as shown on drawings.

DESCRIPTION OF OPERATION:

1) Door normally closed and locked.
2) Upon proper credential validation, entry is permitted.
3) Free egress at all times.
4) Upon loss of power, door to remain locked.
5) The doors are monitored with door position switches and the request to exit switch (integrated in the lock/exit) will signal a valid release.

SET #4

Doors: 133

Each opening to have:

2	Continuous Hinges	780-224HD x LAR x RBCC	CLR	HA
2	Exit Devices	4501 CVR F	US32D	HA
1	Exit Device Trim	45NL ARC	US26D	HA
1	Rim Cylinder	3901 SFIC	US26D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
2	Closers	5200 HDCS	ALM	HA
1	Weatherstrip	881S N x LAR	MIL	HA
1	Meeting Stile	872S N x LAR	CLR	HA
2	Door Sweeps	770S V x LAR	MIL	HA
1	Threshold	520S N x LAR	MIL	HA

NOTE: Provide specified products to meet hurricane resistance level as shown on drawings.

SET #5

Doors: 125A, 125B, 125C, 125D, 125E, 125F, 125G, 125H, 127

Each opening to have:

NOTE: All hardware by door manufacturer. Provide specified products to meet hurricane resistance level as shown on drawings.

SET #6

Doors: 126

Each opening to have:

3	Hinges	BB1191 4 1/2 X 4 1/2 NRP	US32D	HA
1	Lockset	3880 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Closer	5200 HDCS	ALM	HA
1	Seal	726 x LAR	S	HA
1	Door Sweep	750S N x LAR	CLR	HA
1	Threshold	413S x LAR	MIL	HA

SET #7

Doors: 128, 132

Each opening to have:

3	Hinges	BB1191 4 1/2 X 4 1/2 NRP	US32D	HA
1	Lockset	3870 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Closer	5200 HDCS	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Seal	726 x LAR	S	HA
1	Door Sweep	750S N x LAR	CLR	HA
1	Threshold	413S x LAR	MIL	HA

SET #8

Doors: 129, 131

Each opening to have:

3	Hinges	BB1191 4 1/2 X 4 1/2	US32D	HA
1	Lockset	3870 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Closer	5200	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Mop Plate	190S 4" x 1" LDW	US32D	HA
1	Wall Stop	232W/236W (as required)	US32D	HA
1	Seal	726 x LAR	S	HA

SET #9

Doors: 128A

Each opening to have:

3	Hinges	BB1191 4 1/2 X 4 1/2	US32D	HA
1	Lockset	3870 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Closer	5200	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Mop Plate	190S 4" x 1" LDW	US32D	HA
1	Wall Stop	232W/236W (as required)	US32D	HA
3	Door Silencers	307D	GREY	HA

SET #10

Doors: 132A

Each opening to have:

3	Hinges	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
1	Lockset	3880 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Closer	5200 HDCS	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
3	Door Silencers	307D	GREY	HA

SET #11

Doors: 102

Each opening to have:

1	Continuous Hinge	780-224HD x LAR x RBCC	CLR	HA
1	Exit Device	4501 RIM F	US32D	HA
1	Exit Device Trim	45CE ARC	US26D	HA
1	Mortise Cylinder	3902 SFIC 1-3/8"	US26D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Closer	5200 HDCS	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Seal	726 x LAR	S	HA
1	Door Sweep	750S N x LAR	CLR	HA
1	Threshold	413S x LAR	MIL	HA

SET #12

Doors: 112A

Each opening to have:

3	Hinges	BB1191 4 1/2 X 4 1/2	US32D	HA
1	Lockset	3870 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Closer	5200 HDCS	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Seal	726 x LAR	S	HA
1	Door Sweep	750S N x LAR	CLR	HA
1	Threshold	413S x LAR	MIL	HA

SET #13

Doors: 101, 109A, 112B

Each opening to have:

3	Hinges	BB1168 4 1/2 X 4 1/2	US26D	HA
1	Push-Plate	30S 4 X 16	US32D	HA
1	Pull Plate	H 33G 4 X 16	US32D	HA
1	Closer	5200 HDCS	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
3	Door Silencers	307D	GREY	HA

SET #14

Doors: 103

Each opening to have:

3	Hinges	BB1279 4 1/2 X 4 1/2	US26D	HA
1	Lockset	3870 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Closer	5200	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Wall Stop	232W/236W (as required)	US32D	HA
3	Door Silencers	307D	GREY	HA

SET #15

Doors: 104, 113

Each opening to have:

3	Hinges	BB1279 4 1/2 X 4 1/2	US26D	HA
1	Lockset	3850 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Wall Stop	232W/236W (as required)	US32D	HA
3	Door Silencers	307D	GREY	HA

SET #16

Doors: 105, 106

Each opening to have:

3	Hinges	BB1279 4 1/2 X 4 1/2	US26D	HA
1	Privacy w/Indicator	3896 SECT ARC	US32D	HA
1	Closer	5200	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Mop Plate	190S 4" x 1" LDW	US32D	HA
1	Wall Stop	232W/236W (as required)	US32D	HA
3	Door Silencers	307D	GREY	HA

SET #17

Doors: 107

Each opening to have:

3	Hinges	BB1279 4 1/2 X 4 1/2	US26D	HA
1	Lockset	3870 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Wall Stop	232W/236W (as required)	US32D	HA
1	Seal	726 x LAR	S	HA
1	Automatic Door Bottom	743S N x LAR	MIL	HA
1	Threshold	413S x LAR	MIL	HA

SET #18

Doors: 107A, 107B

Each opening to have:

6	Hinges	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
2	Flush Bolts	283D	US26D	HA
1	Dust Proof Strike	280X	US26D	HA
1	Lockset	3870 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
2	Overhead Door Stops	7016 SRF	ALM	HA
2	Door Silencers	307D	GREY	HA

NOTE: Astragal by door manufacturer.

SET #19

Doors: 108A, 108B, 108C

Each opening to have:

3	Hinges	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
1	Lockset	3870 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Overhead Door Stop	7016 SRF	ALM	HA
3	Door Silencers	307D	GREY	HA

SET #20

Doors: 110

Each opening to have:

3	Hinges	BB1168 4 1/2 X 4 1/2	US26D	HA
1	Push-Plate	30S 4 X 16	US32D	HA
1	Pull Plate	H 33G 4 X 16	US32D	HA
1	Closer	5200 TRK NHOTA	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Wall Stop	232W/236W (as required)	US32D	HA
3	Door Silencers	307D	GREY	HA

SET #21

Doors: 112

Each opening to have:

3	Hinges	BB1279 4 1/2 X 4 1/2	US26D	HA
1	Lockset	3870 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Closer	5200	ALM	HA
1	Overhead Stop	7016 CONCEALED	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
3	Door Silencers	307D	GREY	HA

SET #22

Doors: 111

Each opening to have:

3	Hinges	BB1279 4 1/2 X 4 1/2	US26D	HA
1	Lockset	3880 SECT ARC SFIC7	US32D	HA
1	Combinated SFIC	3969 H1 Kwy	US26D	HA
1	Closer	5200	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Wall Stop	232W/236W (as required)	US32D	HA
3	Door Silencers	307D	GREY	HA

SET #23

Doors: 124

Each opening to have:

1	Continuous Hinge	780-224HD x LAR x RBCC	CLR	HA
1	Lockset	3870 SECT ARC SFIC7	US32D	HA
1	Closer	5200 HDCS	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Seal	726 x LAR	S	HA
1	Door Sweep	750S N x LAR	CLR	HA
1	Threshold	413S x LAR	MIL	HA

SET #24

Doors: 114, 116, 118

Each opening to have:

3	Hinges	BB1191 4 1/2 X 4 1/2	US32D	HA
1	Privacy w/Indicator	3896 SECT ARC	US32D	HA
1	Closer	5200	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Mop Plate	190S 4" x 1" LDW	US32D	HA
1	Wall Stop	232W/236W (as required)	US32D	HA
3	Door Silencers	307D	GREY	HA

SET #25

Doors: 115, 117, 119, 120, 121, 122

Each opening to have:

3	Hinges	BB1279 4 1/2 X 4 1/2	US26D	HA
1	Privacy w/Indicator	3896 SECT ARC	US32D	HA
1	Closer	5200	ALM	HA
1	Kick Plate	190S 10" x 2" LDW	US32D	HA
1	Wall Stop	232W/236W (as required)	US32D	HA
1	Seal	726 x LAR	S	HA
1	Automatic Door Bottom	743S N x LAR	MIL	HA
1	Threshold	413S x LAR	MIL	HA

END OF SECTION

SECTION 08 80 00 - GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating glass units.
B. Glazing units.
C. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.
B. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors.
C. Section 08 36 13 - Sectional Doors: Glazed lites in doors.
D. Section 08 51 13 - Aluminum Windows: Glazing furnished by window manufacturer.
E. Section 10 28 00 - Toilet, Bath and Laundry Accessories: Mirrors.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data on Insulating Glass Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
D. Certificate: Certify that products of this section meet or exceed specified requirements.
E. Manufacturer's Qualification Statement.
F. Installer's Qualification Statement.
G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.
B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.06 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.
B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

A. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressure: Calculated in accordance with applicable codes.
   2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
   4. Glass thicknesses listed are minimum.

B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.
   2. To utilize the inner pane of multiple pane insulating glass units for the continuity of the vapor retarder and air barrier seal.
   3. To maintain a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
   1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   3. Solar Optical Properties: Comply with NFRC 300 test method.

2.02 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless noted otherwise.
   1. Fully Tempered Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria.
   2. Impact Resistant Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria; Class A/Category II.
   3. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 test requirements for Category II.

C. Manufacturers:
   1. AGC Flat Glass North America.
   2. Guardian Industries Corp: www.sunguardglass.com.
   3. Pilkington North America Inc: www.pilkington.com/na.
   4. PPG Industries, Inc: www.ppgideascapes.com.
   5. Old Castle Glass, a CRH Company.
   6. Warm-Edge Spacers: Low conductivity thermoplastic and stainless steel.
      a. Spacer Width: As required for specified insulating glass unit.
   7. Spacer Color: Black.

a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.

8. Color: Black.

D. Type IG-1 - Insulating Glass Units: Vision glass, double glazed, safety glazing.
1. Applications: Exterior glazing unless otherwise indicated.
2. Space between lites filled with argon.
3. Outboard Lite: Laminated, 1/4 inch thick, minimum.
a. Tint: Gray.
4. Inboard Lite: Laminated, 1/4 inch thick, minimum.
a. Tint: Clear.
b. Coating: Low-E, on #3 surface.
5. Total Thickness: 1 inch.
6. Air Space Thickness: 1/2 inch.
7. Thermal Transmittance (U-Value), Winter - Center of Glass: .29, minimum.
8. Solar Heat Gain Coefficient (SHGC): .32, minimum.
9. Glazing Method: Wet glazing method, sealant and sealant.

2.03 GLAZING UNITS

A. Type G-2 - Monolithic Interior Vision Glazing:
1. Applications: Interior glazing unless otherwise indicated.
2. Glass Type: Annealed float glass.
3. Tint: Clear.
4. Thickness: 1/4 inch, nominal.

B. Type G-3 - Fire-Resistance-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and blocks radiant heat, as required to achieve indicated fire-rating period exceeding 45 minutes.
1. Applications:
a. Glazing in fire-rated door assembly.
b. Other locations as indicated on drawings.
2. Glass Type: Multi-laminate annealed glass with intumescent fire retardant interlayers.
3. Thickness: 5/16 inch.
4. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
5. Safety Glazing Certification: 16 CFR 1201 Category II.
6. Glazing Method: As required for fire rating.
7. Fire-Rating Period: As indicated on drawings.

C. Type G-8 - Hurricane Impact Resistance Glazing: Laminated glass, 3-Ply.
1. Applications: Locations as indicated on drawings.
2. Tint: Gray.
3. Thickness: As required to meet performance criteria.
4. Outside Lite: Annealed glass.
5. Interlayer: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
6. Middle Lite: Annealed glass.
7. Interlayer, Inboard Side: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
8. Inside Lite: Annealed glass.

2.04 GLAZING COMPOUNDS

A. Type GC-5 - Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

2.05 ACCESSORIES

A. Compatibility: Provide materials with proven record of compatibility with surfaces contacted in installation.
B. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
C. Setting Blocks: Neoprene, with 80 to 90 Shore A durometer hardness. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
D. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Continuous x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
E. Edge Blocks: Neoprene, EPDM, or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.
F. Compressible Filler Rods: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5-10 psi compression strength for 25 percent deflection.
G. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
B. Verify that the minimum required face and edge clearances are being provided.
C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
D. Verify that sealing between joints of glass framing members has been completed effectively.
E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
B. Monitor and report installation procedures and unacceptable conditions.

3.05 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
B. Remove non-permanent labels immediately after glazing installation is complete.
C. Clean glass and adjacent surfaces after sealants are fully cured.
D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.06 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

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SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.
B. Acoustic insulation.
C. Gypsum sheathing.
D. Cementitious backing board.
E. Gypsum wallboard.
F. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
B. Section 09 22 16 - Non-Structural Metal Framing.

1.03 SUBMITTALS

A. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
D. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 3 years of experience.
B. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.06 FIELD CONDITIONS

A. Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
C. Do not install panels that are wet, moisture damaged, and mold damaged.
    1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
    2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
B. Interior Partitions: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
C. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
   1. Fire Rated Partitions: As indicated on drawings.
   2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

A. Non-structural Steel Framing for Application of Gypsum Board: As specified in Section 09 22 16.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum Company: www.americangypsum.com.
   2. Georgia-Pacific Gypsum: www.gpgypsum.com.
   3. National Gypsum Company: www.nationalgypsum.com/#sle.
   4. USG Corporation: www.usg.com.
   5. Substitutions: See Section 01 60 00 - Product Requirements.
B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Glass mat faced gypsum panels, as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
   3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
      a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
      b. Mold resistant board is required at all wet locations and as noted on drawings.
   4. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   5. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings: 5/8 inch.
      c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
   6. Long Edges: Tapered.
C. Backing Board For Wet Areas:
   1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower ceilings.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
      a. Thickness: 1/2 inch.

4. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
    a. Thickness: 1/2 inch.

D. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
1. Application: Exterior sheathing, unless otherwise indicated.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Fungal Resistance: No fungal growth when tested in accordance with ASTM G21.
4. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
5. Core Type: Type X, as indicated.
6. Type X Thickness: 5/8 inch.
7. Edges: Square.

2.04 GYPSUM WALLBOARD ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: as indicated on drawings.
B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
C. Water-Resistive Barrier: As specified in Section 07 25 00.
D. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel, unless noted otherwise.
1. Rigid Corner Beads: Low profile, for 90 degree outside corners.
2. Wall Mounted Deflection Beads: Flexible gasket and bead with 1-1/8 inch flange.
3. Expansion Joints:
    a. Type: V-shaped PVC with tear away fins.

E. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
2. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
3. Joint Compound: Drying type, vinyl-based, ready-mixed or field-mixed.
4. Joint Compound: Setting type, field-mixed.

F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
G. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.03 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
B. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
C. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
    1. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.
D. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
E. Installation on Metal Framing: Use screws for attachment of gypsum board.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
    1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
B. Corner Beads: Install at external corners, using longest practical lengths.
C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.05 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
    1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
    2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
    1. Feather coats of joint compound so that camber is maximum 1/32 inch.
    2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
    3. Taping, filling, and sanding are not required at base layer of double-layer applications.

3.06 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal partition, ceiling, and soffit framing.
B. Framing accessories.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Shop Drawings:
   1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
   2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.
C. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.
D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 FRAMING MATERIALS

A. Fire Rated Assemblies: Comply with applicable code and as indicated on drawings.
B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
   1. Studs: C shaped with flat or formed webs.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C shaped.
C. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws, and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
   1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100.
   2. Material: ASTM A653/A653M steel sheet, SS Grade 50, with G60/Z180 hot-dipped galvanized coating.
   3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
D. Non-Loadbearing Framing Accessories:
   1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
4. Fasteners: ASTM C1002 self-piercing tapping screws.
5. Anchorage Devices: Powder actuated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that rough-in utilities are in proper location.

3.02 INSTALLATION OF STUD FRAMING

A. Extend partition framing to structure in all locations.
B. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
C. Align and secure top and bottom runners at 24 inches on center.
D. At partitions indicated with an acoustic rating:
   1. Provide components and install as required to produce STC rating of [____], based on published tests by manufacturer conducted in accordance with ASTM E90 with STC rating calculated in accordance with ASTM E413.
   2. Place two beads of acoustic sealant between runners and substrate, studs and adjacent construction.
   3. Place one bead of acoustic sealant between studs and adjacent vertical surfaces.
E. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
F. Install studs vertically at spacing indicated on drawings.
G. Align stud web openings horizontally.
H. Stud splicing is not permissible.
I. Fabricate corners using a minimum of three studs.
J. Install double studs at wall openings, door and window jambs, not more than 2 inches from each side of openings.
K. Coordinate erection of studs with requirements of door frames; install supports and attachments.
L. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.
M. Blocking: Use wood blocking secured to studs. Provide blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and opening frames.

3.03 CEILING AND SOFFIT FRAMING

A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
B. Install furring independent of walls, columns, and above-ceiling work.
C. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.
D. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.

E. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

3.04 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch in 10 feet.
B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION

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SECTION 09 30 00 - TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.
B. Tile for wall applications.
C. Stone thresholds.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.03 SUBMITTALS

A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
B. Shop Drawings: Indicate tile layout, patterns, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
C. Submit samples for color selection.
D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.05 FIELD CONDITIONS

A. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS

2.01 TILE

A. Ceramic Mosaic Tile: ANSI A137.1 standard grade.
    1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
    2. Size: 1 by 1 inch, nominal.
    3. Shape: Square.
    4. Edges: Square.
    5. Surface Finish: Matte glazed.
    6. Color(s): To be selected by Architect from manufacturer's standard range.
    7. Trim Units: Matching cove shapes in sizes coordinated with field tile.

2.02 TRIM AND ACCESSORIES

A. Ceramic Trim: Matching cove base ceramic shapes in sizes coordinated with field tile.
    1. Manufacturers: Same as for tile.
B. Thresholds: Marble, As selected by Architect from full range, honed finish; 4 inches wide by full width of wall or frame opening; thickness to fit application; beveled one long edge with radiused corners on top side; without holes, cracks, or open seams.
    1. Applications:
        a. At doorways where tile terminates.

2.03 SETTING MATERIALS

A. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.

1. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
2. Products:
   a. Laticrete International, Inc.
   b. MAPEI Corporation.
   c. TEC, an H.B. Fuller Construction Products Brand: www.tecspecialty.com/#sle.

B. Mortar Bed Materials: Pre-packaged mix of Portland cement, sand, latex additive, and water.

2.04 GROUTS

A. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
1. Color(s): As selected by Architect from manufacturer's full line.
2. Products:
   a. ARDEX Engineered Cements; ARDEX WA: www.ardexamericas.com/#sle.
   b. Custom Building Products; CEG-IG 100% Solids Industrial Grade Epoxy Grout: www.custombuildingproducts.com/#sle.
   c. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com/#sle.
   d. Merkrete, by Parex USA, Inc; Merkrete Pro Epoxy: www.merkrete.com/#sle.
   e. TEC, an H.B. Fuller Construction Products Brand; TEC AccuColor EFX Epoxy Special Effects Grout: www.tecspecialty.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Protect surrounding work from damage.
B. Vacuum clean surfaces and damp clean.
C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.03 INSTALLATION - GENERAL

A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
B. Request tile pattern. Do not interrupt tile pattern through openings.
C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
E. Form internal angles square and external angles square.
F. Install thresholds where indicated.
G. Sound tile after setting. Replace hollow sounding units.
H. Keep control and expansion joints free of mortar, grout, and adhesive.
I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.

3.05 CLEANING

A. Clean tile and grout surfaces.

3.06 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

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SECTION 09 51 00 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acoustical units.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
B. Do not install acoustical units until after interior wet work is dry.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate grid layout and related dimensioning and mechanical and electrical items installed in the ceiling.
C. Product Data: Provide data on suspension system components and acoustical units.

1.04 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. Armstrong World Industries, Inc: www.armstrong.com.
   2. CertainTeed Corporation: www.certainteed.com.
   3. USG: www.usg.com.
B. Suspension Systems:
   1. Same as for acoustical units.

2.02 ACOUSTICAL UNITS

A. Acoustical Tile: Painted mineral fiber,{\rs\#1} Type III, with the following characteristics:
   1. Basis of Design Product: provide product indicated on Drawings or approved equal.
   2. Size: 24 by 24 inches.
   3. Thickness: 5/8 inches.
   4. Surface Color: White.

2.03 SUSPENSION SYSTEM(S)

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
B. Basis-of-Design Product: provide product indicated on drawings or approved equal.
C. Exposed Steel Suspension System Type [____]: Formed steel, commercial quality cold rolled; heavy-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Finish: White painted.

2.04 ACCESSORIES

A. Support Channels and Hangers: Primed steel; size and type to suit application and ceiling system flatness requirement specified.
B. Perimeter Moldings: Same material and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
   2. At Concealed Grid: Provide exposed L-shaped molding.
C. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
D. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
E. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
F. Do not eccentrically load system or induce rotation of runners.

3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.
B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
C. Fit border trim neatly against abutting surfaces.
D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
E. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 54 00 - SPECIALTY CEILINGS - USG

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Specialty ceiling panels and systems.

1.02 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings 2017.
B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels 2013.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

1.04 QUALITY ASSURANCE

A. Designer Qualifications for Seismic Design: Under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the State in which the Project is located.
B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
C. Installer Qualifications: Company specializing in performing the work of this section.
    1. Minimum 5 years documented experience.
    2. Approved by ceiling manufacturer.

PART 2 PRODUCTS

2.01 SPECIALTY CEILING ASSEMBLIES

A. Refer to Room Finish Schedule and Reflected Ceiling Plans on drawings for additional ceiling assemblies information.
B. Specialty Ceiling Assembly Type SC-1:
    1. Panels: Radians 3-Dimensional Panels, Item No. [_____].
        a. Color: White.
        b. Flat Panel Sizes: 24 inches by 24 inches (2 by 2) panel.
        c. Stock Curved Panel Sizes and Radia:
            1) 6-Foot Arc Lengths: As indicated on drawings.
            2) 8-Foot Arc Lengths: As indicated on drawings.
    2. Specialty Suspension System: Radians Suspension System.

2.02 PERFORMANCE REQUIREMENTS:

A. Design for maximum deflection of 1/360 of span.
B. Design to support imposed loads of indicated elements without eccentric loading of supports. Where supported elements may induce rotation of ceiling system components, provide stabilizing reinforcement.

2.03 COMPONENT PRODUCTS

A. Panels:
B. Specialty Suspension Systems:
    1. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, seismic

clips, and splices as required.

2. Custom Concealed Ceiling Suspension System: Hot-dipped galvanized steel custom engineered curved grid.
    a. Structural Classification: Heavy Duty, when tested in accordance with ASTM C635/C635M.
    b. Profile: Flat.
    c. Finish: Baked enamel.
    d. Color: as selected by Architect.
    e. Installation: Panels installed from below by inserting torsion springs into slots in faces of main runners of ceiling grid.
    f. Products:
        1) USG Corporation; Radians Grid Suspension System: www.usg.com/ceilings/#sle.

C. Moldings and Trim:
1. Edge Molding and Splices: Same material, thickness, and finish as metal pan panels, unless otherwise indicated.
2. Perimeter (Wall) Moldings: Same metal and finish as grid.
    a. Size: As required for installation conditions.
    b. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.

2.04 ACCESSORIES

A. Support Channels, Carriers, and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
B. Suspension Wire: Size and type as required for application, seismic requirements, and ceiling system flatness requirement specified.
1. Concealed Suspension:
    a. Suspension Wire: Steel, annealed, galvanized finish, 12 gage, 0.0808 diameter.

2.05 FABRICATION

A. Shop fabricate ceiling components to the greatest extent possible.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that layout of hangers will not interfere with other work.
C. Verify that field measurements are as indicated on shop drawings.
D. Do not begin installation until after interior wet work is dry.
E. Start of installation constitutes acceptance of project conditions.

3.02 PREPARATION

A. Coordinate the location of hangers with other work.
B. Layout ceiling components in pattern according to reflected ceiling plan and as shown on shop drawings.

3.03 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M and manufacturer's instructions and as supplemented in this section.
B. Install hangers and inserts coordinated with overhead work. Provide additional hangers and supports as required.

C. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
D. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
E. Where ducts. facility services, or equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
F. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
G. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
H. Do not eccentrically load system or induce rotation of runners.
I. Edge Moldings: Install at intersection of ceiling and vertical surfaces and penetrations, using components of maximum length, set level. Provide edge moldings at junction with other ceiling finishes. Miter corners. Provide preformed edge closures to match bullnosed cornered partitions.
    1. Use longest practical lengths.

3.04 INSTALLATION - SPECIALTY CEILING UNITS

A. Install in accordance with manufacturer's instructions.
B. Fit components in place, free from damaged edges or other defects detrimental to appearance and function.

3.05 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 CLEANING

A. Clean and touch up minor finish damage. Remove and replace components that cannot be successfully cleaned and repaired.

END OF SECTION

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SECTION 09 65 66 - RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rubber tile, adhesively installed.

1.02 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension 2016.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 PREFORMED ATHLETIC FLOORING

A. Rubber Tile Flooring: Recycled SBR (styrene butadiene rubber) and colored EPDM granules with urethane binder.
   1. Thickness: Minimum 5/16 inch.
   2. Size: Nominal 24 inch square.
   3. Tensile Strength: Minimum 150 psi, per ASTM D412.
   4. Surface Texture: Smooth.
   5. Color: As selected from manufacturer's standard range.

2.02 ACCESSORIES

A. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.
B. Flooring Adhesive: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.
B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.

3.02 PREPARATION

A. Remove coatings that are incompatible with flooring adhesives, using methods recommended by flooring manufacturer.
B. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.
B. Install in accordance with manufacturer's written instructions.
C. Rubber Tile Flooring:
   1. Lay out center lines in spaces to receive tile flooring, based on location of principal walls. Start tile installation from center, and adjust as necessary to avoid tiles less than one-half width at perimeter.

2. Lay tiles square with room axis, matching for color and pattern by selecting from cartons and mixing as recommended by manufacturer.

3.04 CLEANING

A. Clean flooring using methods recommended by manufacturer.

3.05 PROTECTION

A. Protect finished athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion.

END OF SECTION

SECTION 09 68 13 - TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and method of installation.
D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.05 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Tile Carpeting:
    1. Patcraft.
    2. Mannington Mills, Inc.
    3. Shaw Contract Group; a Berkshire Hathaway Company.
    4. Interface, Inc: www.interfaceinc.com.

2.02 MATERIALS

A. Tile Carpeting, Type Loop Pile:
    1. Basis-of-Design Product: as noted on drawings, alternate products will be reviewed on an "or equal" basis.

2.03 ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
B. Edge Strips: Embossed aluminum, as selected by owner from standard selection color.
C. Adhesives:
    1. Compatible with materials being adhered; maximum VOC content of 50 g/L; {\rs\#1} certified; in lieu of labeled product, independent test report showing compliance is acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
D. Vacuum clean substrate.

3.03 INSTALLATION

A. Install carpet tile in accordance with manufacturer's instructions.
B. Blend carpet from different cartons to ensure minimal variation in color match.
C. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
D. Trim carpet tile neatly at walls and around interruptions.
E. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.
B. Field application of paints.
C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Floors, unless specifically indicated.
   6. Glass.
   7. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
B. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
C. SSPC-SP 2 - Hand Tool Cleaning 2018.
D. SSPC-SP 6 - Commercial Blast Cleaning 2007.
E. SSPC-SP 13 - Surface Preparation of Concrete 1997 (Reaffirmed 2003).

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.06 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
    1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
    2. Supply each paint material in quantity required to complete entire project's work from a single production run.
    3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
C. Test shop-applied primer for compatibility with subsequent cover materials.
D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
    1. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
D. Seal surfaces that might cause bleed through or staining of topcoat.
E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
F. Concrete:
    1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
    2. Clean surfaces with pressurized water. Use pressure range of 1,500 to 4,000 psi at 6 to 12 inches. Allow to dry.
    3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
G. Masonry:

1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
2. Prepare surface as recommended by top coat manufacturer.
3. Clean surfaces with pressurized water. Use pressure range of 600 to 1,500 psi at 6 to 12 inches. Allow to dry.

H. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

I. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
2. Prepare surface according to SSPC-SP 2.

J. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance.

D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

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SECTION 09 91 23 - INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.
B. Field application of paints.
C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Mechanical and Electrical:
      a. In all areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
      b. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
      c. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
   6. Floors, unless specifically indicated.
   7. Ceramic and other tiles.
   8. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
   9. Glass.
   10. Concrete masonry units in utility, mechanical, and electrical spaces.
   11. Acoustical materials, unless specifically indicated.
   12. Concealed pipes, ducts, and conduits.
   13. Infrared tube heater

1.02 SUBMITTALS

A. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.
   5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.

B. Samples: Submit two paper chip samples, in size illustrating range of colorsand textures available for each surface finishing product scheduled.
C. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
D. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.
E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    1. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
    2. Label each container with color in addition to the manufacturer's label.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
B. Applicator Qualifications: Company specializing in performing the type of work specified approved by manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.05 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.
D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
    1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
    2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
B. Paints:
    1. Base Manufacturer: Sherwin Williams.

2. Behr Process Corporation: www.behr.com/#sle.
3. Benjamin Moore & Co.
4. PPG Paints: www.ppgpaints.com/#sle.
5. Valspar Corporation: www.valsparpaint.com/#sle.

C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
3. Supply each paint material in quantity required to complete entire project's work from a single production run.
4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:
1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: To be selected from manufacturer's full range of available colors.
1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
2. Extend colors to surface edges; colors may change at any edge as directed by Architect.
3. In all areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.03 PAINT SYSTEMS - INTERIOR

A. Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board and concrete masonry units.
1. Two top coats and one coat primer.
2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
a. Products:
1) PPG Paints Pitt-Glaze WB1 Pre-Catalyzed Water-Borne Acrylic Epoxy, 16-510 Series, Semi-Gloss.
2) Sherwin-Williams Pre-Catalyzed Waterbased Epoxy, Semi-Gloss. (MPI #141)
3) Valspar Professional Interior Pre-Catalyzed Epoxy, No. 33400 Series, Semi-Gloss.
3. Top Coat Sheen:
a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.

4. Primer: As recommended by top coat manufacturer for specific substrate.

B. Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals:
   1. Medium duty applications include doors and door frames.
   2. Two top coats and one coat primer.
   3. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
      a. Products:
         1) PPG Paints Pitt-Glaze WB Water-Borne Acrylic Epoxy, 16-598 Series, Semi-Gloss.
         2) Sherwin-Williams Waterbased Catalyzed Epoxy, Semi-Gloss.
   4. Top Coat Sheen:
      a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
   5. Primer: As recommended by top coat manufacturer for specific substrate.

C. Medium Duty Overhead: Including uncoated steel, shop primed steel, and galvanized steel.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.
      a. Products:
         1) PPG Paints Pure Performance Interior Latex, 9-100 Series, Flat. (MPI #143)
         2) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Flat.
   3. Top Coat Sheen:
      a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.

D. Dry Fall: Metals; exposed structure and overhead-mounted servicesin utilitarian spaces, including shop primed structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.
   1. Shop primer by others.
   2. One top coat.
   3. Top Coat: Alkyd Dry Fall; MPI #55, 89, or 225.
      a. Products:
         1) PPG Paints Speedhide Super Tech Alkyd Dry-Fog, 6-150XI, Flat. (MPI #55)
         2) PPG Paints Speedhide Alkyd Dry-Fog, 6-160XI, Flat. (MPI #55)
         3) Sherwin-Williams Dryfall Flat. (MPI #55)
   4. Top Coat Sheen:
      a. Flat: MPI gloss level 1; use this sheen at all locations.
   5. Primer: As recommended by top coat manufacturer for specific substrate.

2.04 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
   1. Interior/Exterior Latex Block Filler; MPI #4.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
B. Patching Material: Latex filler.
C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.
B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
D. Test shop-applied primer for compatibility with subsequent cover materials.
E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums, refer to manufacturer recommendations for additional information:
    1. Gypsum Wallboard: 12 percent.
    2. Masonry, Concrete, and Concrete Masonry Units : 12 percent.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
D. Seal surfaces that might cause bleed through or staining of topcoat.
E. Masonry:
    1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
    2. Prepare surface as recommended by top coat manufacturer.
F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
G. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
    1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
H. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finishes until completion of project.
B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 10 14 00 - SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Room and door signs.
B. Building identification signs.
C. Plaque.

1.02 RELATED REQUIREMENTS

A. Section 05 51 00 - Metal Stairs: Photoluminescent stair nosings.

1.03 SUBMITTALS

A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
B. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
    1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
    2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
    3. Submit for approval by Owner through Architect prior to fabrication.
C. Samples: Submit two samples, of size similar to that required for project, illustrating sign style, font, and method of attachment.
D. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
E. Verification Samples: Submit samples showing colors specified.
F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.
B. Package room and door signs in sequential order of installation, labeled by floor or building.
C. Store tape adhesive at normal room temperature.
D. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
E. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
B. Room and Door Signs: Provide a sign for every doorway.
    1. Sign Type: Flat signs with applied character panel media as specified.

2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
3. Character Height: 1 inch, unless otherwise noted.
4. Sign Height: As indicated on drawings.
5. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
6. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.

C. Building Identification Signs:
1. Materials as indicated on drawings.
2. Mount on outside wall in location indicated on drawings.

2.02 SIGN TYPES

1. Wall Mounting of One-Sided Signs: Tape adhesive.

B. Color and Font: Unless otherwise indicated:
1. Character Font: Helvetica.
2. Character Case: Upper case only.
3. Background Color: Color as selected from manufacturer's standard range.
4. Character Color: Contrasting color.

2.03 TACTILE SIGNAGE MEDIA

A. Injection Molded Panels: One-piece acrylic plastic, with raised letters and braille.
1. Total Thickness: 1/8 inch.

2.04 NON-TACTILE SIGNAGE MEDIA

A. Sand Blasted Plastic Panels: High gloss acrylic plastic; letters sand blasted to dull sheen:
1. Total Thickness: 1/8 inch.

2.05 PLAQUES

A. Metal Plaques:
1. Metal: Bronze casting.
2. Metal Sheet Thickness: 1/2 inch, minimum.
3. Product: Cast-metal plaque with background texture, border, and charaters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:..
a. Plaque size: 18” x 24”
b. Finishes:
1) Integral Metal Finish: Mill finish raised surface with dark oxidized background. As selected by Architect from full range of industry finishes.
2) Integral Aluminum Finish: Anodized color as selected by Architect from full range of industry colors and color densities.
3) Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color as selected by Architect from manufacturer's full range.
4) Overcoat: Manufacturer's standard baked-on clear coating.

2.06 BUILDING IDENTIFICATION SIGNS

A. Reverse fabricated channel letters (logo and numbers)
1. Manufacture and install building signage as shown on the drawings.
2. Signage to be non-illuminated, reverse fabricated painted aluminum letters with studs for mounting.
3. 1/8" thick aluminum with welded, 2" deep aluminum returns.
4. Mounting: flush with welded 1/4-20ga aluminum studs.

5. Finish: Acrylic Polyurethane Paint. (Basis of design: Matthews Acrylic Polyurethane MAP)

2.07 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
   1. Use concealed fasteners and anchors unless indicated to be exposed.

B. Sign Mounting Fasteners:
   1. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

C. Tape Adhesive: Double sided tape, permanent adhesive.

2.08 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
   1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
   2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
   3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
   4. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
   5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
   1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match sign-background color, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. General: Install in accordance with manufacturer's instructions.
   1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
   3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
   4. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
   5. Protect from damage until Substantial Completion; repair or replace damaged items.

B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
    a. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
2. Back Bar and Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position, so that signage is correctly located and aligned.
3. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

C. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION

SECTION 10 28 00 - TOILET, BATH AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.
B. Commercial shower and bath accessories.
C. Under-lavatory pipe supply covers.
D. Utility room accessories.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.
C. Coordinate the work with the placement of internal wall reinforcement and concealed ceiling supports to receive anchor attachments.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
C. Samples: Submit two samples of each accessory, illustrating color and finish.
D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.04 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
    1. Failures include, but are not limited to, visible silver spoilage defects.
    2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Commercial Toilet Accessories:
    1. AJW Architectural Products: www.ajw.com/#sle.
    2. American Specialties, Inc: www.americanspecialties.com/#sle.
    3. Bradley Corporation: www.bradleycorp.com. Basis-of-Design manufacturer, alternate products will be reviewed on an or equal basis.
    4. Georgia-Pacific Professional: www.blue-connect.com/#sle.
    5. Substitutions: Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
    1. Grind welded joints smooth.
    2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
B. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.
D. Adhesive: Two component epoxy type, waterproof.
E. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

2.04 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser with Utility Shelf: Double roll, surface mounted.
   1. Basis-of-Design Product: Bradley Model 5263.
   2. Description: Two-roll unit with utility shelf.
   3. Mounting: Surface mounted.
   4. Capacity: Designed for 2 standard-core toilet tissue rolls up to 5-1/2" diameter tissue rolls.
   5. Material and Finish: Stainless steel, No. 4 finish (satin).
B. Combination Towel (folded) Dispenser/Waste Receptacle: Recessed with projecting waste receptacle, stainless steel; seamless wall flanges, continuous piano hinges.
   1. Basis-of-Design: Bradley Model 234-10.
   2. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels.
   3. Waste receptacle liner: Reusable, heavy-duty vinyl.
   4. Waste receptacle capacity: 12 gallons.
   5. Material and Finish: Stainless steel, No. 4 finish (satin).
   6. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.
C. Mirrors: Stainless steel framed, 1/4 inch thick tempered safety glass; ASTM C1048.
   1. Size: As indicated on drawings.
   2. Frame: 0.05 inchchannel shapes, with miteredand welded and ground corners, and tamperproof hanging system; satin finish.
   3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
D. Grab Bars: Stainless steel, nonslip grasping surface finish.
   1. Heavy Duty Grab Bars: Floor supports are not acceptable.
      a. Push/Pull Point Load: Minimum 1000 pound-force, minimum.
      b. Dimensions: 1-1/2 inch outside diameter, minimum 0.125 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      c. Mounting: Flanges with concealed fasteners.
      d. Length and Configuration: As indicated on drawings.
E. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
   1. Products:
      a. Bradley Model 4722-15.
F. Hat and Coat Hook: Heavy-duty stainless steel, rectangular-shaped bracket and backplate for concealed attachment, satin finish.
   1. Attached to back of door at toilet room.
   2. Product: Bradley Model 9134.

2.05 COMMERCIAL SHOWER AND BATH ACCESSORIES

A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for concealed mounting.

B. Shower Curtain:
   1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
   2. Size: width to match opening by 72 inches, hemmed edges.
   3. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
   4. Color: As selected from manufacturer's standard colors.

C. Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, swing-down legs, hinges, and mechanical fasteners of Type 304 stainless steel, rectangular seat.
   1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of color as selected.
   2. Size: ADA Standards compliant.

D. Towel Bar: Stainless steel, 3/4 inch round tubular bar; rectangular brackets, concealed attachment, satin finish.
   1. Length: as indicated on drawings.

E. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.

2.06 UNDER-LAVATORY PIPE AND SUPPLY COVERS

A. Under-Lavatory Pipe and Supply Covers:
   1. Insulate exposed drainage piping including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
   2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
   3. Construction: 1/8 inch flexible PVC.
      a. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
      b. Comply with ICC A117.1.
      c. Microbial and Fungal Resistance: Comply with ASTM G21.
   4. Color: White.
   5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces.

2.07 UTILITY ROOM ACCESSORIES

A. Paper Towel (Roll) Dispenser:
   1. Description: Lever-actuated mechanism permits controlled delivery of paper rolls in preset lengths per stroke.
   2. Mounting: Surface mounted.
   3. Minimum Capacity: 8-inch wide, 800-foot long roll.

B. Liquid-Soap Dispenser:
   1. Description: Designed for dispensing soap in liquid or lotion form.
   2. Mounting: Vertically oriented, surface mounted.
   3. Capacity: 16 oz.
   4. Products: Bradley Model 6562.

C. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
   1. Drying rod: Stainless steel, 1/4 inch diameter.
   2. Hooks: 3, 0.06 inch stainless steel rag hooks at shelf front.
   3. Mop/broom holders: 4 spring-loaded rubber cam holders at shelf front.
   4. Length: Manufacturer's standard length for number of holders/hooks.

5. Products:
    a. Bradley Model 9984.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify exact location of accessories for installation.
C. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.
B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
B. Install plumb and level, securely and rigidly anchored to substrate.
C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
    1. Grab Bars: As indicated on drawings.
    2. Other Accessories: As indicated on drawings.

3.04 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.
B. Fire extinguisher cabinets.
C. Accessories.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, anchorage details, and installation instructions.
C. Shop Drawings: Indicate locations of individual fire extinquishers, mounting measurements for wall bracket, installation procedures, and accessories required for complete installation.
D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.03 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:
   1. Ansul, a Tyco Business: www.ansul.com.
   2. Kidde, a unit of United Technologies Corp: www.kidde.com.
   3. Nystrom, Inc: www.nystrom.com/sle.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
   2. Provide quantity indicated on plans.
   3. Fire Marshal has final say on type, location and number or Fire Extinguishers; the extinguishers specified in schedule is basis of design.

2.03 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.
B. Fire Rated Cabinet Construction: One-hour fire rated.
C. Cabinet Configuration: Semi-recessed type (at hallway).
   1. Size to accommodate accessories.
   2. Trim: Flat square edge, with 1 inch wide face.
   3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

D. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinges.
E. Door Glazing: Tempered glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.
F. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
G. Fabrication: Weld, fill, and grind components smooth.
H. Finish of Cabinet Exterior Trim and Door: Baked enamel, color as selected.
I. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

A. Extinguisher Brackets: Formed steel, galvanized and enamel finished.
B. Graphic Identification:
    1. Location: Above Fire Extinguisher.
    2. Application: fire extinguisher arrow sign pictogram with downward arrow, 7"x10" min.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install cabinets plumb and level.
C. Secure rigidly in place.
D. Place extinguishers in cabinets and on wall brackets.
E. Examine fire extinguishers for proper charging and tagging. Remove and replace damaged, defective, or uncharged fire extinguishers.

3.03 SCHEDULES

A. Hallway (101 and 123): 2A:10B:C, semi-recessed cabinet.
B. Apparatus Bays: 80B:C, wall bracket mounting.
C. Kitchen: 2.5 lb., UL 711A, located in base cabinet at kitchen.

END OF SECTION

SECTION 10 51 13 - METAL LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal lockers.

1.02 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's published data on locker construction, sizes and accessories.
C. Shop Drawings: Indicate locker plan layout, numbering plan and combination lock code.
D. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Lockers:
   1. Penco Products, Inc: www.pencoproducts.com/#sle.
   2. Republic Storage Systems Co: www.republicstorage.com/#sle.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LOCKER APPLICATIONS

A. Wardrobe Lockers: Metal lockers, free-standing with matching closed base.
   1. Width: 12 inches.
   2. Depth: 12 inches.
   3. Height: 72 inches.
   4. Configuration: Three tier.
   5. Fittings: Size and configuration as indicated on drawings.
   6. Ventilation: Louvers at top and bottom of door panel.
   7. Locking: Padlock hasps, for padlocks provided by Owner.
   8. Provide sloped top.

2.03 METAL LOCKERS

A. Lockers: Factory assembled, made of formed sheet steel, ASTM A653/A653M SS Grade 33/230, with G60/Z180 coating, stretcher leveled; metal edges finished smooth without burrs; baked enamel finished inside and out.
   1. Where ends or sides are exposed, provide flush panel closures.
   2. Color: To be selected by Architect.
B. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.
   1. Body and Shelves: 24 gauge, 0.0239 inch.
   2. Base: 20 gauge, 0.036 inch.
   3. Metal Base Height: 4 inch.
C. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.

1. Door Frame: 16 gauge, 0.0598 inch, minimum.

D. Doors: Channel edge; welded construction, manufacturer's standard stiffeners, grind and finish edges smooth.
   1. Door Thickness: 16 gauge, 0.0598 inch, minimum.
   2. Form recess for operating handle and locking device.
E. Hinges: Continuous piano hinge with powder coat finish to match locker color.
F. Sloped Top: 20 gauge, 0.0359 inch, with closed ends.
G. Trim: 20 gauge, 0.0359 inch.
H. Locks: Locker manufacturer's standard type indicated above.
I. Built-In Lock Boxes: Same material as locker, manufacturer's standard size, with padlock hasps, for padlocks provided by Owner.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared bases are in correct position and configuration.
B. Verify bases and embedded anchors are properly sized.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Place and secure on prepared base.
C. Install lockers plumb and square.
D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 pounds.
E. Bolt adjoining locker units together to provide rigid installation.
F. Install end panels, filler panels, and sloped tops.
G. Install fittings if not factory installed.
H. Replace components that do not operate smoothly.

3.03 CLEANING

A. Clean locker interiors and exterior surfaces.

END OF SECTION

SECTION 10 51 43 - WIRE MESH STORAGE LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire Station Lockers.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's published data on locker construction, sizes, and accessories.
C. Shop Drawings: Indicate locker plan layout, numbering plan.
D. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wire Mesh Storage Lockers:
    1. GearGrid, LLC.
    2. Groves, Inc.
    3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LOCKER APPLICATIONS

A. Fire Station Wall Mount Lockers: wall-anchored.
    1. General:
        a. Heavy duty, 16-ga, 1-1/4" steel tubing.
        b. Each compartment comes with:
            1) One adjustable boot shelf.
            2) One adjustable helmet shelf.
            3) Hanging pole the length of the unit.
            4) Two apparel hooks.
            5) One name plate.
    2. Compartment Sizes: unit length determined by number of compartments.
        a. Width: 24 inches.
        b. Depth: 24 inches.
        c. Height: 72 inches, min..
    3. Configuration:
        a. Vertical: Single tier.
    4. Components:
        a. Front Panels: Framed door panel.
            1) Doors: Same mesh and framing as wall panels. Factory pre-hung.
                (a) Width: Full-width of locker.
                (b) Height: Full-height of locker.
        b. Side Panels: Welded wire mesh with welded steel angle frame.
        c. Backs: Welded wire mesh.
        d. Shelves: Welded wire mesh.
        e. Tops: individual or continuous; Same mesh and framing as wall panels; Flat.
        f. Floors: Welded wire mesh. Attached to and supported by locker frame.

5. Locking: Padlock hasps, for padlocks provided by tenant.
6. Finish: Powder coat, color as selected from manufacturers standard range.

2.03 WIRE MESH STORAGE LOCKERS

A. Wire Mesh Lockers: Factory assembled, welded construction, modular assemblies of panels, doors, anchors, hardware, and accessories as required to provide a complete system.

2.04 FASTENERS

A. Bolts, Nuts and Washers: Hot dip galvanized.
B. Anchorage Devices: Provide power driven, powder actuated, and drilled expansion bolts.

2.05 FINISHES

A. Painted Finish: Manufacturer's standard powder coat finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install lockers plumb and square.
C. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 pounds.
D. Bolt adjoining locker units together to provide rigid installation.
E. Install fittings if not factory installed.
F. Replace components that do not operate smoothly.

3.03 CLEANING

A. Clean locker interiors and exterior surfaces.

END OF SECTION

SECTION 10 56 13 - METAL STORAGE SHELVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Four post shelving.

1.02 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. Rated uniform shelf loads.
   2. Details of shelving assemblies, including reinforcement.
   3. Accessories.
C. Test Reports: Provide independent agency test reports documenting compliance with specified structural requirements.
D. Shop Drawings: Indicate location, type, and layout of shelving, including lengths, heights, and aisle layout, and relationship to adjacent construction.
   1. Indicate methods of achieving specified anchoring requirements.
E. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and finishes.
F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Inspect for dents, scratches, or other damage. Replace damaged units.
B. Store in manufacturer's unopened packaging until ready for installation.
C. Store under cover and elevated above grade.

1.04 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Provide one year manufacturer warranty covering defects of manufacturing and workmanship and rust and corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Four Post Shelving:
   1. Hallowell: www.hallowell-list.com/#sle.
   2. Penco Products, Inc; Rivetrite: www.pencoproducts.com/#sle.
   3. SpaceSaver Corporation: www.spacesaver.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SHELVING - GENERAL

A. See drawings for layout and sizes.
B. Anchors: Provide anchoring hardware to secure each shelving unit to floor and wall.
   1. Provide hardware of type recommended by manufacturer for substrate.

2.03 FOUR POST SHELVING

A. Four Post Shelving: Steel post-and-beam type with sway bracing, shelving brackets, shelving surfaces, and accessories as specified.
   1. Unit Width: Per Plan, center to center of posts.

2. Shelf Capacity: 1,500 lbs per shelf, minimum.
3. Adjustability of Shelving: Continuous along length of post.
4. Shelf Depth: 18 and 24 inches, as noted on plans.
5. Shelves per Unit: 4.
6. Unit Height: 96 inches, overall .
7. Finish: Manufacturer's standard.
8. Color: As selected by Architect from manufacturer’s standard range.
9. Number of Units: As indicated on drawings.

B. Shelves: Formed sheet, finished on all surfaces .
1. Metal Thickness: 16 gauge, 0.0598 inch, minimum.
2. Shelf Connection to Posts: Manufacturer's standard.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate is level and that clearances are as specified.
B. Verify that walls are suitable for shelving attachment.
C. Do not begin installation until substrates have been properly prepared.
D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Anchor and reinforce as specified, as indicated on drawings, and as recommended by manufacturer.
C. Install shelving with shelf surfaces level and vertical supports plumb; adjust feet and bases as required.
D. Out-Of-Square Tolerance - Four Post Shelving: Maximum of 1/8 inch difference in distance between bottom shelf and canopy top, measured along any post in any direction.

3.04 CLEANING

A. Clean shelving and surrounding area after installation.

3.05 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 10 56 17 - WALL MOUNTED STANDARDS AND SHELVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Steel shelf standards, brackets, and accessories.
B. Closet rods for mounting on brackets.
C. Shelves.
D. See drawings for locations and configurations.

1.02 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.
C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Store products under cover and elevated above grade.
B. Store products in manufacturer's unopened packaging until ready for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Shelf Standards and Brackets:
   1. Knape & Vogt Manufacturing Company; 82™/182™ Series: www.knapeandvogt.com/#sle.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

A. Steel Shelf Standards, Brackets, and Accessories:
   1. Heavy-Duty Shelf Standards and Brackets: Double-slotted channel standards for brackets adjustable in 1 inch increments along entire length of standard, drilled and countersunk for screws.
      a. Load Capacity: Recommended by manufacturer for loading of 300 to 450 pounds per pair of standards.
      b. Finish: Powder-coated.
      c. Color: Black.
      d. Brackets: Double tab type, locking into slots; size to suit shelves; same finish as standards.
      e. Bracket Quantity: Provide one bracket for each 12 inches of standard length.
   2. Closet Rods: Steel tubing for wall mounting in flange fittings.
      a. Type: Round chrome look, heavy duty; 1-1/16 inch outside diameter, 0.109 inch wall thickness.
      b. Length: As required for application, up to 12 feet.
      c. Provide mounting fittings to suit application.
B. Shelving:
   1. Wood Shelves: Solid board shelves, with edges sanded and eased.
      a. Species: maple.
      b. Thickness: 3/4 inch, nominal.
      c. Length: As indicated on drawings.

d. Finish: Polyurethane varnish.

C. Fasteners: Screws as recommended by manufacturer for intended application or as otherwise required by project conditions. Finish of exposed to view fasteners to match finish of standards and other components.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Mount standards or brackets to solid backing capable of supporting intended loads.

C. Install brackets, shelving, and accessories.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 10 75 00 - FLAGPOLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum Flagpoles.

1.02 REFERENCE STANDARDS

A. AASHTO M 36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains 2016.
B. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube 2016.
C. NAAMM FP 1001 - Guide Specifications for Design Loads of Metal Flagpoles 2007.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on pole, accessories, and configurations.
C. Shop Drawings: Indicate detailed dimensions, base details, anchor requirements, and imposed loads.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Flagpoles:
   1. Regal Flags and Poles, Inc.
   2. Concord American Flagpole.
   3. Pole-Tech Co, Inc: www.poletech.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FLAGPOLES

A. Flagpoles:
   1. Material: Aluminum.
   2. Design: Cone tapered.
   3. Mounting: Ground mounted type.
   4. Nominal Height: Center Pole 30 ft, Outside Poles 25 ft ; measured from top of base.
   5. Halyard: Interior type .
B. Performance Requirements:
   1. Wind Pressure Loading on Flagpole with Flag: Resistant without permanent deformation to 135 miles/hr wind speed, in accordance with NAAMM FP 1001.

2.03 POLE MATERIALS

A. Aluminum: ASTM B241/B241M , 6063 alloy , T6 temper.

2.04 ACCESSORIES

A. Finial Ball: Aluminum, 6 inch diameter.
B. Flag: Client to furnish flag.
C. Cleat Box: Aluminum, with built-in hinge and hasp assembly, attached to pole with tamper proof screws inside box.

D. Halyard: 5/16 inch diameter stainless steel aircraft cable.
E. Counterbalance: heavily coated neoprene.

2.05 OPERATORS

A. Hand Crank: Removable type.

2.06 MOUNTING COMPONENTS

A. Foundation Tube Sleeve: AASHTO M 36, corrugated 16 gauge, 0.0598 inch steel, galvanized, depth as indicated.
B. Pole Base Attachment: Tube; aluminum base with base cover.
C. Lightning Ground Cable: Copper No. 6 AWG, soft drawn.

2.07 FINISHING

A. Metal Surfaces in Contact With Concrete: Asphaltic paint.
B. Aluminum: Mill finish.
C. Stainless Steel: No. 4 satin finish.
D. Finial: Spun finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings.

3.02 PREPARATION

A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

3.03 INSTALLATION

A. Install flagpole, base assembly, and fittings in accordance with manufacturer's instructions.
B. Install foundation plate and centering wedges for flagpoles base set in concrete base and fasten.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1 inch.

3.05 ADJUSTING

A. Adjust operating devices so that halyard function smoothly.

END OF SECTION

SECTION 12 24 00 - WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior manual roller shades.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work related to products of this section; require attendance of affected installers.
B. Sequencing:
   1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
   2. Do not install shades until final surface finishes and painting are complete.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
C. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
D. Selection Samples: Include fabric samples in full range of available colors and patterns.
E. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
F. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

1.05 MOCK-UP

A. Mock-Up: Provide full size mock-up of window shade system complete with selected shade fabric including example of seams and batten pockets when applicable.
   1. Obtain Architect's approval of light and privacy characteristics of fabric prior to fabrication.
   2. Full-sized mock-up may become part of the final installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
B. Handle and store shades in accordance with manufacturer's recommendations.

1.07 FIELD CONDITIONS

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
   1. Shade Hardware: One year.
   2. Fabric: One year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Interior Manually Operated Roller Shades:
   1. Draper, Inc; Clutch Operated FlexShade: www.draperinc.com/#sle.
   2. Draper, Inc; Manual LightBloc FlexShade: www.draperinc.com/#sle.
   3. Hunter Douglas Architectural: www.hunterdouglasarchitectural.com/#sle.
   4. Lutron Electronics Co., Inc: www.lutron.com/#sle.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 ROLLER SHADES

A. General:
   1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
   2. Provide shade system that operates smoothly when shades are raised or lowered.

B. Roller Shades:
   1. Description - Interior Roller Shades: Single roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
      a. Drop Position: Regular roll.
      b. Roll Direction: Roll down, closed position is at window sill.
      c. Mounting: Window jamb mounted - inside, between jambs.
      d. Size: match window opening.
      e. Fabric: As indicated under Shade Fabric article.
   2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
   3. Roller Tubes: As required for type of shade operation.
      a. Material: Extruded aluminum, clear anodized finish.
      b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
      c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge.
   4. Hembars: Designed to maintain bottom of shade straight and flat.
      a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
      b. Room-Darkening Shades: Provide a slot in bottom bar with wool-pile light seal.
   5. Manual Operation for Interior Shades:
      a. Clutch Operator: Manufacturer's standard material and design, permanently lubricated.
      b. Drive Chain: Continuous loop beaded ball chain, 95 pounds minimum breaking strength. Provide upper and lower limit stops.
      c. Chain Retainer:
         1) Manufacturer's standard clip.

2.03 SHADE FABRIC

A. Fabric for Light-Filtering Shades: Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.

1. Manufacturers:
    a. Lutron Electronics Co., Inc; E Screen THEIA - 3%: www.lutron.com/#sle.
    b. Mermet Corporation; E-Screen - 3%: www.mermetusa.com/#sle.
    c. Mermet Corporation; GreenScreen Evolve - 3%: www.mermetusa.com/#sle.
    d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Performance Requirements:
    a. Flammability: Pass NFPA 701 large and small tests.
    b. Fungal Resistance: No growth when tested according to ASTM G21.
3. Openness Factor: 3%.
4. Color: As selected by Architect from manufacturer's full range of colors.

B. Fabric for Room-Darkening Shades: Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
1. Manufacturers:
    a. Mermet Corporation; Avila Twilight - 0%: www.mermetusa.com/#sle.
    b. Substitutions: See Section 01 60 00 - Product Requirements.
2. Performance Requirements:
    a. Flammability: Pass NFPA 701 large and small tests.
    b. Fungal Resistance: No growth when tested according to ASTM G21.
3. Openness Factor: 0%.
4. Color: As selected by Architect from manufacturer's full range of colors.

2.04 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.
B. Dimensional Tolerances: As recommended in writing by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine finished openings for deficiencies that may preclude satisfactory installation.
B. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
B. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.
B. Replace shades that cannot be cleaned to "like new" condition.

3.05 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

3.06 PROTECTION

A. Protect installed products from subsequent construction operations.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 32 00 - MANUFACTURED WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured standard casework, with cabinet hardware.

1.02 RELATED REQUIREMENTS

A. Section 06 41 00 - Architectural Wood Casework: Custom casework.
B. Section 12 36 00 - Countertops: Additional requirements for countertops.

1.03 DEFINITIONS

A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches above finished floor, tops of cases less than 72 inches above finished floor and all members visible in open cases or behind glass doors.
B. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches above finished floor and bottoms of cabinets more than 30 inches but less than 42 inches above finished floor.
C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation and cabinets less than 30 inches above finished floor.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Component dimensions, configurations, construction details, joint details, attachments.
C. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors, reinforcements, and blocking, placement dimensions and tolerances, clearances required, and keying information.
D. Samples for Finish Selection: Fully finished, for color selection. Minimum sample size: 2 inches by 3 inches.
    1. Plastic laminate samples, for color, texture, and finish selection.
    2. Thermally fused laminate samples, for color, texture, and finish selection.
E. Manufacturer's Installation Instructions.
F. Manufacturer's Qualification Statement.
G. Installer's Qualification Statement.
H. Maintenance Data: Manufacturer's recommendations for care and cleaning.
I. Finish touch-up kit for each type and color of materials provided.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.
B. Acceptance at Site:
   1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.
C. Storage:
   1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" Article of this section.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a five year period after Date of Substantial Completion, at no additional cost to Owner. Defects include, but are not limited to:
   1. Ruptured, cracked, or stained finish coating.
   2. Discoloration or lack of finish integrity.
   3. Cracking or peeling of finish.
   4. Delamination of components.
   5. Failure of adhesives.
   6. Failure of hardware.

PART 2 PRODUCTS

2.01 CASEWORK, GENERAL

A. Quality Standard: AWI/AWMAC/WI (AWS), unless noted otherwise.
B. Types: More than one type is required. See drawings for location of each type of casework.
C. Plastic Laminate Faced Cabinets: Custom Grade.

2.02 FABRICATION

A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.
B. Construction: As required for selected grade.
C. Structural Performance: Safely support the following minimum loads:
   1. Base Units: 500 pounds per linear foot across the cabinet ends.
   2. Suspended Units: 300 pounds static load.
   3. Drawers: 125 pounds, minimum.
   4. Shelves: 100 pounds, minimum.
D. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

2.03 PLASTIC-LAMINATE-CLAD CASEWORK

A. Plastic-Laminate-Clad Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.

1. Style: Flush overlay. Ease doors and drawer fronts slightly at edges.
2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings, and with following front-to-back dimensions:
   a. Base Cabinets: 22 inches.
   b. Tall Cabinets: 22 inches.
   c. Wall Cabinets: 13 inches.
3. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline.
   a. Finish: Matte or suede, gloss rating of 5 to 20.
   b. Surface Color and Pattern: As selected by Architect from manufacturer's full line.
   c. Exposed Interior Surfaces: Thermally fused laminate.
      1) Color: White.
   d. Cap exposed plastic laminate finish edges with material of same finish and pattern.

2.04 CABINET HARDWARE

A. Manufacturer's standard types, styles and finishes, and as indicated below.
B. Locks: Provide locks on casework drawers and doors where indicated. Lock with 5 pin cylinder and 2 keys per lock.
C. Shelves in Cabinets:
   1. Shelf Standards and Rests: Vertical standards with rubber button fitted rests, satin chromium plated over nickel on base material.
D. Swinging Doors: Hinges, pulls, and catches.
   1. Hinges: Concealed, number as required by referenced standards for width, height, and weight of door.
      a. Concealed Hinges: Installed in cabinet edge, and on door back, satin stainless steel.
   2. Pulls: Stainless Steel Bar Pulls, 8 inches wide, unless otherwise noted.
   3. Catches: Magnetic.
E. Sliding Doors: Pulls and track assemblies.
   1. Track Assembly: Nylon track with solid bearing followers.
F. Drawers: Pulls and slides.
   1. Pulls: Chrome wire pulls, 4 inches wide.
   2. Slides: Steel, full extension arms, ball bearings; self-closing; capacity as recommended by manufacturer for drawer height and width.

2.05 MATERIALS

A. Wood-Based Materials:
   1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.
B. Solid Wood: Clear, dry, sound, plain sawn, selected for compatible species, grain and color, no defects.
C. Semi-Exposed Solid Wood: Dry, sound, plain sawn, no appearance defects, any species similar in color and grain to exposed portions.
D. Hardwood Plywood: Veneer core; HPVA HP-1 Grade as indicated; same species as exposed solid wood, clear, compatible grain and color, no defects. Band exposed edges with solid wood of same species as veneer.
E. Concealed Solid Wood or Plywood: Any species and without defects affecting strength or utility.

F. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications. complying with Grade requirements, and standard with the manufacturer.
G. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.

2.06 ACCESSORIES

A. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
   1. Color: As selected by Architect from manufacturer's full range.
   2. Use at exposed edges.
   3. Use at exposed shelf edges.
B. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel finish in exposed locations.
C. Concealed Joint Fasteners: Corrosion-resistant, standard with manufacturer.
D. Grommets: Standard plastic grommets for cut-outs, in color selected by Architect.
E. Sealant for Use in Casework Installation:
   1. Manufacturer's recommended type.

PART 3 EXECUTION

3.01 PREPARATION

A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

3.02 EXAMINATION

A. Site Verification of Environmental Conditions:
   1. Do not deliver casework until the following conditions have been met:
      a. Building has been enclosed (windows and doors sealed and weather-tight).
      b. An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
      c. Ceiling, overhead ductwork, piping, and lighting have been installed.
      d. Installation areas do not require further "wet work" construction.
B. For Base Cabinets Installation: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 1/2 inch leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.
C. For Wall Cabinets Installation: Examine wall surfaces in installation space. Do not proceed with installation if the following conditions are encountered:
   1. Maximum Variation of finished gypsum board surface from true flatness: 1/8 inch in 10 feet in any direction.
D. Verify adequacy of support framing and anchors.
E. Verify that service connections are correctly located and of proper characteristics.

3.03 INSTALLATION

A. Perform installation in accordance with manufacturer's instructions.
B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.
C. Set casework items plumb and square, securely anchored to building structure.

D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.
E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
   1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
   2. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
   3. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
   4. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
F. Secure wall and floor cabinets to concealed blocking at gypsum board assemblies.
G. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
   1. Where base cabinets are installed away from walls or service space framing, anchor to floor at toe space at not more than 24 inches on center, and at sides of cabinets with not less than two fasteners per side.
H. Wall Cabinets: Fasten to hanging strips, and/or wall substrates. Fasten each cabinet through back, near top, at not less than 16 inches on center.
I. Install hardware uniformly and precisely.
J. Countertops: Install countertops intended and furnished for field installation in one true plane, with ends abutting at hairline joints, and no raised edges.
K. Replace units that are damaged, including those that have damaged finishes.

3.04 ADJUSTING

A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

3.05 CLEANING

A. Clean casework and other installed surfaces thoroughly.

3.06 PROTECTION

A. Do not permit finished casework to be exposed to continued construction activity.
B. Protect casework and countertops from ongoing construction activities. Prevent workmen from standing on, or storing tools and materials on casework or countertops.
C. Repair damage, including to finishes, that occurs prior to Date of Substantial Completion, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION

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SECTION 12 36 00 - COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops.

1.02 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. Specimen warranty.
C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
F. Installation Instructions: Manufacturer's installation instructions and recommendations.
G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.05 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

A. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: 1/2 inch, minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Manufacturers:
         1) Avonite Surfaces: www.avonitesurfaces.com.
         2) Dupont; Corian: www.corian.com.
      b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.

c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
d. Color and Pattern: As selected by Architect from manufacturer's full line.

3. Other Components Thickness: 1/2 inch, minimum.
4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge; use marine edge at sinks.
5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
6. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.

2.02 MATERIALS

A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
C. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
B. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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SECTION 13 34 19 - METAL BUILDING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufacturer-engineered, shop-fabricated structural steel building frame.
B. Metal wall and roof panels including soffits and gutters and downspouts.
C. Thermal insulation for Manufacturer-engineered steel building.
D. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast in Place Concrete: PEMB Column Anchor Rods
B. Section 05 50 00 - Metal Fabrications.
C. Section 07 92 00 - Joint Sealants: Sealing joints between accessory components and wall system.
D. Section 08 11 13 - Hollow Metal Doors and Frames.
E. Section 08 36 13 - Sectional Doors.

1.03 REFERENCE STANDARDS

A. AISC 360 - Specification for Structural Steel Buildings 2016.
B. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.
C. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
D. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems 2018.
E. MBMA (MBSM) - Metal Building Systems Manual 2019.

1.04 ADMINISTRATIVE REQUIREMENTS AND COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-rod inserts into foundation walls and footings. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Section 03 30 00 - Cast-in-Place Concrete.
B. Coordinate metal panel assemblies with rain drainage work, flashing, trim and construction of supports and other adjoining work to provide a leakproof, secure and noncorrosive installation.
C. Preinstallation Meeting: Convene one week before starting work of this section.
    1. Review methods and procedures related to metal building systems including, but no limited to, the following:
        a. Conditions of foundations and other preparatory work.
        b. Structural load limitations.
        c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress to avoid delays.
        d. Required tests, inspections, and certifications.
        e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.
    2. Review Methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
        a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
        b. Structural limitations of purlins and rafters during and after roofing.
        c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.

d. Temporary protection requirements for metal roof panel assembly during and after installation.
e. Roof observation and repair after metal roof panel installation.

3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
   a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
   b. Structural limitations of girts and columns during and after wall panel installation.
   c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
   d. Temporary protection requirements for metal wall panel assembly during and after installation.
   e. Wall observation and repair after metal wall panel installation.

1.05 SUBMITTALS

A. Product Data: For each type of metal building system component.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
      a. Metal roof panels.
      b. Insulated Metal wall panels.
      c. Metal soffit panels.
      d. Thermal insulation and vapor-retarder facings.

B. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, installation; framing anchor bolt settings, sizes, and locations from datum, foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.

C. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and the following:
   1. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings and Roof Top Unit support. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
   2. Metal Roof and Insulated Metal Wall Panel Layout Drawings: Show layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
      a. Show roof-mounted items including equipment supports, pipe supports and penetrations, and lighting fixtures.
      b. Show wall-mounted items including personnel doors, vehicular doors, windows, louvers, and lighting fixtures.
   3. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:8):
      a. Flashing and trim.
      b. Gutters.
      c. Downspouts.

D. Samples: Submit two samples of precoated metal panels for each color selected, illustrating color and texture of finish.

E. Manufacturer's Instructions: Indicate preparation requirements, anchor bolt placement.
F. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.
G. Designer's Qualification Statement.
H. Manufacturer's Qualification Statement: Provide documentation showing metal building manufacturer is accredited under IAS AC472.
    1. Include statement that manufacturer designs and fabricates metal building system as integrated components and assemblies, including but not limited to primary structural members, secondary members, joints, roof, and wall cladding components specifically designed to support and transfer loads and properly assembled components form a complete or partial building shell.
I. Project Record Documents: Record actual locations of concealed components and utilities.
J. Delegated-Design Submittal: For metal building systems.
    1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this type of work.
    1. Design Engineer Qualifications: Licensed in the State in which the Project is located.
    2. Comply with applicable code for submission of design calculations as required for acquiring permits.
    3. Cooperate with regulatory agency or authorities having jurisdiction (AHJ), and provide data as requested.
B. Perform work in accordance with AISC 360 and MBMA (MBSM).
C. Manufacturer Qualifications: Company specializing in the manufacture of products+ similar to those required for this project.
    1. Not less than3 years ofdocumented experience
    2. IAS AC473-Accredited Manufacturer of Cold-formed steel components
D. Erector Qualifications: Company specializing in performing the work of this section approved by manufacturer.
    1. IAS AC478-Accredited Metal Building Assembler.

1.07 DELIVERY, STORAGE, AND HANDLING

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

1.08 FIELD CONDITIONS

A. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

1.09 WARRANTY

A. Special Manufacturer' s Warranty: On manufacturer' s standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within one year from date of Substantial Completion.
B. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
    1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
        a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
        b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
        c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
    2. Finish Warranty Period: 20 years from date of Substantial Completion.
C. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
    1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Buildings Systems:
    1. Butler Manufacturing Company: www.butlermfg.com.
    2. Ceco Building Systems: www.cecobuildings.com.
    3. Nucor Building Systems: www.nucorbuildingsystems.com/#sle.
    4. Dean Steel Buildings, Inc. .

2.02 ASSEMBLIES

A. Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.
B. Single span rigid frame.
C. Primary Framing: Rigid frame of rafter beams and columns, end wall columns, and wind bracing.
D. Secondary Framing: Purlins, Girts, Eave struts, Flange bracing, Sill supports, and Clips, and other items detailed.
E. Wall System: Preformed insulated metal panels of vertical profile, with sub-girt framing/anchorage assembly, insulation, and liner sheets, and accessory components.
F. Roof System: Preformed standing seam metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly, insulation, and liner panels, and accessory components.
G. Roof Slope: 1 inches in 12 inches, unless otherwise indicated.

2.03 PERFORMANCE REQUIREMENTS

A. Installed Thermal Resistance of Wall System: as indicated on drawings.
B. Installed Thermal Resistance of Roof System: as indicated on drawings.
C. Design structural members to withstand dead load, design loads due to pressure and suction of wind calculated in accordance with applicable code.
D. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

E. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of [____] degrees F.
F. Delegated Design: Engage a qualified professional engineer to design metal building systems.
G. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."
    1. Design Loads: As indicated on Drawings.
    2. Mechanical Units and accessories hung from or bearing on roof sytem.
    3. Deflection and Drift Limits: Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."
    4. Deflection and Drift Limits: No greater than the following:
        a. Purlins and Rafters: Vertical deflection of 1/180 of the span.
        b. Girts: Horizontal deflection of 1/180 of the span. When member laterally braces top of CMU wall, allowable horizontal deflection shall be l/600.
        c. Metal Roof Panels: Vertical deflection of 1/180 of the span.
        d. Metal Wall Panels: Horizontal deflection of 1/180 of the span.
        e. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
        f. Lateral Drift: Maximum of 1/100 of the building height. Drift at top of CMU wall connection point shall be maintained to a maximum of l/400.
H. Seismic Performance: Metal building system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
I. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
    1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
J. Structural Performance for Metal Roof and Insulated Metal Wall Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
    1. Wind Loads: As indicated on Drawings.
K. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 1680 or ASTM E 283 at the following test-pressure difference:
    1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa).
L. Air Infiltration for Insulated Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 283 at the following test-pressure difference:
    1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa).
M. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
    1. Test-Pressure Difference: 2.86 lbf/sq. ft. (137 Pa).
N. Water Penetration for Insulated Metal Wall Panels: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
    1. Test-Pressure Difference: 2.86 lbf/sq. ft. (137 Pa).

O. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
   1. Uplift Rating: UL 90.
P. Provide expandable building design for future North-End Expansion.

2.04 STRUCTURAL-STEEL FRAMING

A. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
   1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
      a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.
   2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
B. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
   1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
   2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
C. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:
   1. Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch- (64-mm-) wide flanges.
      a. Depth: As needed to comply with system performance requirements.
   2. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch- (64-mm-) wide flanges.
      a. Depth: As required to comply with system performance requirements.
   3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
   4. Flange Bracing: Minimum 2-by-2-by-1/8-inch (51-by-51-by-3-mm) structural-steel angles or 1-inch- (25-mm-) diameter, cold-formed structural tubing to stiffen primary-frame flanges.
   5. Sag Bracing: Minimum 1-by-1-by-1/8-inch (25-by-25-by-3-mm) structural-steel angles.
   6. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch (76-by-51-mm), fabricated from zinc-coated (galvanized) steel sheet.
   7. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
   8. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.

9. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

D. Bracing: Provide adjustable wind bracing using any method as follows:
   1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 (345); or ASTM A 529/A 529M, Grade 50 (345); minimum 1/2-inch- (13-mm-) diameter steel; threaded full length or threaded a minimum of 6 inches (152 mm) at each end. Rod bracing shall be coordinated to avoid door and window openings as indicated on the architectural drawings.

E. Materials:
   1. W-Shapes: ASTM A 992/A 992M, Grade 50 (345 or 380).
   2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M, Grade 50.
   3. Plate and Bar: ASTM A 36/A 36M, Grade 50(345 or 380).
   4. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
   5. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
   6. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55 (205 through 380), or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70 (310 through 480); or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80 (170 through 550), or HSLAS, Grades 45 through 70 (310 through 480).
   7. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
      a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, SS, Grades 33 through 80 (230 through 550), or HSLAS or HSLAS-F, Grades 50 through 80 (340 through 550); with G90 (Z275) coating designation.
   8. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with spline ends; ASTM A 563 (ASTM A 563M) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers, plain.
   9. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with spline ends.
      a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.
   10. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
      a. Configuration: Straight.
      b. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
      c. Plate Washers: ASTM A 36/A 36M carbon steel.
      d. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
      e. Finish: Hot-dip zinc coating, ASTM F 2329, Class C.
   11. Headed Anchor Rods: ASTM F 1554, Grade 36.
      a. Configuration: Straight.
      b. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
      c. Plate Washers: ASTM A 36/A 36M carbon steel.
      d. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
      e. Finish: Hot-dip zinc coating, ASTM F 2329, Class C.
   12. Threaded Rods: ASTM A 193/A 193M.
      a. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
      b. Washers: [ASTM F 436 (ASTM F 436M) hardened] [ASTM A 36/A 36M] carbon steel.

c. Finish: Hot-dip zinc coating, ASTM F 2329, Class C.

F. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.
1. Clean and prepare in accordance with SSPC-SP2.
2. Coat with manufacturer's standard primer. Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil (0.025 mm).
a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil (0.013 mm) on each side.

2.05 METAL ROOF PANELS

A. Standing-Seam, Trapezoidal-Rib, Metal Roof Panels : Formed with raised trapezoidal ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.
1. Material: Aluminum-zinc alloy-coated steel sheet, 0.024-inch (0.61-mm) nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
a. Exterior Finish: Two-coat fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range.
2. Clips: Manufacturers standard type to accommodate thermal movement.
3. Joint Type: Panels snapped together.
4. Panel Coverage: 24 inches (610 mm).
5. Panel Height: 3 inches (76 mm).
6. Uplift Rating: UL 90.

B. Finishes:
1. Exposed Coil-Coated Finish:
a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.06 METAL LINER PANELS

A. Metal Liner Panels : Solid panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels; designed for interior side of metal wall panel assemblies and installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps.
1. Material: Aluminum-zinc alloy-coated steel sheet, 0.024-inch (0.61-mm) nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
a. Color: As selected by Architect from manufacturer's full range.
2. Panel Coverage: 12 inches (305 mm) min..
3. Panel Height: 1.5 inches (38 mm).

B. Finishes:
1. Exposed Coil-Coated Finish:
a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to

exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.07 TRIM AND ACCESSORIES

A. Sealants according to specification section 07 92 00 - Joint Sealants.
B. Anchors: Galvanized steel.
C. Fasteners: Manufacturer's standard type to suit application; hot-dip galvanized steel with soft neoprene washers. Fastener cap same color as exterior panel.
D. Powder Actuated Fasteners: Steel, hot dip galvanized; with soft neoprene washers, fastener cap same color as exterior panel.
E. Field Touch-up Paint: As recommended by panel manufacturer.
F. Bituminous Paint: Asphalt base.

2.08 THERMAL INSULATION

A. Faced Metal Building Insulation: ASTM C 991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. (8-kg/cu. m) density; 2-inch- (51-mm-) wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.
B. Metal Building Type, Factory Applied, Vapor-Barrier Insulation Facings: Water vapor permeance no greater than 0.10 perm when tested in accordance with ASTM E96/E96M; flame spread index of 25 or less, and smoke developed index of 40 or less when tested in accordance with ASTM E84.
C. Retainer Strips: For securing insulation between supports, 0.025-inch (0.64-mm) nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.
D. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.09 PERSONNEL DOORS AND FRAMES

A. Swinging Personnel Doors and Frames: As specified in Section 08 11 13 "Hollow Metal Doors and Frames."

2.10 WINDOWS

A. Steel Windows: As specified in Section 08 51 13 - Aluminum Windows.
B. Glazing: Comply with requirements specified in Section 08 80 00 "Glazing."

2.11 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
   1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
   1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.

2. Clips: Manufacturer's standard, formed from stainless-steel sheet, designed to withstand negative-load requirements.
3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from stainless-steel sheet or nylon-coated aluminum sheet.
4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch (25-mm) standoff; fabricated from extruded polystyrene.

C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fascia, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

D. Flashing and Trim: Aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.
1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Opening Trim: Aluminum-zinc alloy-coated steel sheet, 0.030-inch (0.76-mm) nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

E. Gutters: Aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2438-mm-) long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
1. Gutter Supports: Fabricated from same material and finish as gutters.
2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.

F. Downspouts: Aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot- (3-m-) long sections, complete with formed elbows and offsets.
1. Mounting Straps: Fabricated from same material and finish as gutters.

G. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

H. Materials:

1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
    a. Fasteners for Metal Roof Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.
    b. Fasteners for Metal Wall Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM sealing washers bearing on weather side of metal panels.
    c. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
    d. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
2. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
3. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
4. Metal Panel Sealants:
    a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
    b. Joint Sealant: ASTM C 920; one part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

2.12 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.
    1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
    2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
    1. Make shop connections by welding or by using high-strength bolts.
    2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
    3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
    4. Weld clips to frames for attaching secondary framing if applicable, or punch for bolts.
    5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
   1. Make shop connections by welding or by using non-high-strength bolts.
   2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
   1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
   1. Engage land surveyor to perform surveying.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.03 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system according to manufacturer's written instructions and drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base and 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. 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.
   3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure.
   2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
   1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.
      a. Joint Type: Snug tightened or pretensioned as required by manufacturer.

G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
   1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
   2. Locate and space wall girts to suit openings such as doors and windows.
   3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
   1. Tighten rod and cable bracing to avoid sag.
   2. Locate interior end-bay bracing only where indicated.

I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

K. It is the responsibility of the erector to provide temporary erection bracings until the structure is complete and able to withstand full loading after removal of bracing.

L. It is the responsibility of the contractor to provide temporary lateral bracings until the roof diaphragm is fully secured to roof structure with fastening as detailed on drawings.

3.04 METAL PANEL INSTALLATION, GENERAL

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
   1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.

C. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.

a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.

2. Install metal panels perpendicular to structural supports unless otherwise indicated.
3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Locate metal panel splices over structural supports with end laps in alignment.
6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.

1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

3.05 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

1. Install ridge caps as metal roof panel work proceeds.
2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.

1. Install clips to supports with self-drilling or self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Predrill panels for fasteners.
5. Provide metal closures at peaks, rake edges, rake walls and each side of ridge caps.

C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

D. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.06 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with

provisions for thermal and structural movement.

1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
2. Shim or otherwise plumb substrates receiving metal wall panels.
3. When two rows of metal panels are required, lap panels 4 inches (102 mm) minimum.
4. Rigidly fasten base end of metal wall panels and allow eave end free movement for thermal expansion and contraction. Predrill panels.
5. Flash and seal metal wall panels with weather closures at eaves and rakes, and at perimeter of all openings. Fasten with self-tapping screws.
6. Install screw fasteners in predrilled holes.
7. Install flashing and trim as metal wall panel work proceeds.
8. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated on Drawings; if not indicated, as necessary for waterproofing.
9. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
10. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

C. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), noncumulative; level, plumb, and on location lines; and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.07 METAL SOFFIT PANEL INSTALLATION

A. Provide metal soffit panels the full width of soffits. Install panels perpendicular to support framing.

B. Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

3.08 THERMAL INSULATION INSTALLATION

A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.

1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.

B. Blanket Roof Insulation: Comply with the following installation method:

1. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
    a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
2. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

3.09 DOOR AND FRAME INSTALLATION

A. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place according to manufacturers' written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for metal wall panels.

3.10 WINDOW INSTALLATION

A. General: Install windows plumb, rigid, properly aligned, without warp or rack of frames or sash, and securely fasten in place according to manufacturer's written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each window frame with elastomeric sealant used for metal wall panels.

3.11 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
   2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
   3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
   2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.
   1. Tie downspouts to underground drainage system indicated.

E. Louvers: Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

F. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.12 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.

B. Product will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.13 ADJUSTING

A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

C. Windows: Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and at weather stripping to ensure smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.14 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.

1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

D. Touchup Painting: Cleaning and touchup painting are specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."

E. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

F. Doors and Frames: Immediately after installation, sand rusted or damaged areas of prime coat until smooth and apply touchup of compatible air-drying primer.

1. Immediately before final inspection, remove protective wrappings from doors and frames.

G. Windows: Clean metal surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances. Clean factory-glazed glass immediately after installing windows.

H. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by

Architect, remove damaged units and replace with new units.

a. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION

SECTION 13 34 44 – PEMB TRAINING TOWER

PART 1– GENERAL

1.1 Work Included

A. The work under this section shall include the furnishing of all items shown as specified including:

1. Steel building system.
2. Prefabricated and custom metal stair systems.
3. Railing, anchors, supports, and other accessories.
4. Steel closures, doors, door hardware, and hollow metal door frames.

1.2 Related Sections

A. Division 3 – Supply and setting of anchor bolts

B. Division 3 – Grouting

C. Division 3 – Concrete foundations, grade beams, and floor slabs

D. Division 3 – Concrete fill on elevated decks

1.3 Definition

A. This simulator shall be used to provide training for firefighters in a controlled simulated environment, which is commensurate with actual fire conditions. These specifications shall be used in conjunction with the drawings for dimensions, features, and exact configuration of the training structure.

1.4 References

A. National Fire Protection Association (NFPA)

1. NFPA 1402 – Standard on Facilities for Fire Training and Associated Props
2. NFPA 1403 – Standard on Live Fire Training Evolutions

B. American Society for Testing and Materials (ASTM)

C. AWS D1.1 – Structural Welding Code – Steel

D. American Institute of Steel Construction (AISC), Manual of Steel Construction, latest edition

E. Occupational Safety and Health Standards (OSHA)

1. 29 CFR 1910.23 – Guarding Wall and Floor Openings
2. 29 CFR 1910.24 – Fixed Industrial Stairs
3. 29 CFR 1910.27 – Fixed Ladders

F. Steel Deck Institute (SDI), SDI 30 - Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute, Inc.

1.5 Design Requirements

A. Structural Requirements

1. Provide metal building system capable of withstanding the effects of gravity loads and the following loads & stresses within the limits and under conditions indicated.
    a. Live Loads:
        1) Floor: 100 PSF
        2) Attic: 100 PSF
        3) Flat Roof: 100 PSF
        4) Sloped/Gabled Roof: 100 PSF
    b. Wind Requirements:
        1) Wind Load: 150 mph
        2) Wind Exposure: D
    c. Seismic Requirements:
        1) Site Class: D
        2) S_S (Short Period): 0.130g
        3) S_1 (1-Second Period): 0.066g
    d. Risk Category: II
    e. Deflection Limits: Engineer primary & secondary framing components, floor systems, and wall assemblies to withstand design loads with deflections no greater than 1/240 of the span.
    f. Exterior Wall Panel System:
        1) The building shall be capable of supporting a 1500-pound point load at any point on the exterior wall of the structure.
    g. Handrails and Guardrails:
        1) Uniform load of 50 lb/ft applied in any direction.
        2) Concentrated load of 200 lbs applied in any direction.
        3) Uniform and concentrated loads need not be assumed to act concurrently.

B. Code Requirements

1. Structural design shall comply with the Florida Building Code 7th Edition (2020).
2. Safety design shall comply with applicable OSHA requirements.
3. Training shall comply with applicable NFPA 1403 requirements.

4. Due to the nature of the intended use, egress and fire code requirements are not expected to satisfy the code criteria for buildings intended to accommodate public occupancy.
    a. Local codes may require the simulator to have a variance due to the intended use and features unique to its application.
    b. It is the responsibility of the owner or owner's representative to determine the proper procedures and variances for their location and obtain the necessary variances or requirements.

1.6 Submittals

A. Shop Drawings
1. Submit steel building drawings showing structural panel layouts, structural frame layouts, joist layouts, locations of openings, building attachment details, and other details as may be required for a weather-tight installation including Anchor Bolt Plan.
    a. Furnish [3] sets of steel building shop drawings bearing the stamp and signature of a professional engineer registered in the State of Florida.
2. Submit miscellaneous metal drawings showing stairs, railing, ladders, window closures, and any other shop fabricated items.
    a. Show member sizes, weld symbols, and attachment details.
    b. Furnish [3] sets of shop drawings with a letter of structural conformance bearing the stamp and signature of a professional engineer registered in the State of Florida.

B. Calculations
1. Furnish [3] sets of steel building calculations bearing the stamp and signature of a professional engineer registered in the State of Florida.

C. Miscellaneous Submittals
1. Submit [3] sets of cut sheet information on all applicable additional materials including rappelling anchors, shutter slam latches and handles, temperature sensing and indicating system, shingles, felt, plywood, color charts, and any other materials included as options.

1.7 Quality Assurance

A. Supplier shall have a minimum of 10 years experience in the design, engineering, and fabrication of fire training simulators and must offer these turn-key services to complete this section of work.

B. Erector shall be qualified by the supplier and have a minimum of 5 years experience installing pre-engineered metal building projects and a minimum of 5 completed projects of similar size and scope.

1.8 Delivery, Storage, and Handling

A. All components and accessories necessary for the assembly of the simulator including interior stairs and decks shall arrive at the project site by over-the-road trailer. Other small items including, fasteners, instruments, and instrumentation shall be delivered separately.

B. Store all building components according to building storage instructions above ground, separated, and protected from exposure to the elements & from physical damage caused by other activities.

C. During storage, space surfaces of materials to permit free circulation of air.

D. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 Warranty

A. Supplier shall provide a one (1) year warranty from the date of Substantial Completion warranting all components to be free from defects in materials and workmanship under normal use and service.

B. Supplier shall provide a five (5) year extended materials and workmanship warranty from the date of structure delivery warranting all components included in the "Steel Building System" to be free from defects in materials and workmanship under normal use and service.

C. Suppler shall provide a thirty/forty (30/40) year extended life warranty from the date of structure delivery warranting the wall panel factory paint finish.

PART 2– PRODUCTS

2.1 Suppliers

A. Basis of Design; Acceptable Suppliers: WHP Trainingtowers; 9130 Flint, Overland Park, KS 66214. TEL: (800) 351-2525 or (913) 385-3663. FAX: (800) 736-7594. Email:info@trainingtowers.com Website:www.trainingtowers.com

B. Substitutions: As approved per Owner/Architect.

1. Include full set of drawings with submittal.
2. Include cut sheets and/or samples of all products included in the package including but not limited to doors, door frames, hardware, shutters, and paint.
3. Provide an itemized list, specifically referencing each item of this specification section where the proposed substitution deviates from the specified product.

2.2 Materials

1. Conform to applicable ASTM specifications.
2. Galvanize all structural and non-structural materials used, less than ¼" in thickness, whether or not exposed to the elements.

2.3 Fasteners

A. Provide pre-drilled/pre-punched holes for bolted attachment of material during erection.

B. Field bolt wall panel system with $^{3}/_{8}$" electro-galvanized, powder coated bolts at 6" on center.

C. Furnish wall panel system fasteners with a nylon washer to complete the weather-tight seal.

D. Provide fasteners of sufficient strength to support connected members and loads, and to develop full strength of parts fastened or connected.

E. Anchor bolts shall meet the diameter specified on the anchor bolt plan.

1. Anchor bolts are included in this section.

2.4 Shop Finish Painting/Coating

A. Clean, prepare surfaces and shop prime structural steel except where members are zinc or aluminum-zinc alloy coated, or are to be incased in concrete.

B. Paint system for wall panel steel exposed to the exterior. Factory applied silicone modified polyester in accordance with manufacturer's standard procedures. Minimum dry film thickness 1.0 mils. Color to be as selected by Architect from manufacturer's nine (9) standard wall colors.

C. Factory finish for all structural roof panels. Steel shall be galvanized to conform to ASTM A653 Z275 zinc coating.

D. Paint system for wall corner steel exposed to the exterior. Factory applied silicone modified polyester or electrostatic-applied polyester powder coating in accordance with manufacturer's standard procedures. Minimum dry film thickness 1.0 mils. Color to be as selected by Architect from manufacturer's nine (9) standard wall colors.

E. Paint system for flat roof steel trim exposed to the exterior. Factory applied silicone modified polyester or electrostatic-applied polyester powder coating in accordance with manufacturer's standard procedures. Minimum dry film thickness 1.0 mils. Color to be as selected by Architect from manufacturer's twelve (12) standard trim colors.

F. Paint system for all window shutters, headers, jambs, and sills exposed to the exterior. Factory applied silicone modified polyester or electrostatic-applied polyester powder coating in accordance with manufacturer's standard procedures. Minimum dry film thickness 1.0 mils. Color to be as selected by Architect from manufacturer's twelve (12) standard trim colors.

G. Paint system for all protective wear plates exposed to the exterior. Factory applied silicone modified polyester or electrostatic-applied polyester powder coating in accordance with manufacturer's standard procedures. Minimum dry film thickness 1.0 mils. Color to be as selected by Architect from manufacturer's twelve (12) standard trim colors.

H. Paint system for all doors and door frames. Factory applied aliphatic urethane in accordance with manufacturer's standard procedures. Minimum dry film thickness 2.0 mils. Color to be as selected by Architect from manufacturer's twelve (12) standard trim colors.

I. Shop finish for all stair stringers, stair rails, guardrail, bar grate treads, bar grate roof surfaces, steel balconies, steel landings, ladders, and rappelling anchors. Steel shall be hot-dipped galvanized to conform to ASTM A123 after drilling, punching, cutting, bending and welding.

J. Shop finish for all other miscellaneous items including but not limited to access hatches, studs, sheeting, hat channels, and decking. Steel shall be galvanized to conform to ASTM A123.

K. Factory finish for roof hatches. Roof hatches shall be provided with manufacturer's standard factory-applied grey powder coat.

2.5 Standard Fire Fighting Simulator System

A. Weather Sealing

1. The footing channel for the building shall be placed over one sponge rubber strip, which shall seal the footing channel to the concrete foundation.
2. All exterior wall panels and vertical seams, which are metal-to-metal laps, shall be sealed with a continuous strip of sealer. The sealer shall not run, separate, or deteriorate with age.
3. All sealer shall be applied according to assembly drawings to form a weather tight structure.
4. The structural panel walls and structural panel roof system shall be weather tight upon completion.

B. Roof Systems

1. Structural Roof System
    a. The flat roof structure shall be a structural single panel roof system and shall consist of all metal panels, which are prefabricated, marked, and ready for assembly. The roof shall be constructed of not less than 14-gauge galvanized steel, roll formed into $7^1/_2$" deep compound corrugations, sealed with approved sealer, and connected together with $^3/_8$" diameter bolts, spaced not more than 6" apart for a weather tight seal, which forms a continuous draining system. Splices shall be completely capable of developing the entire bending moment capability of the panel.
2. "Safe Deck" Roof System
    a. Flat roof surfaces designated as working decks shall be a galvanized bar grate system. When specified, 19W-4, 1" x $^1/_8$" galvanized bar grate shall be provided with a 14-gauge galvanized support channel system and all required fasteners and anchoring devices. "Safe Deck" shall be

applied over the structural panel system, which forms a continuous draining roof system.

3. Parapet Roof System

    a. Flat roof surfaces designated as a parapet roof shall be a concrete working deck. The decks shall be a composite metal deck designed for concrete fill. The deck shall be supported on 14-gauge minimum structural "C's" placed 12" on center. The deck gauge shall be as designated by the deck manufacturer, G60 galvanized, to achieve the design loads. A minimum of 4" of concrete shall be installed over the deck to provide a smooth working surface. The concrete shall be reinforced with chopped strands of fiberglass to form a matrix to reinforce the concrete and protect from shrinkage and temperature cracking. The concrete shall be pitched toward parapet openings or to EDS as described in section 2.5 B.3.b. The concrete mix design and installation is not covered in this section.

    b. All exterior roof areas with parapet walls shall have concrete floors sloped to an Engineered Drainage System [EDS] The EDS consists of a "trench style" floor drain which is piped internally down to the first floor level and to the outside of the building. The floor drain shall have a removable bar grate cover that will allow the drain to be cleaned and flushed if necessary. (Concrete supplied by others).

C. Wall Systems

1. The structural steel panel shall be G90 hot-dipped galvanized, painted one side, steel, and conforming to the appropriate ASTM specification. The panels shall be roll formed from flat steel and shall have a minimum corrugation depth of $4^1/_2$". Panels shall be joined at their seams, which shall lap a minimum of $^1/_2$", and shall be held together with 3/8" bolts spaced not more than 6" center-to-center. All connection holes in the panels shall be factory pre-punched. Self-tapping fasteners are not acceptable. The vertical seams shall be sealed with a sealer. The wall panels of the building shall have sufficient shear resisting capabilities to give the building structural stability when vertical and horizontal loads are applied.

2. Framing for load bearing walls shall be a minimum of 12-gauge, hot-dipped, G90 galvanized "C's" placed 3'-5" center-to-center or 3"x 4"x $^1/_4$" prime painted structural tubing. All mounting plates at the bottom of each vertical shall be attached to the building foundation using the foundation anchor bolts.

3. Framing for interior non-load bearing walls shall be framed with $4^1/_2$", 18-gauge minimum, galvanized studs spaced a minimum of 24" on center. The face of the wall shall be minimum 18-gauge galvanized sheeting on both faces of wall to conceal stud framing.

D. Floor Systems

1. Floor shall be supported on structural "C's" placed 12" on center. The "C's" shall be a minimum of 14-gauge or heavier as designed by the building engineer.

"C's" shall be a minimum of 10" in depth nominally and G90 hot-dipped galvanized. There shall be weeps in the bottom of the "C's" for drainage of water. Headroom shall not be reduced with the use of structural beams and shall have a minimum floor to ceiling height of 8'-9" across the entire floor area.

a. All floor surfaces shall be a concrete working deck. The decks shall be a composite metal deck designed for concrete fill. The deck shall be supported on 14-gauge minimum structural "C's" placed 12" on center. The deck gauge shall be as designated by the deck manufacturer, G60 galvanized, to achieve the design loads. A minimum of 4" of concrete shall be installed over the deck to provide a smooth working surface. The concrete shall be reinforced with chopped strands of fiberglass to form a matrix to reinforce the concrete and protect from shrinkage and temperature cracking. The concrete shall be pitched toward doors and exterior walls or to EDS in the burn rooms above 1st floor as described in section 2.5 D.1.b. The concrete mix design and installation is not covered in this section.

b. All burn rooms floors above first floor shall have concrete floors sloped to an Engineered Drainage System [EDS] The EDS consists of a "trench style" floor drain which is piped internally down to the first floor level and to the outside of the building. The floor drain shall have a removable bar grate cover that will allow the drain to be cleaned and flushed if necessary. (Concrete supplied by others).

E. Access Openings

1. Steel Doors

a. Materials

1) Sheet face is to be made of commercial quality 11 gauge steel.

2) Reinforce top, bottom and sides of all doors with continuous steel channel not less than 3/16" thick, extending the full perimeter of the door and stitch welded to the face sheet.

b. Door Hardware

1) All doors shall have an operating lever latch with handles on the inside and outside of the door. All doors accessible from the ground shall have a key lock lever and shall be keyed alike.

2) Continuous hinge shall be 11 gauge with a 3/8" diameter pin and be stitch welded to the door face and bolted to the jamb 6" on center.

3) Each framed opening shall be provided with drip lip header.

4) Locksets conform to ANSI A156.2 Series 4000, Grade 2

a) All locksets shall be keyed alike.

5) Passage latches conform to ANSI A156.2 Series 4000, Grade 2

6) Strikes conform to ANSI A156.2

7) 4½" door pulls conform to ANSI A156.2

8) Auxiliary Springs conform to ANSI K87454

9) High-temperature door sweep supplied on all doors except control room doors and elevator shaft doors, if any, that do not rest on a stem wall.

2. Window Shutters

a. Materials

1) Sheet face is to be made of commercial quality 11 gauge steel.

2) Reinforce top, bottom and sides of all doors with continuous steel channel not less than 3/16" thick, extending the full perimeter of the door and stitch welded to the face sheet.

b. Window Hardware

1) All windows shall have an operating lever latch with handles on the inside and outside of the door. All windows accessible from the ground shall have a key lock lever and shall be keyed alike.

2) Continuous hinge shall be 11 gauge with a 3/8" diameter pin and be stitch welded to the door face and bolted to the jamb 6" on center.

3) Each framed opening shall be provided with drip lip header.

4) Locksets conform to ANSI A156.2 Series 4000, Grade 2

a) All locksets shall be keyed alike.

5) Passage latches conform to ANSI A156.2 Series 4000, Grade 2

6) Strikes conform to ANSI A156.2

7) 4½" door pulls conform to ANSI A156.2

8) Auxiliary Springs conform to ANSI K87454

F. Stair Systems

1. Stringers shall be 1½" wide channel, minimum MC10x8.4. Drill all required holes prior to hot-dip galvanizing.

2. Stair top rails shall be minimum 1½"x 1½"x 11 gauge square tubing. Mid-rails shall be ¾" solid steel rod. Distance between rails shall be a maximum of 12". Rails shall be a three-line design and shall be a completely welded assembly welded to the posts with all welds ground smooth, prior to hot-dip galvanizing.

3. Stair end posts and intermediate posts shall be minimum 1½"x 1½"x $^{3}/_{16}$" structural square tubing. Posts shall be a completely welded assembly welded to the stair stringer and rails with all welds ground smooth, prior to hot-dip galvanizing.

4. Stair treads shall be constructed of 19W-4, 1" x $^{3}/_{16}$" bar grate, hot-dipped galvanized steel with checker plate nosing. Intermediate stair landings, where

used, are to be identical to stair treads in design. The stair treads shall be bolted to the stringer to allow for ease of replacement of damaged treads.

G. Rail Systems

1. Top edge height of top rails shall be 42" plus or minus 3" above the walking/working level.
2. Top rails shall be minimum 1½"x 1½"x 11 gauge square tubing. Mid-rails shall be ¾" solid steel rod. Distance between rails shall be a maximum of 12". Rails shall be a three-line design and shall be a completely welded assembly welded to the posts with all welds ground smooth, prior to hot-dip galvanizing.
3. End posts and intermediate posts shall be minimum 1½"x 1½"x $^{3}/_{16}$" structural square tubing. Posts shall be a completely welded assembly welded to the toe board and rails with all welds ground smooth, prior to hot-dip galvanizing.
4. Toe board and kick plates shall be structural steel angle 4" x 6" x $^{5}/_{16}$" or 4"x $^{5}/_{16}$" flat bar welded to the railings prior to hot-dip galvanizing and bolted through the concrete deck or structural members.

2.6 Building Description

a. High Rise Five Story Tower Series provide Tower feature **Only** at 20'-9" W x 11'-8" L x 44'-0" max height.

PART 3 – EXECUTION

3.1 Examination

A. Verify that concrete work has cured a minimum of 14 days. Verify that anchor bolts are at the proper spacing and protrude the proper amount above the concrete. Report any variances to the owner's representative prior to proceeding with erection.

1. Concrete stem wall elevation must be within tolerance of +/- ¼".
2. Anchor bolts placement must be within tolerance of +/- $^{1}/_{8}$".

3.2 Installation

A. Comply with the respective manufacturer's recommendations for preparation of building components.

B. Comply with respective manufacturer's instructions and approved shop drawings.

3.3 Adjusting and Cleaning

A. Repair or replace damaged components.

B. Contractor shall properly maintain the site, collect all waste material, place all debris and waste in containers and remove from the site.

SECTION 22 00 00 – PLUMBING

PART I – GENERAL

1.1 TERMS AND CONDITIONS

A. The Plumbing Contractor shall provide all specified and miscellaneous material and labor as required for a complete and operating plumbing system in accordance with these drawings and specifications and the Contract Documents.

B. All work shall be in accordance with Florida Plumbing Code and all Local Codes and Requirements of local inspectors.

C. The Notice to Bidders, Instructions to Bidders, General Conditions, Supplementary General Conditions, Contract Documents and drawings all are part of these specifications.

D. The Contractor shall visit the site to familiarize himself with the existing conditions, the area in which the work is to be performed. If deemed necessary, investigate the subsoil conditions for excavation, prior to making a proposal.

E. Any permits, acreage or tap-on fees, etc., inspection and test charges required for the plumbing work shall be secured and paid for by the Plumbing Contractor.

F. The Plumbing Contractor shall be responsible for excavations performed under this contract, including backfilling and compaction, and replacement or pavement as required. Provide for temporary facilities as specified in General Conditions. Submittal shall include fixtures, valves and major items of equipment.

G. The Plumbing Contractor shall submit six (6) copies of shop drawings or submittal data for approval in accordance with requirements of the general conditions. Submittal shall include fixtures, valves and major items of equipment.

H. As used herein the following definitions shall apply: “Furnish” shall mean furnish and install; “Install” shall mean installation of items furnished by others.

I. The drawings are diagrammatic only and are not intended to show minor details and exact locations. Locations of pipes, ducts, electrical raceways, switches, panels, equipment, fixtures, etc. shall be adjusted to accommodate the work to interferences anticipated and encountered. Lines, whose elevation cannot be changed shall have the right of way. Lines required to pitch shall have right of way over those which are not required to pitch. Larger lines shall have right of way over smaller lines. Plumbing Contractor shall coordinate his work with other trades and drawings to insure smooth progress of work. It shall be this Contractor’s responsibility to call attention to any discrepancy in the drawings or specifications to avoid conflict. Plumbing in ceiling spaces shall be coordinated with ductwork.

J. All work shall be performed in accordance with U.S. Department of Labor, Occupational Safety and Health Standards.

K. The Plumbing Contractor shall refer to the General Conditions for provisions of temporary utilities required under this contract.

1.2 DRAWINGS OF RECORD

A. One complete set of Plumbing Drawings will be provided as record drawings, which shall be separate, clean, blue line prints reserved for the purpose of showing a complete picture of the work as actually installed.

B. The drawings shall also serve as work progress report sheets and the Contractor shall make any notations, net and legible, thereon daily as the work proceeds. The drawings shall be available for inspection at all times and shall be kept at the job site. Drawings shall include elevations of all buried work.

C. Upon completion of the work, these record drawings shall be signed by the Contractor, dated, and turned over to the Owner.

D. Connections to cold water and soil and waste lines shall be made at location as shown on the drawings.

E. All fixtures, floor drains, flush valves and traps to be set plumb and level.

F. Rough-in Piping: All fixtures shall be accurately roughed-in according to the manufacturer's installation dimension so that no offset adaptors flexible connection or other improvisions are necessary. All incorrect work shall be torn out and corrected and walls and floors patched.

G. Supervision and Superintendence: The Contractor shall, during the progress of the work, maintain a competent superintendent, who shall not be changed except if he proves unsatisfactory to the Contractor or to the Architect. Efficient supervision shall be given to the work.

H. Clean-up and Painting: In addition to the cleaning up required in the General Conditions, the Contractor shall, at the completion of the work, clean, polish, and/or wash all exposed items of materials, equipment, and fixtures in his contract so as to leave such items bright and clean.

I. Sterilizing and Flushing Piping System: All water piping shall be sterilized with chlorine, 50 parts per million, and held for a 24-hour period, after which the system shall be flushed prior to being put into service. During the flushing of the system, all flush valves shall be thoroughly flushed out to insure the removal of sediment, pipe dope, etc., from water lines and flush valves removing such working parts of the flush valves as may be deemed necessary.

J. Electrical Contractor shall make electrical connection to hot water heater.

K. Guaranty: See General Conditions.

PART II – PRODUCTS

2.1 MATERIALS

A. All materials shall be new and of the best quality in the price range specified. Equipment and materials herein specified by trade name indicate standard desired and is not intended to restrict competition.

B. All water piping shall be type "L" copper, with the type and manufacturer's name on each piece. Fittings shall be sweat solder wrought type copper or brass. Under no circumstances shall notching or mitering be permitted. Appropriate fittings shall be used for all turns, joints, or other arrangements.

C. Sanitary soil, waste and vent piping shall be Schedule 40 PVC-DWV pipe and fittings conforming to Table 505 of Volume II of the Standard Building Code and ASTM D 2665-73. Pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign matter and other defects. The pipe and all fittings shall be marked with the nominal pipe size and the symbol PVC.

D. Use only Solvent Cements meeting the requirements of ASTM D 2564-72 for solvent cements for PVC-DWV plastic pipe and fittings. Do not use thinners in conjunction with cement, or combination or aerosol cements.

E. Escutcheons: Use chrome-plated, spring type on all pipe passing through walls, ceilings or floors in finished areas. Those at floor shall be cast brass, chrome-plated, with set screw.

F. Joint compound: Use key-tite, blue seal or equal.

G. Stops: Use compression type, chrome-plated, angle or straight way pattern on all fixtures, hot and cold supply. On service sinks use brass gate valve as specified.

H. All hot water lines, including tees, elbows and crosses, etc. and all cold water lines located within 8-feet of the water heater shall be insulated. Insulation shall be rigid fiberglass piping insulation, 1-½" thick with an R-value of 3.5 per inch thickness. Fiberglass piping insulation shall have a white vapor barrier jacket. Jacket shall be foil-scrim-kraft laminate equivalent to Owens Corning 25 ASJ. Jackets shall be vapor sealed with continuous self-sealing lap strips. End joints shall be similarly sealed factory furnished butt strips with pressure sealing adhesive. Where required miter fiberglass piping insulation to form fittings, secure with number 20 gauge annealed steel wire. Seal all joints and seams with tape as recommended by manufacturer.

2.2 HANGERS, INSETS AND SUPPORTS

A. All piping in building shall be rigidly supported from the building structure by means of approved hangers and supports. Piping shall be supported to maintain required grading and pitching of lines, to prevent vibration, and to secure piping in place and shall be so arranged as to provide for expansion and contraction.

B. Spacing of hangers shall be not greater than the following:

1. Horizontal, PVC pipe – 4"-0" o.c.
2. Copper Tubing: 2" and larger – 10-'0" o.c., 1-½" and smaller, 6'-0" o.c.
3. Cast Iron: At every hub and 5'-0" maximum.

C. In addition, provide 2 hangers at each turn in horizontal line approximately 2 feet from fitting.

D. All hangers to be Fee and Mason, of the type listed below. Blw-Knox, Grinnell, or Modern of the same design will be acceptable. Copper water lines shall be supported only with copper hangers and straps.

E. Vertical runs of pipe shall have riser clamps or collars for support.

F. Pipe Anchors for Rough-in Use: Use "rapid rough" products as manufactured by Rapid Rough, P.O. Box 9052, Greensboro, North Carolina 27408 (UL listed). Use these for anchoring rough-in of all hot and cold water connections for all lavatories, sinks, and other wall-connected fixtures to hold pipes securely in alignment according to manufacturer's rough-in measurements. Remove these devices after the wall is built around pipes.

G. Valves: Gate, glove and check valves shall be as manufactured by Jenkins, Walworth, Fairbanks or Powell and selected in accordance with the following table:

1.	Gates:		
	a)	Jenkins	Figure 1242
	b)	Fairbanks	Figure 0282
	c)	Powell	Figure 1821-A
2.	Checks:		
	a)	Jenkins	Figure 122
	b)	Fairbanks	Figure 0680
	c)	Powell	Figure 1923
3.	Globes:		
	a)	Jenkins	Figure 1200
	b)	Fairbanks	Figure 0582
	c)	Powell	Figure 1826

H. Unions in screwed pipe shall be ground joint with brass seat. Unions in copper and brass shall be 125# ground joint.

I. Air Chambers: Provide at each fixture, not less than 18" in length and of the same diameter as the supply.

2.3 DRAINAGE AND VENT LINES

A. Soil, waste and vent stacks of sizes shown shall be run as indicated on the drawings and shall extend above the roof. All extensions above the roof shall be made according to Code and as detailed on the drawings. Soil, waste and vent stacks shall be run in chase and suspended above ceilings where indicated. Vertical vent pipes shall be connected together into one main vent stack or riser above the fixtures and vented as indicated.

B. Branch vent lines shall be free from drops or sags and be graded and connected so as to drip back into the soil or waste pipe by gravity. Where vent pipes connect to the horizontal soil or waste pipe, the vent branch shall be taken off above the centerline of the pipe and the vent pipe extended vertically or at an angle of 45 degrees to the vertical before off-setting or connecting to vent.

C. Vents from any fixture or line of fixtures, when connected to a vent line serving other fixtures, shall be extended at least 6" above the flood level rim of the highest of such fixtures to prevent use of the vent line as a waste.

D. Horizontal drainage piping shall be installed in practical alignment at the grade as shown on the drawings, but in no case less than a uniform grade of ¼" per foot for 3" pipe and smaller; not less than 1/8" per foot for 4- to 8-inch pipe.

E. Fittings: Changes in pipe size on soil, waste and drain lines shall be made with reducing fittings or recessed reducers. All changes in direction shall be made by the appropriate use of 45-degree wyes, half wyes, long-sweep ¼ bends; 1/6, 1/8 or 1/16 bends, except that sanitary tees may be used in soil and waste lines when the change in direction or flow is from the horizontal to the vertical, and on the discharge from water closets. Where it becomes necessary because of space conditions to use short-radius fittings in any other location, the approval of the Architect shall be obtained before they are installed. No change in direction of flow greater than 90 degrees shall be made. Where different sizes of drainage pipes or pipes and fittings are to be connected, standard increasers and reducers of proper size shall be used. Reduction of the size of drainage piping in the direction of flow is prohibited.

F. Union connections: Slip joints will be permitted only in trap seals or on the inlet side of the traps. Tucker or Hub drainage fittings shall be used for making union connections wherever practicable. The use of long screws and bushings is prohibited.

G. Drilling and tapping of house drains, soil, waste, or vent pipes, and the use of saddle hubs and bands are prohibited.

H. Cross-connection on any fixtures, devices, or construction which will permit backflow connections between a water distribution system and any part of the drainage system shall not be installed.

I. Only new piping will be allowed for waste piping. Waste pipe having paint, varnish or putty will not be acceptable.

2.4 JOINTS

A. All piping shall be made permanently gas and watertight. Any fitting or connection which has an enlargement, chamber, or recess with a ledge or shoulder of reduction of the pipe area that offers an obstruction to flow through the pipe shall not be installed.

B. PVC-DWW Waste and Vent Pipes: Installation and joining technique shall be as described in ASTM D 2665-73. All joints shall be square cut and all pieces shall be seated to the bottom of the fitting socket. In no case shall stress be applied to the joint for offsetting the pipe. No combination or aerosol cements shall be used. All fittings and cements shall bear the seal of approval of the NSF. All defective joints and fittings shall be removed and replaced.

C. Soldered or Bronzed Joints: Joints 1-¼" and larger shall be made with silver solder, for joints less than 1-¼" and all valves (regardless of size) use 95/5 solder. Also, use a non-corrosive paste flux in accordance with manufacturer's instructions. All joints shall be thoroughly cleaned with emery cloth and reamed out before assembly. Acid core

solder will not be permitted. Care shall be taken to prevent annealing of fittings and hard drawn tubing when making connections.

D. Test: Soil pipe shall be filled with water to the roof and shall be gas and water tight. Water lines shall be tested with 100 psi of pressure for two hours without loss of pressure. This test shall be approved by the plumbing inspector.

E. Plumbing Contractor shall be responsible for all openings for his work. Chases, sleeves, insert, etc., shall be located and General Contractor advised of any framing, furring, cutting, recessing, etc. required. At the proper time as the work progresses to avoid damage to completed work or others, and at all times cooperate with the General Contractor and the other trades to expedite the work. Where all plumbing pipes pass through walls or floors, use galvanized pipe sleeve of size large enough for insulation. Furnish sleeves to the General Contractor and locate them properly in time for building them in place as the building progresses.

F. Since the plans are diagrammatic only and not intended to show all details, the Plumbing Contractor shall make any necessary adjustments or changes to avoid beams, fittings, piers, vents, columns or other obstructions without additional cost to Owners.

G. The entire system shall be accepted as a unit. There will be no partial acceptance.

H. Remove all debris, rubbish and leftover materials resulting from the plumbing work. Excess dirt shall be distributed on lot, or removed as directed by the Architect.

2.5 FOAMED PLASTIC PIPE INSULATION

A. Foamed plastic tubing shall have a minimum density of 4.5 pcf. Thermal conductivity shall not exceed 0.28 at 75 degrees F mean temperature.

B. Apply and secure insulation and seal all joints with Armaflex 520 adhesive so as to maintain a continuous vapor barrier. On piping, do not split the insulation longitudinally except at branch fittings where it cannot be avoided.

2.6 DOMESTIC WATER HYDRANTS

A. Hydrants shall be as listed for each item in the Plumbing Fixture Schedule as shown on Sheet P-001.

2.7 GRINDER PUMP

A. See civil documents for grinder pump lift station.

PART III – EXECUTION

3.1 WORKMANSHIP AND INSTALLATION

A. Workmanship to be of first rate quality, performed by experienced and skilled craftsmen.

B. All piping to be concealed in finished areas, either in pipe space provided, or in walls. Piping to be fit snugly to walls or ceilings.

C. All plumbing work shall be coordinated with the building construction, so all will be finished together.

D. Close and protect open ends of piping until final connections are made. Such closing shall be made with fittings which cannot be easily removed. Caps or plugs shall be required at all times during construction so that no pipes are left open at the end of any day's work, even though continuation is expected the next day.

E. Piping shall extend to all fixtures, outlets, and equipment from the main service. Cold water system shall be installed with the fall toward the shut-off valve. Outlets shall be capped or plugged as shown on the drawings and left ready for future connections. Mains, branches and runouts of hot and cold water piping shall be as indicated on the drawings. Pipe shall be cut accurately to measurements established at the building by the Contractor, and shall be worked into place without springing or forcing. Care shall be taken when cutting so as not to weaken the structural portion of the building. Piping above the ground shall be run parallel with lines of the building unless otherwise shown or noted on the drawings.

F. Service pipe, valves and fittings shall be kept a sufficient distance from the other work and other services to permit not less than 1-½" between finish covering and other work and not less than 1-½" between finish covering and the different services, except where detailed otherwise on drawings.

G. Changes in pipe sizes shall be made with reducing fittings. Use of long screw and bushings will not be permitted. Allowance shall be made throughout for expansion and contraction of pipe. Horizontal runs of pipe over 50 feet in length shall be anchored to wall or to the supporting construction about midway the run to force expansion, evenly divided, toward the ends.

H. All water mains shall be pitched at least 1" in 25 feet toward drain valves, and branches shall drain toward fixtures. The piping installation shall be arranged so that the entire system can be drained through accessible valves at low points or fixture supply connections.

I. Unions shall be installed at the connections to each piece of equipment to allow removal of equipment without dismantling connected piping.

J. Plumbing Contractor shall be held responsible for any damage to any work, installed by others, caused by leaks or improper installation of the piping system. The Contractor shall coordinate his work with that of the heating and Electrical Contractor and, where interferences occur, shall procure approval from the Architect before installation of the work.

K. All fixtures shall be free from imperfections, true as to line, angles, curves, color. Installations shall have smooth watertight joints, complete in every respect. All fixtures shall be in perfect working order.

L. It shall be the responsibility of this Division to guarantee proper selection and coordination of all fittings and parts relating to each fixture.

M. Wall hydrants shall be mounted flush to exterior wall and all interior domestic water piping serving hydrants shall be concealed in wall.

3.2 INSULATION FOR PIPING

A. Insulate all piping with insulation with material as indicated in Part II.

END OF SECTION 22 00 00

SECTION 23 00 00 – HEATING and AIR CONDITIONING

PART I – GENERAL

1.1 TERMS AND CONDITIONS

A. The Contractor shall refer to the plans, General Conditions, supplementary General Conditions, Instructions to Bidders, and Addenda, all of which are a part of the Heating and Air Conditioning System Specifications.

1.2 DRAWINGS

A. The drawings and specifications are complementary and what is called for in one shall be as binding as if called for in both.

1.3 AS INSTALLED DRAWINGS

A. The Mechanical Contractor shall familiarize himself with general construction portion of the plans, especially the foundation plan and foundation wall and pier layout. If changes are made in the routing of pipe, ducts or the location of apparatus from that shown on the drawings. The Contractor shall furnish "as installed" drawings to the Architect and Owner, showing the true location of pipes, ducts, or apparatus.

1.4 CODES

A. All work shall conform to the requirement of the Southern Standard Building Code, Volume III, latest amendments, and the requirements of the local inspector.

B. Where applicable, materials for electrically operated apparatus shall have Underwriter's Laboratory approval or UL Re-examination listing.

1.5 OBJECTIONABLE NOISE and VIBRATION

A. Mechanical and Electrical equipment shall operate without objectionable noise or vibration, as determined by the Architect.

B. If such objectionable noise or vibration should be produced and transmitted to occupied portions of the building, the Contractor shall make the necessary changes and additions, as approved, without extra cost to the Owner or Architect.

1.6 SCOPE OF WORK

A. The Scope of Work is a brief outline of the work, including in the Heating and Air Conditioning Contract, but is not intended to cover every item in detail.

1. Ducts, fans, etc.
2. Pipes, valves, fittings and specialties, as required.
3. Insulation.
4. Automatic control system.
5. Cutting and patching.
6. Wiring.

7. Painting.
8. Air conditioning and heating units.
9. Bases and supports for all equipment.
10. Coil condensate drainage piping.
11. Refrigerant piping and insulation.

1.7 INSTRUCTION OF OPERATING PERSONNEL

A. The Contractor shall instruct the maintenance personnel in the proper operation of each piece of apparatus, as well as the complete system.

B. All services required of factory representatives or specialized servicemen to check, test, or start, or put the system into proper operation shall be supplied by the Contractor.

C. Three (3) bound sets of instruction books for the operation, repair, or maintenance of the equipment shall be given to the Owner. A copy of the transmittal letter to the Owner shall be forwarded to the Engineer.

1.8 OWNER'S REQUIREMENTS

A. This Contractor shall work closely with the Owners at all times during the installation of the heating and air conditioning equipment.

1.9 ELECTRICAL VOLTAGE

A. The electrical system will be as shown on the drawings.

1.10 GUARANTEE

A. All work on this project to be in accordance with the guarantee stipulated under the General Conditions.

B. At the completion of the job the Contractor shall send a letter to the Architect stating that he has personally checked the control system observed its operation and found the complete system installed and functioning satisfactorily and in accordance with the plans and specifications.

1.11 EXISTING SERVICES

A. When encountered in work, protect, brace, support existing active sewer, water, gas, electric, or other services, where required for proper execution of work.

PART II – PRODUCTS

2.1 EQUIPMENT IDENTIFICATION AND LABELING

A. Attach aluminum name plate having etched lettering and black enameled background or engraved laminated plastic plate with self-tapping screws to the cover, or in a prominent location, on each safety switch, motor starter and on the corresponding apparatus served. Plate shall identify the equipment or equipment being served.

2.2 ELECTRICAL CONNECTIONS

A. The Mechanical Contractor shall furnish and install all electrical connections to HVAC equipment from disconnect switches installed by Electrical Contractor.

B. Each new motor or apparatus shall have a disconnect switch as noted on the drawings, located where indicated. A single pole switch shall be used for small motors less than 1/6 h.p. and requiring 120-volts.

1. Wires:
   a. Power - Type THW
   b. Control and ground - Type TW

2. Conduit:
   a. Electrical Metallic Tubing (EMT)

3. Connection to motors or vibrating equipment:
   a. Dry Areas - Flexible steel conduit
   b. Damp Areas - Flexible watertight conduit

4. Outlet Box:
   a. Exposed - Cast

C. All motors shall have thermal overload protection for the full rating of the motor. Motors 5 h.p. and larger shall have thermal protection on each phase.

D. All equipment shall be grounded to the conduit system. Wires shall be color-coded the same as required for the electrical system of the building.

2.3 MATERIALS AND APPARATUS

A. The following describes the materials and apparatus required for the project and is intended to describe quality and type of equipment. Any miscellaneous equipment required for proper operation, mounting or support, but not specifically mentioned, shall be furnished at no additional cost to the Owner or Architect.

B. All materials shall be new and of size and capacity as shown on the drawings.

C. Specific trade names or catalog numbers of manufacturers are mentioned in the specifications or drawings to establish a degree of quality and not intended to limit competition.

D. Where catalog numbers are used, they refer to the first manufacturer listed under "make".

E. Before any material is ordered, the Contractor shall submit a complete list of materials in six copies and six (6) sets of cuts or certified prints of the apparatus he proposed to use. Each cut or drawing shall be clearly marked, as to job name, catalog number, size, capacity, materials, etc. of the equipment submitted, and shall bear a note stating that the Contractor has checked the material and found it to meet the requirements of the specifications. Otherwise, the Contractor shall install the materials as specified.

F. Specified modification of apparatus shall be noted on submittals. Capacities, electric requirements, etc. of submitted material at condition shown on the drawings or specifications shall be shown clearly.

G. All material lists for approval shall be submitted at one time within 30 days after award of the contract.

H. Partial lists will not be acted upon.

I. All shop drawings shall be submitted at one time.

J. Where the phase "or equal" appears, it shall mean "equal material, as previously approved by the Architect."

K. Where any special make of fixture or materials are specified by plate number or trademark, deliver to the building with original labels or other identification marks placed thereon by the manufacturers and do not remove until inspected and approved.

2.4 SLEEVES

A. All pipes passing through walls, floors, or ceilings shall pass through pipe sleeves made from schedule 40 steel pipe.

B. Motors ½ h.p. and larger shall be ball bearing, with hand-operated grease cups, or alemite hydraulic lubriguard fittings. Motors having belt drive shall be mounted on an adjustable motor mount.

C. All motors shall have circuit breaker and thermal overload protection, sized for the full load rating of the motor, and low voltage protection.

D. Motors shall be rated at 40 degrees C temperature rise, and 40 degrees C ambient temperature.

E. Make: Westinghouse, General Electric, Wagner Electric, or equal.

2.5 VIBRATION CONTROL EQUIPMENT

A. Vibration isolators shall be used for each fan, motor, blower, etc. to limit the transmission of vibration to the surrounding structure to a maximum of 10% or an efficiency of 90%.

B. The Contractor shall submit, along with the cuts of the isolators, a statement showing the vibration control equipment used for each piece of equipment and the efficiency of the mounting system.

2.6 DUCTWORK

A. All ducts shall be the size as shown on the drawings, unless structural conditions or head room makes this impossible. Changes in shape of duct shall be made at an angle to 20 degrees or less. Elbows shall have an inside radius of 1-½ times the duct width. If this is not possible or, if shown on the drawings, turning vanes shall be used.

B. No pipe or conduit shall pass through duct without written permission of the Architect.

C. Volume or splitter dampers shall be installed where shown and necessary to control the air flow.

D. Ducts shall be made of galvanized steel gauge in accordance with the recommendations of the latest edition of the ASHRAE guide. Alternate, deduct for fiberboard ductwork with R-6 value may be used. See Sheet M-1. Flexible duct may be used on individual diffuser runs which do not exceed 5 feet in length.

E. Ducts larger than 30" shall be cross broken.

F. All traverse joints shall be fastened together with pocket slip joint and sheet metal screws on 8" centers.

2.7 DUCT HANGERS

A. 1 x 1/16" galvanized steel strips installed near each traverse joint, but not over 6' on centers. Hangers shall be attached to the sides of the duct with at least two sheet metal screws per hanger, or on 8" centers.

B. Hangers shall extend to bottom of duct and turn under at least 3: and be fastened to bottom of duct with sheet metal screw.

C. Ducts wider than 30" shall be supported on galvanized steel angles, suspended from the ceiling or building structure by ¼" rod. Rods shall be threaded to allow vertical adjustment of the hanger. Maximum spacing of hangers shall be 48".

2.8 DAMPERS

A. Splitter or butterfly dampers shall be installed where shown on the drawing and as required for proper control of air flow.

B. Damper operator and end bearing shall be riveted to duct with rubber gasket beneath to prevent air leakage. Maximum blade width shall be 8" otherwise multi-blade or louvered dampers shall be used.

C. Splitter Damper: 690 self-locking splitter damper assembly with 609 Ventlok damper and bearings, 3/8" rod, damper hardware clips.

D. Miscellaneous hardware shall be of equal quality.

E. Make: Ventfabrics, Inc., Young Regulator, Barber–Colman or equal.

F. Where ducts are insulated, regulator shall be mounted on elevated bracket equal to thickness of insulation.

2.9 TURNING VANES

A. Style: Airturns with mounting plates.

B. Make: Barber-Colman, Tuttle & Bailey, Carnes, or equal.

C. Turning vanes shall be used on all duct turns.

2.10 FLEXIBLE DUCT CONNECTIONS

A. Flexible fabric connection shall be used on duct connection to apparatus to prevent equipment vibration from being transmitted to the duct work. Materials shall be fire-resistant and UL-approved. Flexible connections shall be made on both the supply and return ducts for each air-handling unit.

B. Flexible fabric: Ventfab 20 oz. Waterproof and fire-resistant, UL-approved.

C. Make: Ventfabrics, Inc. or equal.

2.11 DUCT INSULATION

A. Provide duct liner and insulation as noted on drawings.

2.12 CONDENSATE DRAIN

A. Style: Schedule 40 PVC.

2.13 TEMPERATURE CONTROL SYSTEM

A. Furnish and install a system of electric temperature control as called for on drawings. This system shall be installed complete in all respects by competent mechanics, regularly employed by the Mechanical Contractor. All 24V electric wiring necessary for the proper operation of the temperature control system shall be performed by the Mechanical Contractor. Power wiring, i.e. 120-208V, shall be installed by the Electrical Contractor.

2.14 HEATING AND COOLING UNITS

A. Furnish and install a two-piece, split system air-conditioning and heating system, factory-tested and ready to operate as manufactured by Carrier Corporation as specified on the drawings. Equal systems by Trane, Bryant, Lennox are acceptable subject to capacity compliance and dimensional considerations. Do not substitute other manufacturer's equipment without prior approval from the Owner.

2.15 EXHAUST FANS

A. Furnished and installed as indicated on the drawings and schedule on the drawings.

2.16 FIRE DAMPERS

A. Provide fire dampers at all penetrations through fire rated walls, floors and partitions. Fire dampers shall comply with the requirements of UL 555, 6th Edition, and damper type shall be as follows:

   a. Type 'A' with blades and blade channels in the air stream for use behind sidewall registers and grilles.
   b. Type 'B' with blades out of the air stream for rectangular ductwork passing completely through walls, floors and partitions.

c. Type 'C' with blades and blade channels out of the air stream for round and flat oval ductwork passing completely through walls, floors and partitions.

B. Fire dampers shall be rated as either static (for use in HVAC systems that are automatically shut down in the event of a fire), or dynamic (for use in HVAC systems that are operational in the event of a fire), as appropriate for the application.

C. Fire dampers manufactured by Prefco, Nailor, Ruskin or Air Balance will be acceptable.

2.17 LOUVERS

A. Furnished and installed as indicated on the drawings and scheduled on the drawings.

B. Fixed louvers shall be 4 inch deep, all-welded construction and fabricated from 0.125 inch thick extruded aluminum alloy 6063-T6. Blades shall be slanted at approximately 45 degrees and shall feature an integral rain water baffle. If required due to blade length, concealed intermediate blade supports shall be provided. Louver frame shall be channel style unless otherwise indicated. Louvers shall be fitted with a 1/2" mesh 16 gauge aluminum bird screen in a detachable aluminum frame.

C. Finish shall be Duranar Kynar 500 in a color selected by the Architect. The pressure drop and water entrainment performance ratings shall be certified by the manufacturer in accordance with the AMCA Certified Ratings Program and each louver shall bear the AMCA Seal.

D. Performance ratings shall be as follows:
   a. Maximum static pressure drop at 600 FPM velocity through free area - 0.05" wg.
   b. Zero water penetration at up to 700 FPM velocity through the free area.
   c. Minimum free area in relation to gross overall area - 47%.

PART III – EXECUTION

3.1 CLEANING SYSTEM

A. Upon the completion of each system, the system and all connected apparatus shall be flushed and cleaned to remove oil, grease, sand or other impurities or foreign matter.

B. Condensate shall be wasted until it appears clean.

C. New ducts shall be cleaned of all foreign matter prior to acceptance of the project by the Owner.

3.2 CUTTING AND PATCHING

A. The Contractor shall do all cutting and patching required for the proper installation of his equipment. If cutting will harm the structure or mar the appearance, consult the Architect for approval before proceeding. Patching shall meet the approval of the Architect.

B. Patching in the building shall match the existing surface as near as possible.

3.3 TESTING

A. The Contractor shall adjust and calibrate each piece of equipment, so it will function properly with the completed system. After the system is complete, it shall be test operated under normal conditions. The Contractor shall run the system through all normal operating cycles or sequences. Any apparatus found not functioning properly shall be adjusted or replaced and the test repeated until proper performance is attained.

B. If the performance of the system or any apparatus is found questionable by the Architect, the Contractor shall make all tests required to verify its performance. Where possible, the tests shall be made as recommended by standard test Codes or standard procedures acceptable to the industry.

C. Copies of all data collected, as well as the results, shall be supplied to the Architect, along with a written description of the test procedure.

D. Leaks or defects shall be repaired by re-making the joint or replacing defective equipment.

E. Duct system shall be balanced for proper distribution of air. After final adjustment, the Contractor shall measure the system in the presence of the Architect, and furnish a report stating the measured cfm at each outlet.

F. Electrical insulation leakage test using a megohmmeter, shall be made on all power and control wiring installed by the Contractor. All apparatus and wiring devices shall be in place when test is made.

G. All apparatus, and labor necessary to make the specified tests during installation, or to make performance verification tests, shall be furnished by the Contractor.

H. The Architect shall be given notice prior to starting the tests so they may be witnessed.

I. Before requesting final inspection, the Contractor, or an Officer of the Contracting Company, shall personally inspect the system to check the operation, to check the quality of workmanship and to see that all items have been completed, including cleaning, painting and labeling, in accordance with the intent of the plans and specifications. After he has satisfied himself that the installation is complete, he shall state in a letter to the Architect that he has checked the installation, that it is complete and that it is ready for final inspection.

3.4 NOTICE OF TEST

A. The Contractor shall make preliminary tests to be sure the systems are tight and conform with the tests as stated above. After he is sure the tests are satisfactory, he shall notify the Architect that the test is ready for inspection. The Architect will then arrange a time for the test to be demonstrated.

3.5 PAINTING

A. Equipment furnished by the Contractor in a finished painted condition shall be clean and free from scratches, blemishes, or rust spots. If not, it shall be cleaned or repainted.

B. This Contractor shall paint all materials and apparatus furnished or installed by him on the project. This includes all rooftop and side wall exhaust fan hoods. Color as selected by the Architect.

C. The Contractor shall paint new pipe and/or insulation so designated, with colors to follow the National Color Coding recommendations.

D. The following color scheme for other items shall be used:

1. Piping, conduit, equipment supports, valve body – Black H-5.
2. Mounting Boards – Lt. Tan H-28
3. Valve handles, operating handles – Orange 1151.
4. Switches, starters, gutters, or machinery bases – Dark Grey.
5. Bare ferrous metal – Black Asphaltum.

Make: Rust Oleum, Sherwin-Williams, Glidden or equal.

E. Do not cover nameplates, exposed threads, wrench marks or other breaks in galvanized surfaces shall be covered with red lead and given 2 coats of paint.

F. All canvas-coated insulation shall be given 2 coats of sizing in preparation for piping.

3.6 INSTALLATION OF FIRE DAMPERS

A. Install all fire dampers per manufacturer's recommendations and connect for operation.

B. All fire dampers shall be field tested to verify they are fully operational.

C. Seal all joints in ductwork with a fire retardant sealant. Tape is not acceptable.

3.7 INSTALLATION OF LOUVERS

A. Install all louvers per manufacturer's recommendations and connect for operation.

B. Field verify the actual dimensions of the openings for louvers and bring any discrepancies from that shown on the drawings to the attention of the Architect prior to ordering the louvers.

END OF SECTION 23 00 00

SECTION 26 00 00 – ELECTRICAL

PART I – GENERAL

1.1 TERMS AND DEFINITIONS

A. Terms: The following definitions of terms are applicable to the Electrical Drawings and Specifications.

1. Provide: As used herein shall mean "furnish, install and connect complete".

2. Wiring: As used herein shall mean "wire or cable, installed in raceways with all required boxes, fittings, connectors and accessories, completely installed".

3. Work: As used herein shall be understood to mean the materials completely installed, including the labor involved.

4. Power Wiring: Wiring which supplies the electrical current, which flows through a connected motor.

I. 1.2 DRAWINGS AND SPECIFICATIONS

A. The Contractor shall familiarize himself with the architectural, structural, and mechanical drawings and specifications and shall coordinate and adapt his work to the building as required by these drawings and specifications.

B. The equipment, conduit and device locations are approximate and any changes to clear obstructions shall be made as approved by the A/E at no additional cost to the Owner and any work to complete the system, or which may be fairly implied, shall be provided.

C. The electrical drawings are generally diagrammatic design drawings and not intended to indicate all the details of the work to be performed.

D. The electrical drawings and specifications shall jointly govern the installation. Any conflicts, discrepancies, or variances shall be called to the attention of the A/E for remedial instructions before the work is installed.

1.3 SUBMITTALS

A. Shop Drawing List: Submit six (6) sets of shop drawings and/or schedules of the following equipment for review:

1. Branch Circuit Panelboards
2. Distribution Panelboards
3. Safety Switches and Motor Starters
4. Lighting Fixtures
5. Fire Alarm System

B. The following items, as a minimum, shall be turned over to the A/E for the Owner at the time final inspection is held:

1. Certificates of Inspection and Approval from authorities having jurisdiction.

2. Written Guarantee.

3. One complete set of shop drawings, including a copy of all data prepared by manufacturers detailing operation and maintenance instructions on all equipment requiring maintenance.

1.4 CONTINUITY OF SERVICE

A. Electric Service to all existing equipment and apparatus and all existing lighting in the building shall be continuous and uninterrupted during the course of the construction, except as approved by the Owner. Shutdown time for the installation of new service and feeders, or work on the existing apparatus shall be prearranged and scheduled with the Owner.

B. All work shall be done at such time and in such manner as to cause minimum inconvenience to the Owner.

C. The Contractor shall make all arrangements with the electrical utility company for disconnecting the existing electric service and for connecting the new electric service and metering equipment.

D. Upon request, the Contractor shall submit in writing a detailed description of the procedure to be followed in making the cutover, including estimated outage times, for approval by the owner.

1.5 APPARATUS AND OTHER TRADES

A. Install all manual and magnetic starters and contactors that are not integral with equipment, including those furnished under other divisions.

B. Mechanical equipment control devices, such as thermostats, firestats and similar devices for equipment controlled by magnetic starters and contactors, are to be furnished and installed under another division. The power wiring provided under this division for equipment not controlled by magnetic starters or contactors shall also include wiring through manual line voltage control devices, such as thermostats and firestats, furnished and mounted under another division.

C. Provide all power wiring to equipment as shown on the drawings and according to approved wiring diagrams furnished by the respective trades and provide safety switches or motor starters as noted on the electrical drawings. Power wiring shall include correct phase connections for proper motor shaft rotation and shall include wiring through all control devices furnished under another division.

D. All electric motor and electric heater sizes and locations indicated are approximate. Make connections to equipment as actually installed. Before connecting to any piece of such equipment, check the nameplate data against the information shown on the drawings and notify the A/E if any discrepancies are discovered.

E. Ventilation: Make all electrical connections to exhaust fans required for proper operation.

1.6 UTILITY COMPANY AND METERING EQUIPMENT

A. The Contractor shall make all arrangements with the utility company for the installation of the electric service and metering equipment.

B. The utility company will furnish the metering equipment for installation by the Contractor. The installation of the electric service and the metering equipment shall be in accordance with the regulations of the utility company and shall be subject to approval by the utility company.

C. The Contractor shall furnish any other additional items of equipment and shall perform any items of work needed to meet the requirements of the utility company.

1.7 CODES, ORDINANCES, PERMITS AND FEES

A. Codes and Ordinances:

1. The installation included under this Division shall comply with the latest amended editions of the National Electrical Code and the Electrical Code of the municipality having jurisdiction.

B. Permits and Fees:

1. Obtain and pay for all taxes, fees, permits and licenses, and give all notices, pay all fees, and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn or specified.

2. Deliver to the A/E for the Owner the official receipts of the proper authorities certifying that all taxes, fees, permits and licenses to which the work under this Division is subject have been paid.

3. Furnish the A/E (for the Owner) with certificates of inspection and final approval from all authorities having jurisdiction.

1.8 FINAL TESTS AND ACCEPTANCE OF COMPLETE INSTALLATION

A. Distribution Equipment Test:

1. In general, tests shall determine whether circuit breaker trip devices are functioning properly and are correctly adjusted; control and interlock systems are performing as specified; contact surfaces and joints in switches and circuit breakers have a minimum electrical resistance; all bolted connections are tight and bus bars properly braced

2. In general, the bus duct test shall determine whether the insulation resistance is within limits and that all bolted joints are properly braced.

B. System Tests:

1. Upon completion of the work, test the individual systems, including all feeders, service branches, outlets, lighting, motors, apparatus and appliances for operation.

2. Provide all instruments, labor and materials required by the A/E for any essential intermediate and final test designated. Tests shall indicate full compliance with specifications, drawings and applicable codes.

3. These tests shall not alter the Contractor's guarantee of the equipment. All work and materials found to be in non-compliance with the Contract Documents shall be replaced and re-tested by the Contractor at no additional cost to the Owner.

C. Guarantee and Review:

1. The electrical installation shall be made by competent mechanics under the supervision of a foreman, all of whom shall be duly certified by local authorities.

2. Furnish the A/E for the Owner a written guarantee, countersigned by the General Contractor, stating that if any workmanship or material executed under this Division proves defective within one (1) year after final acceptance, such defects and all other work damaged thereby shall be made good by him without charge.

PART II - PRODUCTS

2.1 IDENTIFICATION AND NAMEPLATES

A. Provide nameplates for the equipment as scheduled with the designation shown on the drawings etched on the plate along with the supply voltage rating to distribution panel and branch circuit panel mains.

B. Nameplates shall be white core "bakelite" with surface color and letter height as specified herein. Letter shall be block style.

C. Nameplates for equipment from the non-essential (normal) supply voltage shall be black and equipment served from the essential (emergency) supply shall be red. Equipment served only by the emergency alternator shall be yellow.

D. Schedule: The following letter size shall be provided for each piece of following equipment.

Branch Circuit Panelboards	¼"
Distribution Panelboards	¼"
Circuit Breakers in Distribution Panelboards	3/16"
Safety Switches and Motor Starters	3/16"
Individually Enclosed Breakers	3/16"
Time Switches	3/16"

2.2 RACEWAYS

A. Definitions:

1. Concealed Conduit: Conduit installed above suspended ceilings or within new walls.

2. Exposed Conduit: Conduit exposed to view.

B. Protection: Secure conduits in place and protect to prevent damage to the work during construction. Plug ends of all conduit runs with cork, oakum, or “Push-Pennies” to avoid filling with mortar and debris.

C. Electrical Metallic Tubing:

1. Electrical metallic tubing shall be of best quality steel, of standard pipe size, smooth inside and out, and shall be hot-dipped galvanized.

2. All connectors and couplings for electrical metallic tubing shall be of the all steel, raintight, compression type or of the all steel, concrete tight, set screw type.

3. All electrical metallic tubing entering panel cabinets, outlet boxes, pull boxes or equipment enclosures shall be provided with an all steel Appleton, T & B, RACO, or Steel City insulated throat connector or insulating bushings added to the connector.

4. Electrical metallic tubing installed in outdoor locations (exposed to weather) shall be provided with raintight, compression connectors and couplings.

D. Liquidtight Flexible Conduit: Shall be PVC jacketed flexible metal conduit.

E. Flexible Metal Conduit: Shall be hot-dipped galvanized steel conduit.

F. Non-Metallic Conduit:

1. Material: Type 40, heavy wall rigid, polyvinyl chloride conduit.

2. Accessories: Fittings, couplings and bends shall be of the same manufacture as conduit.

2.3 WIRE AND CABLE

A. Quality Assurance:

1. Standards: Specified conductor gauge sizes refer to American Wire Gauge.

B. Color Coding:

1. 208/120 volts, 3∅, 4-wire system: Ungrounded conductors: 1 black, 1 red and 1 blue. Ground (neutral) conductor: 1 white (or gray). Grounding conductors shall be green.

2. Branch circuit wiring (#8 and smaller) shall be color coded by continuous insulation color and feeders and services (#6 and larger) shall be color coded at all junction or pull points (except LB's or LBD's) using color markers or plastic tape manufactured for the purpose.

C. Conductors:

1. Conductor Material: Conductors shall be copper, 98.5% conductivity.

2. Insulation Type: Except as otherwise noted on the drawings or specified herein all wire shall be 00 volt, N.E.C. Type "THW", "THHN-THWN" or "XHHW".

3. Minimum size: No wire shall e smaller than No. 12 unless so noted on the drawings or specified herein.

D. Accessories:

1. Wire Joint shall be screw-on wire connector (wire nut).

2. Tap Connectors shall be H-Type compression tap and shall have insulating covers.

3. Two-way Cable Connectors shall be tin plated, solid copper, long barrel compression type.

4. Cable lugs shall be tin-plated, solid copper, long barrel, two-hole compression type.

5. Heat Shrinkable Cable Insulation Sleeves shall be installed over all two-way connectors after the connection is made.

E. Preparation:

1. Lubricant: No grease, oil or lubricant other than powdered soapstone or pulling compound, UL listed and compatible with conductor insulation, shall be used to facilitate the pulling of wires.

2. Raceway: Raceways shall be free of concrete, moisture or foreign matter. Raceways shall be swabbed before pulling wire.

2.4 OUTLET BOXES AND JUNCTION BOXES

A. Job Conditions:

1. Protection: Anchor boxes to formwork. Provide protection to prevent entry of concrete.

2. Sequencing, Scheduling: Location of outlets shown on the drawings are relative and approximate. Exact locations shall be determined on the job and the outlets set according to architectural drawings, dimensions, and building conditions. The right is reserved to change the exact location of any switch, ceiling outlet or other outlet before it is permanently installed.

B. Outlet Boxes and Junction Boxes:

1. Standard Outlet Boxes and Junction Boxes and covers shall be galvanized steel not less than 1/16 thick, adapted to use and location, kind of fixtures to be used, and number, size and arrangement of conduits connecting thereto.

2. Ceiling Outlet Boxes:

a. Boxes shall be 4" octagonal or 4-11/16" square when required due to number of wires.

b. Provide 3/8" fixture studs where required.

c. Outlet boxes in the slab shall be 4" deep minimum. Provide plaster ring and cover where required.

3. Wall Outlet Boxes (Flush Mounted):

a. Concrete Block Walls: Outlet boxes shall be 2-1/8" deep, 4" square box, with raised 4" square-cut device cover through block. Masonry boxes 3-1/2" deep (minimum) may also be used for concrete block walls. Note: Route conduit in block void to outlet box.

b. Sheet Rock Walls: Outlet boxes shall be 2-1/8" deep, 4" square box with raised, 4" square device cover.

c. Concrete Walls and Columns or Stucco/Plaster Walls: Outlet boxes shall be 2-1/8" deep, 4" square box with raised, 4" square device cover.

d. Concrete Block Walls with Metal Furring and Sheet Rock: Outlet boxes shall be 2-1/8" deep, 4" square box with 4" square extension ring through block of sheet rock. Note: Route conduit in block void to outlet box.

e. Tile Walls: Similar to sheet rock walls except with 1" (minimum) raised, 4" square-cut tile wall device cover.

C. Outlet Boxes (Exposed Conduit):

1. Outlet boxes or junction boxes used with exposed conduit shall be 2-1/8" deep, 4" square box with ½" raised square cover.

D. Where more than two (flush or surface mounted) switches or receptacles occur at the same location, 2-1/2" deep gang boxes with raised gang box covers shall be used.

E. Junction Boxes: Junction boxes shall be provided with blank covers.

F. Pull Boxes:

1. Pull boxes shall be not less than the minimum size required by the National Electrical Code and shall be constructed of code-gauge sheet steel.

2. Pull boxes shall be furnished with removable screw-fastened covers. Where several feeders pass through a common pull box, the feeders shall be tagged to indicate the electrical characteristics, circuit number and panel designation.

G. Face Plates:

1. Material: Face plates for wall mounted devices in the building shall be white color nylon, smooth design.

2. Type: Plates shall be standard size: "Jumbo" plates are not acceptable.

2.5 WOOD BACKBOARDS

A. Wood:

1. Backboards shall be made of ¾" Grade B-C plywood.

B. Treatment:

1. All wood backboards shall be pressure impregnated with fire protective chemicals to provide fire hazard classification in tests of 30-minute duration. The flame spread shall not be over the equivalent of 25 with no evidence of significant progressive combustion as tested by Underwriter's Laboratories, Inc. and shall be so labeled. After treatment, backboards shall be kiln-dried to a maximum moisture content of 12%.

C. Paint:

1. Finish painting to be compatible with fire retarding treatment. Color shall be light gray.

2.6 SWITCHES & RECEPTACLES

A. Quality Assurance:

1. Wiring devices shall comply with NEMA Standard Publication WD-1, 1974.

2. All special purpose receptacles shall be NEMA Standard configuration.

3. All devices shall be white.

2.7 BRANCH CIRCUIT PANELBOARD

A. Quality Assurance:

1. Panels and branch breakers shall be as follows:

Manufacturer	208/120V, 3∅ 4W
General Electric	Type AQ
Square-D	Type NQOD
Westinghouse	Pow-R-Line 2

Siemens Type SI

2. Panels shall be factory-assembled.

B. Submittals:

1. Shop drawings shall indicate enclosure size, gutter space, breaker frame sizes and trips, and main bus type and rating.

C. Branch circuit panels shall be of the dead front type with lugs in the mains, or with main breaker, as indicated on the drawings, and shall bear the UL label.

D. Panel main and branch bus shall be copper, of the voltage rating shown on the drawings. Ampacity shall be not less than the rating of the overcurrent device feeding the panel.

E. Provide an insulated neutral bus where indicated for four-wire service and provide a ground bus bonded to the panel enclosure. Provide lugs for all incoming branch neutrals and grounding conductors.

F. Provide branch circuit breakers and spaces as indicated in the panel board schedule on the electrical drawings. The main and branch circuit breakers shall have a minimum short circuit interrupting capacity of 10,000 amperes R.M.S. symmetrical or as indicated on the electrical drawings. Branch breakers shall be "bolt-on". ("Plug-in" type breakers are not acceptable) Multiple pole breakers shall have internal common trip.

G. Branch circuit panels shall be mounted in enclosing cabinets, consisting of a galvanized steel box with door and trim. The door shall have a cylinder lock and catch and all locks shall be keyed alike. The cabinets shall be flush or surface mounted as indicated on the drawings and shall be of size to allow a minimum gutter space of at least 4" on each side around the panel and 6-1/2" at the top and bottom.

2.8 DISTRIBUTION PANELBOARDS

A. Quality Assurance:

1. Distribution panelboards shall be Square-D "HC-I-LINE" with I-LINE circuit breakers.

B. Submittals:

1. Shop drawings shall indicate enclosure size, gutter space, circuit breaker frame sizes and trip ratings, main bus type, voltage, current and short circuit rating.

C. Distribution panelboards shall be dead front safety type panelboards equipped with thermal magnetic molded case circuit breakers of frame size and trip rating as shown on distribution panel schedule on the drawings.

D. Panelboard main and branch bus shall be copper of the voltage and current ratings as scheduled on the drawings. Distribution panelboard rating shall be established by heat rise tests with maximum hot spot temperature on any connector at bus bar not to exceed 50°C rise above ambient. Heat rise test shall be conducted in accordance with

Underwriters' Laboratories, Inc., Standard UL-67. Use of conductor dimensions will not be accepted in lieu of actual heat tests.

E. Distribution panelboards shall be provided with a copper ground bar bonded to the panel enclosure and with an insulated neutral bus where indicated for four wire service. Provide lugs for connection of incoming feeder and branch circuit ground connections.

F. Circuit breakers shall be equipped with individually insulated, braced and protected connectors. The front face of all circuit breakers shall be installed flush with each other and all provisions for future circuit breakers shall be such that no additional connectors will be required to add the circuit breakers. The continuous trip unit rating of each circuit breaker shall be identifiable without having to removal panel trim or cover and the circuit breaker tripped indication shall be shown by the breaker handle taking a position between "on" and "off".

G. Branch circuits shall be numbered down each side of the panel with odd numbers on the left and even numbers on the right and large, permanent individual circuit numbers shall be attached to each circuit breaker in a uniform position. A white core bakelite nameplate with surface color and letter height as specified shall be attached adjacent to each circuit breaker and shall describe the equipment controlled.

H. Each panelboard as a complete unit shall have a short circuit rating equal to or greater than the circuit breaker short circuit interrupting capacity ratings shown on the distribution panel schedule on the drawings.

I. The panelboard interior assembly shall be dead front with panelboard front removed and branch circuit load connections shall be changeable without exposing any lineside bussing or line terminals. Main lugs or main breakers shall have barriers on five sides and the barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the mains shall have barriers.

J. The panelboard assembly shall be enclosed in a steel cabinet, the rigidity and gauge of steel shall be as specified in UL Standard 50 for cabinets and the size of wiring cutters shall be in accordance with UL Standard 67. Cabinets shall be equipped with spring latch and tumbler lock on door of trim. Doors over 48" long shall be equipped with three-point latch and vault lock and all locks shall be keyed alike. Panel fronts shall be full-finished steel, with rust-inhibiting primer and gray baked enamel finish.

2.9 SAFETY SWITCHES AND MOTOR STARTERS

A. Quality Assurance:

Manufacturer	Safety Switches	Motor Starters
General Electric	Type "TH"	"200 LINE"
Westinghouse	Type "H-600"	Class "200"
Square D	Type "HD" Class	"8536/8338"
ITE	"Heavy Duty"	Class SXL, SCN/SCF

B. Safety Switches:

1. Safety switches shall be NEMA Type "HD", with quickmate, quickbreak contacts and external operating handle with interlocking cover. Safety switches shall be

rated for the system voltage and shall have the number of poles and ampere rating as indicated on the electrical drawings. Safety switches shall be fusible or non-fusible as indicated on the electrical drawings.

2. Enclosures shall be NEMA-1 for indoor locations and NEMA-3R for outdoor locations. Enclosures shall have a factory-applied gray enamel finish.

3. Fuses:

   a. Fuses shall be of the ampere rating indicated on the electrical drawings.

   b. Fuses shall be dual element, U.L. Class RK1, cartridge type with time delay and shall be Bussman "Low-Peak" or Chase-Shawmut "Amp-Trap".

C. Motor Starters:

1. Magnetic starters or combination magnetic starters shall be full voltage, non-reversing and of the type, rating and number of poles as indicated on the electrical drawings.

2. Line voltage magnetic starters shall have melting allow type thermal overload relays sized to protect the motor as actually installed and shall have protection for all phases. Provide auxiliary contacts, including a N.O. holding circuit interlock wiring, as specified under Division 15, Mechanical, or as indicated on the electrical drawings. Control coils for three-phase magnetic starters shall be rated 120 volts. Single phase motor starters shall have a dual voltage, 120/240-volt coil. Provide factory wired "hand-off-automatic" switch in front of motor starter enclosure.

3. All three-phase motor starters shall have a control power transformer with fused 120-volt secondary.

4. Enclosures shall be NEMA-1 for indoor locations and NEMA-3R for outdoor locations. Enclosures shall have factory-applied gray enamel finish.

2.10 LIGHTING

A. Lighting Fixtures:

1. Lighting fixtures shall be as described in the "Lighting Fixture Schedule" on the electrical drawings.

2. All recessed fixtures shall be compatible with ceiling construction where they are to be installed. Contractor shall determine requirements for plaster frames and flanges before ordering fixtures.

3. All fixtures used with inverted T-bar suspension systems shall be supported by the suspension system. Fixtures shall be securely fastened to the ceiling framing members by T-bar grid clips identified for use with type of framing members and fixtures.

4. Provide suspended fixtures with single stem, adjustable, swivel hangers (one each end) and unless otherwise indicated on the drawings, hang to 10'0" from bottom of fixtures to finished floor. Support suspended fixtures indicated to be mounted under A/C duct on galvanized steel channel secured from ceiling slab.

2.11 LIGHTING CONTROLS

A. Interior Lighting Controls:

1. Interior lighting controls shall be as specified in the electrical drawings.

B. Exterior Lighting Controls:

1. Exterior lighting controls shall be as specified in the electrical drawings.

PART III - EXECUTION

3.1 MATERIALS INSTALLATION AND STORAGE

A. Materials and Apparatus:

1. Materials used in this work, which are included in Underwriters' Label Service, shall be new and bear the Underwriters' Laboratories Inc. label. Materials not included in Underwriters' Label Service shall be new and conform to NEMA or other applicable industry standards. All material shall be the best quality of their respective kinds, full weight and standard in every way and satisfactory to the Owner.

2. All apparatus for the various systems shall be rated for the voltage of the system.

B. Installation:

1. All manufactured articles, materials, apparatus, and equipment shall be applied, connected, erected, used, cleaned, and conditioned as recommended by the manufacturer.

2. The Contractor shall make field measurements to ascertain space requirements, including those for connection, and shall order such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the Contract Documents.

3. All equipment shall readily fit the space indicated on the drawings.

4. All equipment and apparatus normally requiring maintenance shall be made easily accessible.

5. Equipment shall be introduced into the building at such times and in such manner as to cause no damage to the structure.

C. Storage: Materials and equipment shall be so stored as to ensure the preservation of their quality and fitness for the work. Stored materials and equipment shall be located so

as to facilitate prompt inspection. All items subject to moisture damage shall be stored in dry, heated spaces.

D. Protection:

1. Equipment shall be tightly covered and protected against dirt, water, or chemical, or mechanical injury or theft.

2. At completion of work, fixtures, equipment and materials shall be cleaned and polished thoroughly and turned over to the Owner in a condition satisfactory to the A/E.

3. Equipment or apparatus, which has become damaged or has defects shall be repaired or replaced prior to final payment.

3.2 CUTTING AND REPAIRING (ALSO SEE GENERAL REQUIREMENTS)

A. Cutting, repairing, and fitting of the electrical work shall be done by the Contractor for the installation of the electrical system as described in the Contract Documents. Do not cut work of other trades without their explicit consent and arrangement for repairs.

B. All cutting and repairing of walls, floors and ceilings shall be subject to supervision and approval by the A/E.

C. Existing walls, floors and ceilings shall be restored to a finished appearance and quality to match existing after the installation of any electrical equipment or device.

3.3 EXCAVATING AND BACKFILLING

A. Do all trenching, excavating and backfilling required for the electrical work indicated on the drawings, including repairing, shoring, bracing and pumping.

B. Backfilling shall be done in layers of 12" fill, wetted down and tamped for each consecutive layer to grade. Refer to Section 02200, Earthwork for compacting requirements.

C. Repairing of paved or sodded areas shall be comparable to work cut and shall be subject to approval by the A/E.

D. The Contractor shall locate and avoid any existing facilities during excavation and shall give written notification of any unforeseen condition.

3.4 CONDUIT AND RACEWAY INSTALLATION

A. The conduit sizes indicated on the drawings may be increased to facilitate the pulling of cable.

B. Provide junction boxes or pull boxes to avoid excessive runs or too many bends between outlets.

C. Grout around all conduits passing through walls.

D. Provide a No. 16 gauge steel pulley wire in all empty metallic conduits. Provide nylon pull cord in all empty PVC conduits.

E. The conduit installation shall follow the layout indicated on the drawings.

1. All conduit shall be concealed unless specified otherwise or indicated on the drawings. Concealed conduit shall be run above the suspended ceiling or within new walls.

2. Run exposed conduit parallel with or at right angles to the building walls.

3. Exposed conduits shall be run tight against the ceiling and offset below obstruction, unless otherwise indicated on the drawings.

4. Conduits shown exposed at ceiling and connected to outlets or boxes in new walls shall be concealed in wall from ceiling down to outlet.

5. Exposed conduits shall not be supported from any of the Telephone Company's cable racking or auxiliary framing.

F. Schedule:

1. Electrical metallic tubing and fittings shall be used for the raceway system except as otherwise specified herein or otherwise shown on the drawings.

2. Conduits run underground or below floor slabs on grade shall be Schedule 40, heavy wall rigid PVC conduit. Lay underground conduits at a minimum depth below grade of 24" unless specifically indicated otherwise. Provide warning tape over all underground conduits or over each vertical tier when conduits are grouped in same trench.

G. Sizes:

1. No homerun conduit shall be smaller than ¾".

2. No conduit shall be smaller than ½".

3. No bends shall be made with a radius less than six (6) times the diameter of the conduit nor more than 90°.

H. Apparatus Connections:

1. Where connections are to be made to equipment and motors that are not located near a wall or column, a vertical conduit attached to the floor and ceiling shall be installed and the wiring brought out of this conduit by means of condulets.

2. Connections to vibrating equipment such as electric motors, transformers and duct heaters shall be made with a short length of liquid tight flexible conduit.

3.5 SUPPORTING DEVICE INSTALLATION

A. Spacing and Attachment: Support exposed conduit from walls or ceilings, at intervals required by the National Electrical Code, but not to exceed intervals of 2'0" for non-metallic conduit and 5'0" for electrical metallic tubing with approved galvanized iron clamps or hangers. Devices attached to masonry or slabs shall be secured with inserts or lead expansion sleeves.

B. Exposed conduit run vertically up walls or columns shall be supported using two hole pipe straps directly on the wall or column.

C. Support surface metal raceway and firmly fasten to wall when raceway enters outlet box and at intervals not to exceed 12".

D. PVC conduit used in the grounding system shall be supported using nylon bolts in pipe straps or with all nylon conduit supports and hangers. PVC conduit used in the grounding system shall not be totally encircled by metal.

3.6 INSTALLATION OF WIRE AND CABLE

A. No conductors shall be pulled until conduit system is complete.

B. Conductors shall be pulled without damage to conductor or insulation. Provide pull boxes to facilitate pulling of wire.

C. No conductors shall be pulled unless insulated bushings or insulated throat connectors have been installed as specified.

D. Circuit Work: Make necessary joints in circuit work at the outlets with wire joints. Soldered joints shall not be used.

E. Fixture Connections: Leave at each fixture outlet a loop or end of wire not less than 8" long for connections to fixtures.

3.7 INSTALLATION OF OUTLET BOXES AND RECEPTACLES

A. The Contractor shall check the location of all wall outlets, including light fixtures, receptacle and switch boxes, to see that the outlet will clear any obstruction that may be encountered. The Contractor shall notify the A/E immediately if any conflict is noted.

B. New Construction: Install <u>all</u> outlet boxes in new construction flush with all or ceiling finish.

C. Architectural Placement: Outlets occurring in architectural features shall be centered. Install all wall switch outlets an equal distance from door trims on the strike side of doors.

D. Provide a standard galvanized steel outlet box and raised device cover or plaster ring where required for all flush mounted wall and ceiling light outlets, wall switches and wall receptacles:

1. Outlet boxes shall be anchored in place.

2. Where outlet boxes are installed in unfinished concrete walls or columns, a 1" deep device cover shall be provided and the box and cover set in position before the concrete is poured so that the concrete will fill around the device cover.

3. Where outlet boxes are installed in brick walls or stucco/plaster walls, the same procedure as for concrete shall be followed and the mason will fill in around the device cover with mortar, stucco or plaster.

E. Face Plates: Face plates shall be provided for all wiring devices, and all telephone outlets. Where more than one flush mounted wall outlet occurs at the same location, provide a multigang box and cover with one faceplate.

F. Receptacles:

1. Provide 6" long pigtail green ground wire from grounding lug at all grounded type receptacles to a bonding device on the conduit or the outlet box. Ground wire shall not be connected to screw which attaches receptacle to outlet box.

2. Provide 6" pigtail ("T" connection) and extend from neutral conductor of receptacle circuit being routed through outlet box and connect to neutral lug of grounding type receptacle.

G. "Tele-Power" Poles": Support tele-power poles from ceiling structure with 3/8" diameter threaded rod. Attach threaded rod to power pole hangar clamp and attach hangar clamp to ceiling "T" – bar grid structure.

3.8 INSTALLATION OF WOOD BACKBOARDS

A. Provide backboards for motor starters, safety switches and wiring gutters as indicated on the electrical drawings.

B. Provide backboards for telephone equipment and terminal connections as indicated on the drawings.

3.9 INSTALLATION OF PANELBOARDS, SAFETY SWITCHES AND MOTOR STARTERS

A. Provide distribution panels and branch circuit panelboards where indicated on the drawings complete with circuit breakers and spaces.

B. The top of panelboard trim shall be at the same height above the floor throughout the buildings and no breaker handle shall be higher than 6'6" above the floor.

C. Provide safety switches and motor starters complete with all accessories, where indicated on the drawings.

D. Motor starter overload elements shall be coordinated with the actual motor as installed.

E. Provide fuses for all fusible equipment as indicated on the drawings.

3.10 INSTALLATION OF LIGHTING FIXTURES

A. All lighting fixtures shall be installed, wired, connected to current source, and provided with lamps.

B. Provide lighting fixtures at all light outlets and where otherwise indicated on the drawings or as specified herein.

C. Furnish and install one complete set of lamps for all fixtures installed.

D. The lighting system shall be coordinated with the ceiling system, refer to Division entitled "Acoustical Treatment" or "Suspended Ceiling Systems".

3.11 INSTALLATION OF LIGHTING CONTROLS

A. Install all lighting control devices per manufacturer's recommendations, including wiring and programming systems, and connect for operation. Ensure that all sensing equipment is calibrated to the full range of visibility.

B. All lighting control systems shall be field tested to verify lighting control systems are fully operational.

3.12 FIRE ALARM SYSTEM

A. Install ionization smoke detectors surface mounted on underside of ceiling or as otherwise indicated on the electrical drawings.

B. At no additional cost to the Owner, shift location of detectors 5'0" in any direction from the approximate location shown on the drawings to comply with the following:

1. In no instance shall a detector be located directly in front of an air conditioning supply diffuser unless it is at least 4'0" from the diffuser.

2. Detectors shall be located away from piping and A/C ducts and be visible from the floor.

C. Install air duct smoke detectors in the return air duct and supply air duct as indicated on the electrical drawings. Coordinate installation with mechanical.

D. Install remote alarm lamps 12" above door.

E. Preliminary Testing: Wiring shall be checked and tested by the Contractor in accordance with the instructions provided by the manufacturer to ensure that the system is free of grounds, opens, shorts and that insulation resistance between current carrying conductors is 10 megohoms or greater.

F. Final Testing and Adjustment: A factory-trained technician shall perform all final tests and check adjustments and described in NFPA-72, and as required for certification of the fire alarm system.

END OF SECTION 26 00 00

ITEM C-102: TEMPORARY AIR AND WATER POLLUTION, SOIL EROSION, AND SILTATION CONTROL

DESCRIPTION

102-1. This item shall consist of temporary control measures as shown on the plans or as ordered by the Resident Project Representative (RPR) during the life of a contract to control pollution of air and water, soil erosion, and siltation through the use of silt fences, berms, dikes, dams, sediment basins, fiber mats, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

Temporary erosion control shall be in accordance with the approved erosion control plan; the approved Construction Safety and Phasing Plan (CSPP) and AC 150/5370-2, *Operational Safety on Airports During Construction*. The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

Temporary control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

Temporary control measures shall be designed, installed and maintained to minimize the creation of wildlife attractants that have the potential to attract hazardous wildlife on or near public-use airports.

MATERIALS

102-2.1 Grass. Grass that will not compete with the grasses sown later for permanent cover per Item T-901shall be a quick-growing species (such as ryegrass, Italian ryegrass, or cereal grasses) suitable to the area providing a temporary cover. Selected grass species shall not create a wildlife attractant.

102-2.2 Mulches. Mulches may be hay, straw, fiber mats, netting, bark, wood chips, or other suitable material reasonably clean and free of noxious weeds and deleterious materials per Item T-908. Mulches shall not create a wildlife attractant.

102-2.3 Fertilizer. Fertilizer shall be a standard commercial grade and shall conform to all federal and state regulations and to the standards of the Association of Official Agricultural Chemists.

102-2.4 Slope drains. Slope drains may be constructed of pipe, fiber mats, rubble, concrete, asphalt, or other materials that will adequately control erosion.

102-2.5 Silt fence. Silt fence shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months

of expected usable construction life. Silt fence shall meet the requirements of ASTM D6461.

102-2.6 Other. All other materials shall meet commercial grade standards and shall be approved by the RPR before being incorporated into the project.

CONSTRUCTION REQUIREMENTS

102-3.1 General. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

The RPR shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved.

102-3.2 Schedule. Prior to the start of construction, the Contractor shall submit schedules in accordance with the approved Construction Safety and Phasing Plan (CSPP) and the plans for accomplishment of temporary and permanent erosion control work for clearing and grubbing; grading; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the RPR.

102-3.3 Construction details. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the plans and approved CSPP. Except where future construction operations will damage slopes, the Contractor shall perform the permanent seeding and mulching and other specified slope protection work in stages, as soon as substantial areas of exposed slopes can be made available. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

Where erosion may be a problem, schedule and perform clearing and grubbing operations so that grading operations and permanent erosion control features can follow immediately if project conditions permit. Temporary erosion control measures are required if permanent measures cannot immediately follow grading operations. The RPR shall limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent control measures current with the accepted schedule. If seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified as directed by the RPR.

The Contractor shall provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment as directed by the RPR. If temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or

directed by the RPR, the work shall be performed by the Contractor and the cost shall be incidental to this item.
The RPR may increase or decrease the area of erodible earth material that can be exposed at any time based on an analysis of project conditions.
The erosion control features installed by the Contractor shall be maintained by the Contractor during the construction period.
Provide temporary structures whenever construction equipment must cross watercourses at frequent intervals. Pollutants such as fuels, lubricants, bitumen, raw sewage, wash water from concrete mixing operations, and other harmful materials shall not be discharged into any waterways, impoundments or into natural or manmade channels.
102-3.4 Installation, maintenance and removal of silt fence. Silt fences shall extend a minimum of 16 inches (41 cm) and a maximum of 34 inches (86 cm) above the ground surface. Posts shall be set no more than 10 feet (3 m) on center. Filter fabric shall be cut from a continuous roll to the length required minimizing joints where possible. When joints are necessary, the fabric shall be spliced at a support post with a minimum 12-inch (300-mm) overlap and securely sealed. A trench shall be excavated approximately 4 inches (100 mm) deep by 4 inches (100 mm) wide on the upslope side of the silt fence. The trench shall be backfilled and the soil compacted over the silt fence fabric. The Contractor shall remove and dispose of silt that accumulates during construction and prior to establishment of permanent erosion control. The fence shall be maintained in good working condition until permanent erosion control is established. Silt fence shall be removed upon approval of the RPR.

METHOD OF MEASUREMENT

102-4.1 Temporary erosion and pollution control work required will be performed as scheduled or directed by the RPR. Completed and accepted work will be measured as follows:

a. Temporary seeding and mulching will be measured by the square yard (square meter).

b. Temporary slope drains will be measured by the linear foot (meter).

c. Temporary benches, dikes, dams, and sediment basins will be measured by the cubic yard (cubic meter) of excavation performed, including necessary cleaning of sediment basins, and the cubic yard (cubic meter) of embankment placed as directed by the RPR.

d. All fertilizing will be measured by the ton (kg).

e. Installation and removal of silt fence will be measured by the linear foot (meter).

102-4.2 Control work performed for protection of construction areas outside the construction limits, such as borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor.

BASIS OF PAYMENT

102-5.1 Accepted quantities of temporary water pollution, soil erosion, and siltation control work ordered by the RPR and measured as provided in paragraph 102-4.1 will be paid for under:

Item C-102-5.1 – TEMPORARY AIR AND WATER POLLUTION, SOIL EROSION, AND SILTATION CONTROL – per lump sum

Where other directed work falls within the specifications for a work item that has a contract price, the units of work shall be measured and paid for at the contract unit price bid for the various items.
Temporary control features not covered by contract items that are ordered by the RPR will be paid for in accordance with Section 90, paragraph 90-05 *Payment for Extra Work*.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5200-33 *Hazardous Wildlife Attractants on or Near Airports*

AC 150/5370-2 *Operational Safety on Airports During Construction*

ASTM International (ASTM)

ASTM D6461 *Standard Specification for Silt Fence Materials*

United States Department of Agriculture (USDA)

FAA/USDA Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM C-102

ITEM C-105: MOBILIZATION

105-1 Description. This item of work shall consist of, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

105-2 Mobilization limit. Mobilization is limited to 10% of the total contract value.

105-3 Posted notices. Prior to commencement of construction activities, the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster "Equal Employment Opportunity is the Law" in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL "Notice to All Employees" Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

105-4 Engineer/RPR field office. An Engineer/RPR field office is not required.

METHOD OF MEASUREMENT

105-5 Basis of measurement and payment. Based upon the contract lump sum price for "Mobilization" partial payments will be allowed as follows:

a. With first pay request, 25%.

b. When 25% or more of the original contract is earned, an additional 25%.

c. When 50% or more of the original contract is earned, an additional 40%.

d. After Final Inspection, Staging area clean-up and delivery of all Project Closeout materials as required by Section 90, paragraph 90-11, *Contractor Final Project Documentation,* the final 10%.

BASIS OF PAYMENT

105-6 Payment will be made under:

Item C-105-6.1 – MOBILIZATION – per lump sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Office of Federal Contract Compliance Programs (OFCCP)

Executive Order 11246, as amended

EEOC-P/E-1 – Equal Employment Opportunity is the Law Poster

United States Department of Labor, Wage and Hour Division (WHD)

WH 1321 – Employee Rights under the Davis-Bacon Act Poster

END OF ITEM C-105

ITEM C-106: MAINTENANCE AND PROTECTION OF TRAFFIC

DESCRIPTION

106-1.1 GENERAL. This work shall consist of maintaining aircraft and vehicular traffic and protecting the public from damage to person and property within the limits of and for the duration of the Contract.

The following additional items are specifically included without limiting the generality implied by these Specifications and the Plans:

Restoration of all surfaces disturbed as a result of the Contractor's operations.

Installation, maintenance and removal of temporary access roads and haul roads. Construction of permanent access roads and maintenance and repair of existing access roads.

Installation and maintenance of permanent or temporary fences and access gates, if required.

Installation, maintenance and removal of temporary barricades, warning signs, hazard markings, displaced runway markings, runway closure markings.

Installation, maintenance and removal and temporary lights and lighting circuits.

Installation, maintenance and removal of barricade lights.

Cleaning and maintenance of all paved areas, including affected portion of main highways, and any dust control measures that may be necessary.

Supplying of gate monitor, runway crossing guards and observers, and radios if necessary.

Restoration of staging areas, borrow pits, and haul roads outside of the grading limits in accordance with Items T-901, and T-905.

Removal of temporary or interim runway and taxiway markings to the satisfaction of the Engineer and Owner.

MATERIALS

106-2.1 AIRPORT LOW PROFILE BARRICADES. Barricades used for the temporary closures of taxiways or aprons shall meet the requiremetns of the notes and details in the Plans. Barricades supplied to the Owner (if requried by the Contract), shall be low profile Model NAV-PVC2310 as manufactured by Nuebert Aero Corp. of Tampa Florida, Multibarrier (AR10x96 HDPE SPN) with solar powere light, or equal. Sixty (60) barricades shall be provided to the Owner at the end of the proejct per this Contract.

They shall be provided with alternating high reflective white and orange tape stripes, three way State DOT approved red lights, and always extended orange flags at least 12 inches square. Barricades shall be securely held in place by means of sand bags or other approved means. Barricades shall be routinely inspected to replace damaged units and to replace batteries. Barricades shall be provided and maintained as needed.

106-2.2 TYPE III LIGHTED BARRICADES. Where required, barricades used for the temporary closure of vehicle roadways shall be Type III lighted barricades in accordance with FDOT design standards index 600. Barricades shall be securely held in place by means of sand bags or other approved means. Barricades shall be routinely inspected to replace damaged units and to replace batteries. Barricades shall be provided and maintained as needed.

106-2.3 TEMPORARY RUNWAY CLOSURE MARKERS.

106-2.3-1.1 L-893, Raised-Lighted "X" Runway Closure Markers. The contractor shall supply one set (two each – total) of raised lighted temporary runway closure markers. One set (two each) of raised lighted X's shall be provided by the Owner/Airport. The Contractor shall operate & maintain all of these "X"s for the entire duration of the Contract.

The Contractor supplied "X"s shall conform to the requirements of AC 150/5345-55A and be certified under AC 150/5345-53C. X's shall be Halibrite model RCM-D, or approved equal**.** Approval shall be obtained through the shop drawing review process. The ideal placement location is over the runway designation numeral or, if required by construction acitivty, within 250' of the runway end.

106-2.3-1.2 Laydown (Unlighted) "X" Runway Closure Markers. Unlit runway closure markers laid on the ground are required for this project. The ideal placement location is over the runway designation numeral or, when required by construction activity, just off the runway end. The temporary "X" marker shall be per Figure 25 of AC 150/5340-1K, and shall be constructed of an easily removable material such as plywood, plastic, or fabric. If the materials are not secured by their own weight, then sandbags or other suitable anchors shall be used to keep the temporary "X" securely in place. The Engineer shall approve the materials being used prior to placement. The Airport will provide laydown runway closure markers at the Contractor's request.

METHOD OF MEASUREMENT

106-3.1 Payment for maintenance and protection of traffic will be made on a lump sum basis. The lump sum shall include all items required to satisfy this Specification and the requirements of the Plans as they relate to Maintenancea & Protection of Traffic.

BASIS OF PAYMENT

106-4.1 The lump sum price bid for maintenance and protection of traffic shall include all equipment, materials and labor necessary to adequately and safely maintain and protect aircraft and vehicular traffic.

In the event the contract completion date is extended, no additional payment will be made for maintenance and protection of traffic.

Progress payments will be made for this item in proportion to the total amount of contract work completed, less any deductions for unsatisfactory maintenance and protection of traffic.

No payment will be made under maintenance and protection of traffic for each calendar day during which there are substantial deficiencies in compliance with the Specification requirements of any subsection of this Item as determined by the Engineer.

The amount of such calendar day non-payment will be determined by dividing the lump sum amount bid for maintenance and protection of traffic by the number of calendar days between the date the Contractor commences work and the date of completion as designated in this proposal, without regard to any extension of contract time.

If the Contractor fails to maintain and protect traffic adequately and safely for a period of 24 hours, the Owner shall correct the adverse conditions by any means it deems appropriate and shall deduct the cost of the corrective work from any monies due the Contractor. The cost of this work shall be in addition to the liquidated damages and non-payment for maintenance and protection of traffic listed above.

However, where major nonconformance with the requirements of this Specification is noted by the Engineer and prompt Contractor compliance is deemed not to be obtainable, all contract work may be stopped by direct order of the Engineer regardless of whether corrections are made by the Owner as stated in the paragraph above.

Payment will be made under:

Item C-106-4.1 - MAINTENANCE AND PROTECTION OF TRAFFIC – per lump sum

END ITEM C-106

ITEM C-108

PROJECT SURVEY, STAKEOUT, AND RECORD DRAWINGS

1.0 DESCRIPTION

1.1 Under this item, the Contractor shall do all necessary surveying required to construct all elements of the Project as shown on the Plans and specified in the Proposal and Specifications. This shall include but not be limited to stakeout, layout and elevations for pavements, structures, forms, and appurtenances as shown and required, consistent with the current practices and shall be performed by competently qualified personnel acceptable to the Engineer. The stakeout survey shall proceed immediately following the award of the Contract and shall be expeditiously progressed to completion in a manner and at a rate satisfactory to the Engineer. The Contractor shall keep the Engineer fully informed as to the progress of the stakeout survey. All survey work shall be provided under the direction of a licensed land surveyor.

2.0 MATERIALS

2.1 All instruments, equipment, stakes and any other material necessary to perform the work satisfactorily shall be provided by the Contractor.

All stakes used shall be of a type approved by the Engineer. It shall be the Contractor's responsibility to maintain these stakes in their proper position and location at all times.

Record drawing deliverables shall meet the requirements of the sections 126-4.1 and 126-4.2 as applicable to the project.

3.0 CONSTRUCTION DETAILS

3.1 The Contractor shall trim trees, brush, and other interfering objects, not consistent with the Plans, from survey lines in advance of all survey work to permit accurate and unimpeded work by his stakeout survey crews and cross-section and topographic survey crews.

The exact position of all work shall be established from control points, baseline transit points or other points of similar nature which are shown on the Plans and/or modified by the Engineer. Any error, apparent discrepancy, or absence in or of data shown or required for accurately accomplishing the stakeout survey shall be referred to the Engineer for interpretation.

The Contractor shall place two offset stakes or references at each centerline station and at such intermediate locations as the Engineer may direct. From computations and measurements made by the Contractor, these stakes shall be clearly and legibly marked with the correct centerline station number, offset and cut or fill to permit the establishment of the exact centerline location and elevation during construction. If markings become faded or blurred for any reason, the markings shall be restored by the Contractor and at the request of the Engineer. The Contractor shall locate and place all cut, fill, slope, fine grade or other stakes and points, as the Engineer may direct, for the proper progress of the work. All control points shall be properly guarded and flagged for easy identification.

Drainage structures shall be staked out by the Contractor at the locations and elevations shown on the Plans or as specified by the Engineer.

Reference points, baselines, stakes, and benchmarks for borrow pits shall be established by the Contractor.

Settlement gauges shall be established on subgrade in embankment areas, as shown on the plans, after topsoil stripping is complete.

Permanent survey marker locations shall be established and referenced by the Contractor.

The Contractor shall be responsible for the accuracy of his work and shall maintain all reference points, stakes, etc., throughout the life of the Contract. Damaged or destroyed points, benchmarks or stakes, or any reference points made inaccessible by the progress of the construction, shall be replaced or transferred by the Contractor. Any of the above points which may be destroyed or damaged shall be transferred by the Contractor before construction begins. All control points shall be referenced by ties to acceptable objects and recorded. Any alterations or revisions in the ties shall be so noted and the information furnished to the Engineer immediately. All stakeout survey work shall be referenced to the centerlines shown on the Plans. All computations necessary to establish the exact position of the work from control points shall be made and preserved by the Contractor. All computations, survey notes and other records necessary to accomplish the work shall be neatly made. Such computations, survey notes and other records shall be made available to the Engineer upon request and delivered to the Engineer not later than the date of acceptance of the Contract, to become the property of the owner.

The Engineer may check all or any portion of the stakeout survey work or notes made by the Contractor. Any necessary correction to the work shall be made immediately by the Contractor. Such checking by the Engineer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of his work.

Prior to the final cross-section and topo survey of the Project by the Contractor, the Contractor shall re-establish centerline or baseline points and stationing as required by the Engineer.

Prior to the final cross-section survey of any borrow pits by the Contractor; the Contractor shall reestablish baseline points and stationing, as well as any necessary benchmarks as required by the Engineer.

During the progress of the construction work, the Contractor will be required to furnish all of the surveying and stakeout incidental to the proper location by line and grade for each phase of the work. For paving and any other operation requiring extreme accuracy, the Contractor will restake with pins or other acceptable hubs located directly adjacent to the work at a spacing directed by the Engineer.

Any existing stakes, iron pins, survey monuments or other markers defining property lines which may be disturbed during construction shall be properly tied into fixed reference points before construction begins and accurately reset in their proper position upon completion of the work.

The Contractor shall set nails or pins flush with finished grade on the centerline of the runway pavement at each runway threshold. The set points shall be located, elevated and referenced to the project coordinate system. The as-built runway threshold elevation and coordinates shall be given to the Engineer.

Just prior to completion of the Contract, the Contractor shall reestablish if necessary, and retie all control points as permanently as possible, to the satisfaction of the Engineer.

4.0 AS-BUILT DRAWINGS

4.1. **REDLINE DRAWINGS.** The Contractor shall be provided one (1) set of full-size construction drawings by the Engineer for the sole purpose of recording as-built conditions. The Contractor shall mark each sheet of the non-reproducible drawings in red pencil and record thereon in a legible manner, (heretofore known as redline drawings) any and all field changes and conditions as they occur. A complete file of approved field sketches, diagrams and other approved changes/modifications shall be maintained and attached to the redline drawings.

A Redline set of As-Built drawings shall be kept current during the progress of the work. All deviations from the proposed drawings shall be noted. Special attention shall be given to note any shift in the location of underground items (utilities, pipes, etc) to facilitate accurately locating underground items on the final As-Built drawings.

Redline drawings shall be reviewed by the Engineer for accuracy as often as deemed necessary by the Engineer. Errors or omissions that are identified shall be promptly corrected. The Engineer may withhold the monthly progress payment request until such time as the redline drawings have been updated by the Contractor. At the completion of the work, each sheet of the redline drawings, plus all approved field sketches and diagrams shall be certified by the Contractor as reflecting the as-built conditions of the work. The Contractor shall thereafter submit to the Engineer the original redline drawings, referenced above, for approval prior to release of any retainage and establishing the value of the work.

4.2. FINAL AS-BUILT AND ELECTRONIC DRAWINGS. Horizontal datum shall be State Plane Coordinates derived from North American Datum of 1983 (NAD 83). Vertical Datum shall be North American Vertical Datum of 1988 (NAVD 1988). The location and elevation all benchmarks used shall be shown on the As-Built drawings.

The As-Built drawings shall accurately reflect and shall encompass all alterations that occurred during the progress of the work. The term As-Built Condition, referenced in this specification, shall be defined as the result of construction alterations. All proposed lines and proposed features on the design drawings that do not accurately reflect the As-Built condition shall not be shown on the As-Built drawings. Such proposed lines and features shall be erased and redrawn or otherwise modified on the As-Built drawings to accurately reflect the As-Built Condition. All proposed notes on the design drawings that do not reflect the As-Built Condition shall not be shown on the As-Built drawings. Such notes shall be erased and replaced, struck-through and corrected, or otherwise modified to accurately reflect the As-Built Condition. Design elevations that deviate from As-Built elevations shall be struck-through, and the As-Built elevation shall be noted adjacent to the struck-through design elevation.

The Contractor shall provide original and finished grade, As-Built topographic survey of all areas altered during construction. Unless otherwise noted, As-Built elevations shall be measured at 50 feet intervals (50 feet grid), at changes in surface slope, and at limits of construction alteration (grading, clearing or otherwise). This spacing requirement applies to paved and unpaved surfaces that do not have specific topographic measurement spacing requirements defined elsewhere. A topographic digital terrain model (DTM) that can be utilized in .dwg, CAD format, version 2004 or later shall be provided for all areas altered during construction. DTM shall mean the AutoCAD surface generated from surface data points (location and elevation) connected by TIN (triangulated irregular network) lines.

Runways, Taxiways, Taxilanes, and Roads: As-Built elevations shall be measured along the centerline and at both edges of the travel-way. If shoulders are provided, an additional elevation measurement shall be taken at the outer edge of the shoulder. These elevations shall be measured at 50 feet intervals (corresponding with the stationing shown on the plans) and at the connection points between new and existing pavement. In addition to plan-view As-Built drawings, centerline-profile As-Built drawings shall be provided, if centerline-profile design drawings were provided in the construction plan set.

Ditches: As-Built elevations shall be measured along the centerline, at toes of slopes, and at tops of bank. These measurements shall be taken at 50 feet intervals and at the beginning and end points of the ditch alteration.

Storm Drains, Structures, and Retention/Detention Ponds: All piping, wyes, tees, manholes, inlets, cleanouts and points of connection to the existing system shall be located and shown on the As-Built Drawings. Runs of storm sewers shall be identified (i.e. 300' of 15" RCP at S=.004). Elevations shall be given for top of rim/grate of all manhole covers and inlets. Elevations shall be given for all manhole, inlet, and catch basin inverts. Elevations shall be given for underdrain inverts at the location of cleanouts. Elevations shall be given for control structure weirs, orifices, and outfall elevations. Elevations shall be given for inverts of all outfall pipes. Elevations shall be given for the bottom of pond and top of bank for Retention/Detention ponds. Elevations may be required for any other pertinent design data not listed here.

Potable Water, Sanitary Gravity Sewer, Sanitary Force Mains, Pumping Stations, Reclaimed Water, and other Utilities: At a minimum, the same extent of data provided in the design drawings shall be measured and provided as as-built information in the As-Built drawings.

Buildings shall be marked to indicate any and all changes made. As-built drawings will also include the installed size, elevation and location of all interior equipment, structures, and concealed materials, including plumbing, electrical conduits, ducts, air and chemical pipes. All additional AIA General Provision and technical specification requirements of this Contract as they relate to Project Record Documents and Project Closeout shall be met.

A review-set of Final As-Built drawings shall be submitted to the Engineer (electronic PDF or CAD files is acceptable) and if requested modifications shall be made. When modifications are required, the Contractor shall make the requested modifications and submit a revised review-set. Written approval from the Engineer shall be given prior to submitting the Final As-Built drawings described in the below paragraph.

The Final As-Built drawings shall be prepared, signed, and sealed by a licensed Professional Surveyor. These drawings shall describe all alterations that occurred during the construction project. The Contractor shall provide one (1) set of Redline As-Built drawings, five (5) sets of signed and sealed Final As-Built drawings, and one (1) CD containing an electronic copy of the As-Built drawings in CAD (version 2004 or later) including a DTM of all topographic information. Final payment for this project will not be made until the As-Built drawings have been reviewed and accepted by the engineer. Cost of producing the As-built drawings shall be considered incidental to the contract unless a specific pay item is provided.

5.0 METHOD OF MEASURMENT

5.1 This is a Lump Sum Item and thus there is no measurement for payment. The Item shall be completed per the requirements of this specification.

6.0 BASIS OF PAYMENT

6.1 The lump sum price bid shall include the cost of furnishing all labor, equipment, instruments and all other material necessary to satisfactorily complete all requirements of this specification. Partial payments may be made at the discretion of the Engineer as the work progresses.

Payment will be made under:

Item C-108-6.1	Project Survey & Stakeout– Per Lump Sum
Item C-108-6.2	As-Built Drawings - Per Lump Sum

END ITEM C-108

ITEM P-101

SURFACE PREPARATION

1.0 DESCRIPTION

1.1 This item shall consist of preparation of existing pavement surfaces for overlay, surface treatments, removal of existing pavement, and other miscellaneous items. The work shall be accomplished in accordance with these specifications and the applicable drawings.

2.0 EQUIPMENT

2.1 All equipment shall be specified here and in the following paragraphs or approved by the Engineer. The equipment shall not cause damage to the pavement to remain in place.

3.0 CONSTRUCTION

3.1 Removal of Existing Pavement.

a. Concrete Pavement. The existing concrete pavement to be removed shall be freed from the pavement to remain by sawing through the complete depth of the slab one foot (30 cm) inside the perimeter of the final removal limits or outside the dowels, whichever is greater when the limits of removal are located on the joints. The pavement between the perimeter of the pavement removal and the saw cut shall be carefully broken up and removed using hand-held jackhammers, weighing 30 pounds (14 kg) or less, or other light-duty equipment which will not cause distress in the pavement which is to remain in place. The Contractor shall have the option of sawing through the dowels at the joint, removing the pavement and installing new dowels. Where the perimeter of the removal limits is not located on the joint and there are no dowels present, then the perimeter shall be saw cut the full depth of the pavement. The pavement inside the saw cut shall be removed by methods suitable to the Engineer which will not cause distress in the pavement which is to remain in place. If the material is to be wasted on the airport site, it shall be reduced to a maximum size designated by the Engineer. The Contractor's removal operation shall not cause damage to cables, utility ducts, pipelines, or drainage structures under the pavement. Concrete slabs that are damaged by under breaking shall be removed. Any damage shall be repaired at the Contractor's expense.

b. Asphalt Concrete Pavement. Asphalt concrete pavement to be removed shall be cut to the full depth of the bituminous material around the perimeter of the area to be removed. The pavement shall be removed so the joint for each layer of pavement replacement is offset 1 foot (30 cm) from the joint in the preceding layer. This does not apply if the removed pavement is to be replaced with concrete or soil. If the material is to be wasted on the airport site, it shall be a maximum size as designated by the airport owner or Engineer.

(1) Sawcutting: The existing pavement shall be saw cut perpendicular to the surface along neat lines and to the depth indicated on the plans. A power saw approved by the Engineer shall be used for cutting asphalt or concrete. After the existing pavement course has been saw cut through, the Contractor shall carefully remove it by methods approved by the Engineer, from that pavement which is remaining. All excavated

material shall be disposed of off airport property unless otherwise specified on the Plans or ordered by the Engineer. Pavement around existing drainage structures in areas to be removed shall be removed by hand or mechanical methods approved by the Engineer. Any damage to structures caused by the Contractor shall be repaired at no cost to the Owner.

Care shall be taken not to disturb or damage edge of existing pavement to remain.

Any existing pavements not indicated to be removed that are damaged by the Contractor's operations, shall be repaired by him to the satisfaction of the Engineer at no additional cost to the Owner.

Sawcutting new bituminous pavement courses to establish vertical joints to pave against are considered incidental to the paving operation and will not be measured for payment as sawcutting.

3.2 Preparation of Joints and Cracks. Remove all vegetation and debris from cracks to a minimum depth of 1 inch (25 mm). If extensive vegetation exists treat the specific area with a concentrated solution of a water-based herbicide approved by the Engineer. Fill all cracks, ignoring hairline cracks (< 1/4 inch (6 mm) wide) with a crack sealant per ASTM D6690. Wider cracks (over 1-1/2 inch wide (38 mm)), along with soft or sunken spots, indicate that the pavement or the pavement base should be repaired or replaced as stated below. Any excess joint or crack sealer on the surface of the pavement shall also be removed from the pavement surface.

Cracks and joints may be filled with a mixture of emulsified asphalt and aggregate. The aggregate shall consist of limestone, volcanic ash, sand, or other material that will cure to form a hard substance. The combined gradation shall be as shown in the following table.

Gradation

Sieve Size	Percent Passing
No. 4	100
No. 8	90-100
No. 16	65-90
No. 30	40-60
No. 50	25-42
No. 100	15-30
No. 200	10-20

Up to 3% cement can be added to accelerate the set time. The mixture shall not contain more than 20% natural sand without approval in writing from the Engineer.

The proportions of asphalt emulsion and aggregate shall be determined in the field and may be varied to facilitate construction requirements. Normally, these proportions will be approximately one part asphalt emulsion to five parts aggregate by volume. The material shall be poured or placed into the joints or cracks and compacted to form a voidless mass. The joint or crack shall be filled within 0 to 1/8 inches (0-3 mm) of the surface. Any material spilled outside the width of the joint shall be removed from the pavement surface prior to constructing the overlay. Where concrete overlays are to be constructed, only the excess joint material on the pavement surface and vegetation in the joints need to be removed.

3.3 Removal of Paint and Rubber. All paint and rubber over 1 foot (30 cm) wide that will affect the bond of the new overlay shall be removed from the surface of the existing pavement. Chemicals, high-pressure water, heater scarifier (asphaltic concrete only), cold milling, or sandblasting may be used. Any methods used shall not cause major damage to the pavement. Major damage is defined as changing the properties of the pavement or removing pavement over 1/8 inch (3 mm) deep. If chemicals are used, they shall comply with the state's environmental protection regulations. No material shall be deposited on the runway shoulders. All wastes shall be disposed of in areas indicated in this specification or shown on the plans.

3.4 Concrete Spall or Failed Asphaltic Concrete Pavement Repair.

a. **Repair of Concrete Spalls in Areas to be Overlaid with Asphalt.** The Contractors shall repair all spalled concrete as shown on the plans or as directed by the Engineer. The perimeter of the repair shall be saw cut a minimum of 2 inches (50 mm) outside the affected area and 2 inches (50 mm) deep. The deteriorated material shall be removed to a depth where the existing material is firm or cannot be easily removed with a geologist pick. The removed area shall be filled with asphaltic concrete with a minimum Marshall stability of 1,200 lbs (544 kg) and maximum flow of 20 (units of 0.01 in). The material shall be compacted with equipment approved by the Engineer until the material is dense and no movement or marks are visible. The material shall not be placed in lifts over 4 inches (100 mm) in depth. This method of repair applies only to pavement to be overlaid.
b. **Asphaltic Concrete Pavement Repair.** The failed areas shall be removed as specified in paragraph 101-3.1b. All failed material including surface, base course, subbase course, and subgrade shall be removed. The base course and subbase shall be replaced if it has been infiltrated with clay, silt, or other material affecting the load-bearing capacity. Materials and methods of construction shall comply with the other applicable sections of this specification.

3.5 Cold Milling. Milling shall be performed with a power-operated milling machine or grinder, capable of producing a finished surface that provides a good bond to the new overlay. The milling machine or grinder shall operate without tearing or gouging the under laying surface. The milling machine or grinder shall be equipped with automatic grade and slope controls. All millings shall be removed and disposed off Airport property, unless otherwise specified. If the Contractor mills or grinds deeper or wider than the plans specify, the Contractor shall replace the material that was removed with new material at no additional cost to the Owner.

a. **Patching.** The milling machine shall be capable of cutting a vertical edge without chipping or spalling the edges of the remaining pavement and it shall have a positive method of controlling the depth of cut. The Engineer shall layout the area to be milled with a straightedge in increments of 1 foot (30 cm) widths. The area to be milled shall cover only the failed area. Any excessive area that is milled because the Contractor doesn't have the appropriate milling machine, or areas that are damaged because of his negligence, shall not be included in the measurement for payment.

b. **Profiling, Grade Correction, or Surface Correction.** The milling machine shall have a minimum width of 7 feet (2 m) and it shall be equipped with electronic grade control devices that will cut the surface to the grade and tolerances specified. The machine shall cut vertical edges. A positive method of dust control shall be provided. The machine shall have the ability to remove the millings or cuttings from the pavement and load them into a truck.

c. Clean-up. The Contractor shall sweep the milled surface daily and immediately after the milling until all residual aggregate and fines are removed from the pavement surface. Prior to paving, the Contractor shall wet down the milled pavement and thoroughly sweep and/or blow the surface to remove any remaining aggregate or fines.

3.6. Preparation of Asphalt Pavement Surfaces. Existing asphalt pavements indicated to be treated with a surface treatment shall be prepared as follows:

a. Patch asphalt pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new asphalt concrete similar to that of the existing pavement in accordance with paragraph 101-3.4.

b. Repair joints and cracks in accordance with paragraph 101-3.2.

c. Remove oil or grease that has not penetrated the asphalt pavement by scraping or by scrubbing with a detergent, then wash thoroughly with clean water. After cleaning, treat these areas with an oil spot primer.

d. Clean pavement surface immediately prior to placing the surface treatment by sweeping, flushing well with water leaving no standing water, or a combination of both, so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film. This shall apply to aircraft anchor tie-downs specified to be filled with concrete.

3.7 Maintenance. The Contractor shall perform all maintenance work necessary to keep the pavement in a satisfactory condition until the full section is complete and accepted by the Engineer. The surface shall be kept clean and free from foreign material. The pavement shall be properly drained at all times. If cleaning is necessary or if the pavement becomes disturbed, any work repairs necessary shall be performed at the Contractor's expense.

3.8 Preparation of Joints in Rigid Pavement.

3.8.1 Removal of Existing Joint Sealant. All existing joint sealants will be removed by plowing or use of hand tools. Any remaining sealant and or debris will be removed by use of wire brushes or other tools as necessary. Resaw joints removing no more than 1/16 inch (2 mm) from each joint face. Immediately after sawing, flush out joint with water and other tools as necessary to completely remove the slurry. Allow sufficient time to dry out joints prior to sealing.

3.8.2 Cleaning Prior to Sealing. Immediately before sealing, joints shall be cleaned by removing any remaining laitance and other foreign material. Clean joints by sandblasting, or other method approved by the Engineer, on each joint face with nozzle held at an angle and not more than three inches (75 mm) from face. Following sandblasting, clean joints with air free of oil and water. Joint surfaces will be surface-dry prior to installation of sealant.

3.9.1 Preparation of Cracks in Flexible Pavement.

3.9.1 Preparation of Crack. Widen crack with router or random crack saw by removing a minimum of 1/16 inch (2 mm) from each side of crack. Immediately before sealing, joints will be blown out with a hot air lance combined with oil and water-free compressed air.

3.9.2 Removal of Existing Sealant. Existing sealants will be removed by routing or random crack saw. Following routing or sawing any remaining debris will be removed by use of a hot lance combined with oil and water-free compressed air.

4.0 METHOD OF MEASUREMENT

4.1 Pavement Removal. The unit of measurement for pavement removal shall be per square yard.

5.0 BASIS OF PAYMENT

5.1 Payment. Payment shall be made at contract unit price for the unit of measurement as specified above. This price shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

P-101-5.1 Pavement Removal (Bituminous Layer Only)– per square yard

P-101-5.2 Pavement Removal (Full Depth)– per square yard

MATERIAL REQUIREMENTS

ASTM D6690 Standard Specification For Joint And Crack Sealants, Hot Applied, For Concrete And Asphalt Pavements

END OF ITEM P-101

ITEM P-151

CLEARING & GRUBBING

1.0 DESCRIPTION

1.1 This item shall consist of clearing or clearing and grubbing, including the removal and disposal of materials, for all areas within the limits designated on the plans or as required by the Engineer.

a. Clearing shall consist of the cutting and removal of all trees, stumps, brush, logs, hedges, the removal of fences and other loose or projecting material from the designated areas. The grubbing of stumps and roots will not be required.

b. Clearing and Grubbing shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the Engineer is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing.

c. Miscellaneous Demolition shall consist of removal and disposal of any items specified as such in the Plans which are not specifically included in another pay item.

2.0 CONSTRUCTION METHODS

2.1 General. The areas denoted on the plans to be cleared or cleared and grubbed shall be staked on the ground by the Engineer. The clearing and grubbing shall be done at a satisfactory distance in advance of the grading operations.

All spoil materials removed by clearing or by clearing and grubbing shall be disposed of outside the Airport's limits at the Contractor's responsibility, except when otherwise directed by the Engineer. As far as practicable, waste concrete and masonry shall be placed on slopes of embankments or channels. When embankments are constructed of such material, this material shall be placed in accordance with requirements for formation of embankments. Any broken concrete or masonry that cannot be used in construction and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the Engineer and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits, the Contractor shall obtain and file with the Engineer permission in writing from the property owner for the use of private property for this purpose.

Blasting shall not be allowed.

The removal of existing structure and utilities required to permit orderly progress of work shall be accomplished by local agencies, unless otherwise shown on the plans. Whenever a telephone or telegraph pole, pipeline, conduit, sewer, roadway, or other utility is encountered

and must be removed or relocated, the Contractor shall advise the Engineer who will notify the proper local authority or owner to secure prompt action.

2.2 Clearing. The Contractor shall clear the staked or indicated area of all objectionable materials. Trees unavoidably falling outside the specified clearing limits must be cut up, removed, and disposed of in a satisfactory manner. To minimize damage to trees that are to be left standing, trees shall be felled toward the center of the area being cleared. The Contractor shall preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut flush with the original ground surface. The grubbing of stumps and roots will not be required.

Fences shall be removed and disposed of as directed by the Engineer. Fence wire shall be neatly rolled and the wire and posts stored on the airport if they are to be used again, or stored at a location designated by the Engineer if the fence is to remain the property of a local owner or authority.

2.3 Clearing and Grubbing. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials shall be removed, except where embankments exceeding 3-1/2 feet (105 cm) in depth will be constructed outside of paved areas. For embankments constructed outside of paved areas, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off flush with the original ground and allowed to remain. Tap roots and other projections over 1-1/2 inches (38 mm) in diameter shall be grubbed out to a depth of at least 18 inches (0.5 m) below the finished subgrade or slope elevation.

Any buildings and miscellaneous structures that are shown on the plans to be removed shall be demolished or removed, and all materials shall be disposed of by removal from the site. The cost of removal is incidental to this item. The remaining or existing foundations, wells, cesspools, and like structures shall be destroyed by breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least 2 feet (60 cm) below the existing surrounding ground. Any broken concrete, blocks, or other objectionable material that cannot be used in backfill shall be removed and disposed of at the Contractor's expense. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes under embankment areas remaining after the grubbing operation shall have the sides of the holes flattened to facilitate filling with acceptable material and compacting as required in Item P-152. The same procedure shall be applied to all holes remaining after grubbing in areas where the depth of holes exceeds the depth of the proposed excavation.

3.0 METHOD OF MEASUREMENT

3.1 The quantities of clearing or clearing and grubbing, as shown by the limits on the plans or as ordered by the Engineer shall be the number of acres (square meters) or fractions thereof, of land specifically cleared or cleared and grubbed.

3.2 Miscellaneous Demolition shall not be measured and is a lump sum item.

4.0 BASIS OF PAYMENT

4.1 Payment shall be made at the contract unit price per acre (square meter) for clearing. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

4.2 Payment shall be made at the contract unit price per acre (square meter) for clearing and grubbing. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

4.3 Payment shall be made at the contract unit price per lump sum for Miscellaneous Demolition. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-151-4.1	Clearing & Grubbing (Miscellaneous Demolition), Complete - per lump sum

END OF ITEM P-151

ITEM P-152

EXCAVATION, SUBGRADE, AND EMBANKMENT

1.0 DESCRIPTION

1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

1.2 Classification. All material excavated shall be classified as defined below:

a. **Unclassified excavation.** Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature which is not otherwise classified and paid for under one of the following items.
b. **Rock excavation**. Rock excavation shall include all solid rock in ledges, in bedded deposits, in unstratified masses, and conglomerate deposits which are so firmly cemented they cannot be removed without blasting or using rippers. All boulders containing a volume of more than 1/2 cubic yard (0.4 m^3) will be classified as "rock excavation."
c. **Muck excavation**. Muck excavation shall consist of the removal and disposal of deposits or mixtures of soils and organic matter not suitable for foundation material. Muck shall include materials that will decay or produce subsidence in the embankment. It may consist of decaying stumps, roots, logs, humus, or other material not satisfactory for incorporation in the embankment.
d. **Drainage excavation**. Drainage excavation shall consist of all excavation made for the primary purpose of drainage and includes drainage ditches, such as intercepting, inlet or outlet ditches; temporary levee construction; or any other type as shown on the plans.
e. **Borrow excavation**. Borrow excavation shall consist of approved material required for the construction of embankments or for other portions of the work in excess of the quantity of usable material available from required excavations. Borrow material shall be obtained from areas designated by the Engineer within the limits of the airport property but outside the normal limits of necessary grading, or from areas outside the airport boundaries.

1.3 Unsuitable Excavation. Any material containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material, suitable for topsoil may be used on the embankment slope when approved by the Engineer.

2.0 CONSTRUCTION METHODS

2.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be completely cleared and grubbed in accordance with Item P-151. The suitability of material to be placed in embankments shall be subject to approval by the Engineer. All unsuitable material shall be disposed of in waste areas shown on the plans. All waste areas shall be graded to allow positive drainage of the area and of adjacent areas. The surface elevation of waste areas shall not extend above the surface elevation of

adjacent usable areas of the airport, unless specified on the plans or approved by the Engineer.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the Engineer notified per subsection 70-20. At the direction of the Engineer, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Those areas outside of the limits of the pavement areas where the top layer of soil material has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches (100 mm), to loosen and pulverize the soil.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the Engineer, who shall arrange for their removal if necessary. The Contractor, at his or her expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

2.2 Excavation. No excavation shall be started until the work has been staked out by the Contractor and the Engineer has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the Engineer. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

When the volume of the excavation exceeds that required to construct the embankments to the grades indicated, the excess shall be used to grade the areas of ultimate development or disposed as directed by the Engineer. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

The grade shall be maintained so that the surface is well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water that may affect the work.

a. Selective Grading. When selective grading is indicated on the plans, the more suitable material designated by the Engineer shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas so that it can be measured for payment as specified in paragraph 152-3.3.

b. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches (300 mm) below the subgrade or to the depth specified by the Engineer. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed of off the airport. The cost

is incidental to this item. This excavated material shall be paid for at the contract unit price per cubic yard (per cubic meter) for unclassified excavation. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans.

c. Overbreak. Overbreak, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the Engineer. All overbreak shall be graded or removed by the Contractor and disposed of as directed by the Engineer. The Engineer shall determine if the displacement of such material was unavoidable and his or her decision shall be final. Payment will not be made for the removal and disposal of overbreak that the Engineer determines as avoidable. Unavoidable overbreak will be classified as "Unclassified Excavation."

d. Removal of Utilities. The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by someone other than the Contractor; for example, the utility unless otherwise shown on the plans. All existing foundations shall be excavated at least 2 feet (60 cm) below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the Engineer. All foundations thus excavated shall be backfilled with suitable material and compacted as specified.

e. Compaction Requirements. The subgrade under areas to be paved shall be compacted to a depth of 17-30 inches and to a density of not less than 95 percent of the maximum density as determined by ASTM D698 or AASHTO T-99 for areas designated for aircraft with gross weights of 60,000 pounds (27200 kg) or less, and ASTM D1557 or AASHTO T-180 for areas designated for aircraft with gross weights greater than 60,000 pounds (27200 kg). The material to be compacted shall be within ±2% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils).

The in-place field density shall be determined in accordance with ASTM D1556, ASTM D2167, ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. Stones or rock fragments larger than 4 inches (100 mm) in their greatest dimension will not be permitted in the top 6 inches (150 mm) of the subgrade. The finished grading operations, conforming to the typical cross-section, shall be completed and maintained at least 1,000 feet (300 m) ahead of the paving operations or as directed by the Engineer.

All loose or protruding rocks on the back slopes of cuts shall be pried loose or otherwise removed to the slope finished grade line. All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the Engineer.

Compacted subgrade shall be accepted for density on a lot basis. A lot will consist of one day's production where it is not expected to exceed 2400 square yards (2000 square meters). A lot will consist of one-half day's production where a day's production is expected to consist of between 2400 and 4800 square yards (2000 and 4000 square meters). When subgrade is required to be compacted in lifts, a minimum

of one field density test shall be taken for each lift. Isolated compaction operations will be considered separate LOTs. For multiple phase construction a LOT shall not extend beyond the limits of the phase. The Engineer may determine other appropriate LOT sizes as deemed necessary.

Each lot shall be divided into two equal sublots. One field density test shall be made for each sublot. One maximum density test shall be made for each soil type encountered. One Soil Classification Test shall be made for each soil type encountered, in accordance with AASHTO T-88. Sampling locations will be determined by the Engineer on a random basis in accordance with statistical procedures contained in ASTM D 3665. The Engineer may determine other testing frequencies as deemed appropriate.

Blasting shall not be allowed.

e. Proof Rolling. After compaction is completed, the subgrade area shall be proof rolled with a heavy pneumatic-tired roller having four or more tires abreast, each tire loaded to a minimum of 30,000 pounds (13.6 metric tons) and inflated to a minimum of 125 psi (0.861 MPa) in the presence of the Engineer. Apply a minimum of 30 coverage, or as specified by the Engineer, to all paved areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch (25 mm) or show permanent deformation greater than 1 inch (25 mm) shall be removed and replaced with suitable material or reworked to conform to the moisture content and compaction requirements in accordance with these specifications.

2.3 Borrow Excavation. Borrow areas within the airport property are indicated on the plans. Borrow excavation shall be made only at these designated locations and within the horizontal and vertical limits as staked or as directed by the Engineer.

When borrow sources are outside the boundaries of the airport property, it shall be the Contractor's responsibility to locate and obtain the borrow sources, subject to the approval of the Engineer. The Contractor shall notify the Engineer at least 15 days prior to beginning the excavation so necessary measurements and tests can be made. All borrow pits shall be opened up to expose the various strata of acceptable material to allow obtaining a uniform product. All unsuitable material shall be disposed of by the Contractor. Borrow pits shall be excavated to regular lines to permit accurate measurements, and they shall be drained and left in a neat, presentable condition with all slopes dressed uniformly.

2.4 Drainage Excavation. Drainage excavation shall consist of excavating for drainage ditches such as intercepting; inlet or outlet ditches; for temporary levee construction; or for any other type as designed or as shown on the plans. The work shall be performed in sequence with the other construction. Intercepting ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas or as directed by the Engineer. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

2.5 Preparation of Embankment Area. Where an embankment is to be constructed to a height of 4 feet (1.2 m) or less, all sod and vegetative matter shall be removed from the

surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches (150 mm) and shall then be compacted as indicated in paragraph 152-2.6. When the height of fill is greater than 4 feet (1.2 m), sod not required to be removed shall be thoroughly disked and recompacted to the density of the surrounding ground before construction of embankment.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches (300 mm) and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

2.6 Formation of Embankments. Embankments shall be formed in successive horizontal layers of not more than 8 inches (200 mm) in loose depth for the full width of the cross-section, unless otherwise approved by the Engineer.

The layers shall be placed, to produce a soil structure as shown on the typical cross-section or as directed by the Engineer. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each layer shall be within ±2% of optimum moisture content before rolling to obtain the prescribed compaction. To achieve a uniform moisture content throughout the layer, the material shall be moistened or aerated as necessary. Samples of all embankment materials for testing, both before and after placement and compaction, will be taken for each 1,000 square yards (840 square meters). Based on these tests, the Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

Rolling operations shall be continued until the embankment is compacted to not less than 95% of maximum density for non-cohesive soils, and 90% of maximum density for cohesive soils as determined by ASTM *D698 for areas designated for aircraft with gross weights of 60,000 pounds (27200 kg) or less and ASTM D1557 for areas designated for aircraft with gross weights greater than 60,000 pounds (27200 kg)*. Under all areas to be paved, the embankments shall be compacted to a depth of 17-30 inches and to a density of not less than 95 percent of the maximum density as determined by ASTM *D1557*.

For soils with expansive characteristics, the maximum density should be determined in accordance with ASTM D698 regardless of aircraft weight.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches (100 mm).

The in-place field density shall be determined in accordance with ASTM D1556, ASTM D2167, ASTM 6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. The Engineer shall perform all quality assurance density tests. Contractor's laboratory shall perform all density tests in the Engineer's presence and provide the test results upon completion to the Engineer for acceptance.

Compaction areas shall be kept separate, and no layer shall be covered by another layer until the proper density is obtained.

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each layer is placed. Layer placement shall begin in the deepest portion of the embankment fill. As placement progresses, the layers shall be constructed approximately parallel to the finished pavement grade line.

When rock and other embankment material are excavated at approximately the same time, the rock shall be incorporated into the outer portion of the embankment and the other material shall be incorporated under the future paved areas. Stones or fragmentary rock larger than 4 inches (100 mm) in their greatest dimensions will not be allowed in the top 6 inches (150 mm) of the subgrade. Rockfill shall be brought up in layers as specified or as directed by the Engineer and the finer material shall be used to fill the voids with forming a dense, compact mass. Rock or boulders shall not be disposed of outside the excavation or embankment areas, except at places and in the manner designated on the plans or by the Engineer.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in layers of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in layers not exceeding 2 feet (60 cm) in thickness. Each layer shall be leveled and smoothed with suitable equipment by distribution of spalls and finer fragments of rock. The layer shall not be constructed above an elevation 4 feet (1.2 m) below the finished subgrade.

2.7 Finishing and Protection of Subgrade. After the subgrade is substantially complete, the Contractor shall remove any soft or other unstable material over the full width of the subgrade that will not compact properly. All low areas, holes or depressions in the subgrade shall be brought to grade with suitable select material. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans.

Grading of the subgrade shall be performed so that it will drain readily. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes. All ruts or rough places that develop in the completed subgrade shall be graded and recompacted.

No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been approved by the Engineer.

2.8 Haul. All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work

involved. No payment will be made separately or directly for hauling on any part of the work.

2.9 Tolerances. In those areas upon which a subbase or base course is to be placed, the top of the subgrade shall be of such smoothness that, when tested with a 12-foot (3.7-m) straightedge applied parallel and at right angles to the centerline, it shall not show any deviation in excess of 1/2 inch (12 mm), or shall not be more than 0.05 feet (15 mm) from true grade as established by grade hubs. Any deviation in excess of these amounts shall be corrected by loosening, adding, or removing materials; reshaping; and recompacting.

On safety areas, intermediate and other designated areas, the surface shall be of such smoothness that it will not vary more than 0.10 feet (3 mm) from true grade as established by grade hubs. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

2.10 Topsoil. When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall not be placed within 500 feet of runway pavement or 150 feet of taxiway pavement and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the Engineer, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further rehandling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as directed, or as required in Item T-905.

No direct payment will be made for topsoil under Item P-152. The quantity removed and placed directly or stockpiled shall be paid for at the contract unit price per cubic yard (cubic meter) for "Unclassified Excavation."

When stockpiling of topsoil and later rehandling of such material is directed by the Engineer, the material so rehandled shall be paid for at the contract unit price per cubic yard (cubic meter) for "topsoiling," as provided in Item T-905.

3.0 METHOD OF MEASUREMENT

3.1 The quantity of excavation to be paid for shall be the number of cubic yards (cubic meters) measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed. The quantity of compacted embankment in-place to be paid for shall be the number of cubic yards (cubic meters) measured in its final position.

3.2 Borrow material shall be paid for on the basis of the number of cubic yards (cubic meters) measured in its original position at the borrow pit.

3.3 Stockpiled material shall be paid for on the basis of the number of cubic yards (cubic meters) measured in the stockpiled position.

3.4 For payment specified by the cubic yard (cubic meter), measurement for all excavation and embankment shall be computed by the average end area method. The end area is that bound by the original ground line established by field cross-sections and the final theoretical pay line established by excavation and embankment cross-sections shown on the plans, subject to verification by the Engineer. After completion of all excavation and embankment operations and prior to the placing of base or subbase material, the final excavation and embankment shall be verified by the Engineer by means of field cross-sections taken randomly at intervals not exceeding 500 linear feet (150 m).

4.0 BASIS OF PAYMENT

4.1 "Unclassified excavation" payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

4.2 "Rock Excavation" payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

4.3 "Muck Excavation" payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

4.4 "Drainage Excavation" payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

4.5 "Borrow Excavation" payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

4.6 "Stockpiled Material" payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

4.2 For embankment in place, payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-152-4.1	Unclassified Excavation - per cubic yard (cubic meter)
Item P-152-4.2	Embankment in place - per cubic yard (cubic meter)

TESTING REQUIREMENTS

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

END OF ITEM P-152

ITEM P-160

SUBGRADE STABILIZATION

1.0 DESCRIPTION

1.1 GENERAL. The work specified in this section consists of the stabilizing of designated portions of the pavement subgrade to provide a firm and unyielding subgrade having the required bearing value specified in the. The work shall be constructed in accordance with these specifications, FDOT Specification Sections 160 and 914, according to an approved Quality Control Plan meeting the requirements of GP 100, and the lines, grades, thicknesses and notes shown in the plans.

1.2 STABILIZED SUBGRADE. For stabilized subgrade, the type of materials, commercial or local, is at the Contractor's option and no separate payment for stabilizing materials will be made. Compliance with the bearing value requirements will be determined by the Limerock Bearing Ratio Method.

It is the Contractor's responsibility that the finished pavement subgrade section meets the bearing value requirements, regardless of the quantity of stabilizing materials necessary to be added. Also, full payment will be made for any areas where the existing subgrade materials meet the design bearing value requirements without the addition of stabilizing additives, as well as areas where the Contractor may elect to place select high-bearing value materials from other sources, within the limits of the stabilizing.

After the grading operations have been substantially completed, the Contractor shall make his own determination as to the quantity (if any) of stabilizing material necessary for compliance with the bearing value requirements. If the Contractor determines that stabilizing material is necessary for compliance, then he shall submit material data and testing documentation and certification that the material meets all Contract requirements. Written approval from the Engineer is required prior to incorporating the material into the work. The Contractor shall notify the Engineer of the approximate quantity to be added. The spreading and mixing in of such quantity of materials shall meet the approval of the Engineer as to uniformity and effectiveness.

2.0 MATERIALS

2.1 COMMERCIAL AND LOCAL MATERIALS. The particular type of stabilizing material to be used shall meet the requirements of Item P-211, FDOT Section 914, or an approved equal.

2.2 USE OF MATERIALS FROM EXISTING BASE. When the utilization of materials from an existing base is called for (as all or a portion of the stabilizing additives), the Engineer will approve the locations, placing and distribution of such materials and this work shall be done prior to the spreading of any additional commercial or local materials. No materials from an existing base will be eligible for payment as Commercial Materials.

3.0 CONSTRUCTION METHODS

3.1 GENERAL. Prior to the beginning of stabilizing operations, the area to be stabilized shall have been constructed to an elevation such that upon completion of stabilizing operations the completed stabilized subgrade will conform to the lines, grades and cross-section shown in the

plans. Prior to the spreading of any additive stabilizing material, the surface of the pavement subgrade shall be brought to a plane approximately parallel to the plane of the proposed finished surface.

The subgrade to be stabilized may be processed in one course unless the equipment and methods being used do not provide the required uniformity, particle size limitation, compaction and other desired results, in which case, the processing be done in more than one course.

3.2 APPLICATION OF STABILIZING MATERIAL. When additive stabilizing materials are required, the designated quantity shall be spread uniformly over the area to be stabilized.

When materials from an existing base are to be utilized in the stabilizing at a particular location, all of such materials shall be placed and spread prior to the addition of other stabilizing additives.

Commercial stabilizing material shall be spread by the use of mechanical material spreaders except that where use of such equipment is not practicable. Other means of spreading may be used, but only upon written approval of the proposed alternate method.

a. **Sampling and Testing of Local Materials:** When local materials are being utilized as stabilizing material, the material shall be sampled once for every two LOTs and tested for liquid limit, plastic index and organic content.

3.3 MIXING. The mixing shall be done with rotary tillers or other equipment meeting the approval of the Engineer. At the Contractor's election, the mixing of the materials may be accomplished in a plant of an approved type suitable for this work. The area to be stabilized shall be thoroughly mixed throughout the entire depth and width of the stabilizing limits.

The mixing operations, as specified, (either in place or in a plant) will be required regardless of whether the existing soil, or any select soils placed within the limits of the stabilized sections, have the required bearing value without the addition of stabilizing materials.

As an exception to the above mixing requirements, where the subgrade is of rock, the Engineer may direct that the mixing operations (and the work of stabilizing) be waived and no payment for stabilization will be made for such sections of the area to be paved.

3.4 MAXIMUM PARTICLE SIZE OF MIXED MATERIALS. At the completion of mixing, all particles of material within the limits of the area to be stabilized shall pass a 3-1/2 inch ring. Any particles not meeting this requirement shall be removed from the stabilized area or shall be broken down so as to meet this requirement.

3.5 COMPACTION. After the mixing operations have been completed and requirements for bearing value, uniformity and particle size have been satisfied, the stabilized area shall be compacted in accordance with 160-6.1. The materials shall be compacted at a moisture content permitting the specified compaction. If the moisture content of the material is improper for attaining the specified density, either water shall be added or the material shall be permitted to dry until the proper moisture content for the specified compaction is reached.

3.6 FINISH GRADING. The completed stabilized subgrade shall be shaped to conform with the finished lines, grades and cross-section indicated in the plans. The subgrade shall be checked by the use of elevation stakes or other means approved by the Engineer.

3.7 REQUIREMENTS FOR CONDITION OF COMPLETED SUBGRADE. After the stabilizing and compacting operations have been completed, the subgrade shall be firm and substantially unyielding to the extent that it will support construction equipment and will have the bearing value required by the plans.

All soft and yielding material and any other portions of the subgrade which will not compact readily shall be removed and replaced with suitable material and the whole subgrade brought to line and grade with proper allowance for subsequent compaction.

3.8 MAINTENANCE OF COMPLETED SUBGRADE. After the subgrade has been completed as specified above, the Contractor shall maintain it free from ruts, depressions and any damage resulting from the hauling or handling of materials, equipment, tools, etc. It shall be the Contractor's responsibility to maintain the required density until the subsequent base or pavement is in place. Such responsibility shall include any repairs, replacement, etc., of curb and gutter, sidewalk, etc. which might become necessary in order to recompact the subgrade in the event of underwash or other damage occurring to the previously compacted subgrade.

Any such work required for recompaction shall be at the Contractor's expense. Ditches and drains shall be constructed and maintained along the completed subgrade section.

4.0 QUALITY CONTROL

4.1 BEARING VALUE REQUIREMENTS. The minimum limerock bearing value shall be 40, unless otherwise required by the Contract. Bearing value samples will be obtained and tested by the Engineer at completion of satisfactory mixing of the stabilized area. For any area where the bearing value obtained is deficient from the value indicated in the plans in excess of the tolerances established herein, additional stabilizing material shall be spread and mixed in accordance with 160-4.3. This reprocessing shall be done for the full width of the pavement area being stabilized and longitudinally for a distance of fifty feet (50') beyond the limits of the area in which the bearing value is deficient.

The Contractor shall make his own determination of the quantity of additional stabilizing material to be used in reprocessing.

4.2 TOLERANCES IN BEARING VALUE REQUIREMENTS. The following under tolerances from the specified bearing value will be allowed on individual tests performed on samples obtained after mixing operations have been completed:

Specified Bearing Value	Undertolerance
LBR 40	3.0
LBR 35	2.5
LBR 30 (and under)	2.0

4.3 DENSITY REQUIREMENTS. Within the entire limits of the width and depth of the areas to be stabilized (other than as provided in 160-6.2) the minimum density acceptable at any location will be 100 percent of the Modified Proctor maximum density as determined by FM 1-T 180. ~~For~~

~~maximum laboratory density, Test Method D of ASTM D698 will be used.~~

4.4 EXCEPTION TO DENSITY REQUIREMENTS. Attainment of the minimum density specified in 160-6.1 is not required under this section when the surface of the area is to be grassed under the same contract.
This area shall be compacted to a reasonably firm condition and approved by the Engineer.

4.5 FREQUENCY OF QUALITY CONTROL TESTING. A LOT is defined as a single lift of finished subgrade not to exceed 1500 square yards. Isolated mixing and compaction operations will be considered as separate LOTS. For multiple phase construction, a LOT shall not extend beyond the limits of the phase.

Conduct Quality Control sampling and testing at a minimum frequency listed in the table below. The Engineer may determine alternate LOT sizes and testing frequencies as deemed appropriate.

Test Name	Frequency
Modified Proctor Maximum Density	One per two consecutive LOTs
Field Density	One per LOT
Stabilizing Mixing Depth	Three per 1500 square yards
LBR	One per two consecutive LOTs

5.0 MEASUREMENT

7.1 MEASUREMENT. For all work of Subgrade Stabilization specified herein, the areas to be paid for shall be plan quantity within limerock base course neat lines.

6.0 BASIS OF PAYMENT

6.1 QUANTITY. The quantity of Subgrade Stabilization, determined as provided in 160-7.1, shall be paid for at the contract price per square yard of Subgrade Stabilization. Such price and payment shall constitute full compensation for all work specified in this section applicable to these types of stabilization, including furnishing and spreading of all stabilizing material required and any reprocessing of stabilization areas necessary to attain the specified bearing value.

6.2 COMMERCIAL STABILIZING MATERIAL. No separate payment shall be made for any commercial stabilizing material which the Contractor may elect to utilize in Subgrade Stabilization.

No separate payment will be made for the work of utilizing of materials from an existing base in the stabilizing section.

6.3 GENERAL. The above prices and payments shall constitute full compensation for all work and materials specified in this section and shall specifically include all costs of the processing and incorporation of existing base materials into the proposed stabilization area when such work is required by the plans.

Payment shall be made under:

Item No. 160-6.1 12-Inch Subgrade Stabilization -- per square yard.

TESTING REQUIREMENTS

ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregate
FM 5-515	Limerock Bearing Ratio
ASTM D 698	Moisture-Density Relations of Soils and Aggregate Mixtures Using 5.5 lb (2.49 Kg) Rammer and 12 in. (305 mm) Drop.
ASTM D 1556	Density of Soil in Place by the Sand-Cone Method
ASTM D 2167	Density of Soil in Place by the Rubber-Balloon Method
ASTM D 4318	Liquid limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 2922	Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods
ASTM D 3017	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

END OF ITEM P-160

ITEM P-200

ROCK BASE COURSE

1.0 DESCRIPTION

1.1 GENERAL. This item shall consist of constructing a pavement base course composed of base rock, to the lines and grades shown on the plans and to the satisfaction of the Engineer.

The requirements of Section 200, including the applicable requirements of Sections 120 and 911 (and any other referenced reuqirements), as specified in the Florida Department of Transportation Standard Specifications shall apply with the following modifications and/or revisions as described below or in Contract Plans.

2.0 MATERIALS

2.1 Materials shall meet the requirements of FDOT Section 911.

3.0 METHOD OF MEASUREMENT

3.1 The quantity of rock base to be paid for will be the number of square yards, completed and accepted, per the Plans and Specifications.

4.0 BASIS OF PAYMENT

4.1 The unit price bid per square yard for the rock base course shall include the cost of furnishing all equipment, materials, testing, and labor necessary to complete the item as specified, and to the satisfaction of the Engineer.

Payment will be made under:

Item P-200-4.1 Rock Base Course – per square yard

END OF ITEM P-200

ITEM P- 210: REWORKING LIMEROCK BASE

DESCRIPTION

210-1 Rework (or rework and widen) the existing rock base, by adding new limerock material as required by the Plans. Construct adjacent turnouts, entirely with new limerock.

MATERIALS

210-2 Meet the limerock material requirements as specified in Section 911 if new limerock is needed. The Contractor may use limerock of either Miami Oolite or Ocala Formation but only use limerock of one formation on any Contract.

210-3EQUIPMENT.

Provide equipment meeting the requirements of 200-3.

210-4EXISTING BITUMINOUS SURFACES.

210-4.1 Asphalt Concrete: Remove asphalt concrete surfaces from the base prior to excavating trenches or scarifying the rock. Dispose of removed materials as specified in 120-5.

210-4.2 BITUMINOUS SURFACE TREATMENT: Remove and dispose of existing bituminous surface treatment only when specifically specified in the Plans. Otherwise, the Contractor may mix the existing bituminous surfacing in with the existing limerock material.

210-5TRENCHES AND SUBGRADE.

Where widening the existing base, excavate trenches along the edges of the existing pavement to the width and depth indicated in the Plans. Excavate the trenches before scarifying the existing base. Shape, compact, and maintain the subgrade of the trenches and turnouts as specified in 120-9, except that when stabilization of the subgrade is not included in the Plans, do not compact the trenches unless the native underlying material has been disturbed. Dispose of all excavated materials as specified in 120-5.

210-6SPREADING, SHAPING, AND COMPACTING ROCK.

210-6.1 General: Scarify and disk, or otherwise loosen the existing base to such exte nt that no pieces larger than 3 1/2 inches in greatest dimension remain bonded together. Then, spread the material to the full width of the proposed new base course and to a grade and cross section roughly parallel to the finished grade. Meet the requirements of 200-7.1.

210-6.2 Widening Strips: Where the widening strips are not of sufficient width to permit the use of standard compaction equipment, compact the rock in accordance with 200-6.5.

210-6.3 Construction Sequence: Do not spread any material for the upper course until the Engineer has made the density tests on the lower course and has determined that the specified compaction requirements have been met. Then, construct the second course of new limerock in accordance with the requirements of 200-5 through 200-7.

210-7 PRIMING AND MAINTAINING.

Meet the requirements of 200-8

METHOD OF MEASUREMENT

210-8.1 Base: The quantity to be paid for will be the plan quantity, in square yards, completed and accepted, including the areas of widened base and of turnouts constructed of new limerock material.

210-8.2 Limerock Material: The quantity to be paid for will be the number of cubic yards of only the new limerock material actually placed in the road and accepted. The quantity will be determined by measurement in loose volume, in truck bodies, at the point of dumping on the road, with proper deduction for all materials wasted, left in trucks or otherwise not actually used in the road. For this purpose, level the material in the truck bodies to facilitate accurate measurement.

BASIS OF PAYMENT

210-9 Prices and payments will be full compensation for performing all work specified in this Section including prime coat application as specified in 300-7, except all earthwork required for this work, and the work of removal and disposal of the existing bituminous surfaces, if required, as indicated in the Plans.

When the plans do not provide for direct payment for such work, the cost will be included in the Contract unit price for reworking Limerock base.

Payment will be made under:

Item P-210-9.1 – REWORKING OF LIMEROCK BASE COURSE – per square yard

END OF ITEM P-210

ITEM P-409

SUPERPAVE ASPHALT CONCRETE

1.0 DESCRIPTION

1.1 GENERAL. This work shall consist of constructing Superpave asphalt concrete pavement courses, pavement restoration for pipe crossing, to the lines and grades shown on the plans and to the satisfaction of the Engineer.

The requirements of Section 334, including the applicable requirements of Sections 125, 320, and 330, as specified in the Florida Department of Transportation Standard Specifications shall apply with the following modifications and/or revisions as described below or in Contract Plans.

2.0 MATERIALS

2.1 Materials shall conform to the requirements listed above. The Superpave Asphalt mix shall be **Type SP-9.5, Fine Mix, Traffic Level B**, unless otherwise aproved by the Engineer.

3.0 METHOD OF MEASUREMENT

3.1 The quantity of asphalt to be paid for will be the weight of the mixture, in tons, completed and accepted, as outlined in Section 334 of the Florida Department of Transportation Standard Specifications.

3.2 The quantity of pavement restoration to be paid for will be the lump sum quantiy of the specied work.

4.0 BASIS OF PAYMENT

4.1 The unit price bid per ton for the pavement course(s) shall include the cost of furnishing all equipment, materials, testing, and labor necessary to complete the item as specified, and to the satisfaction of the Engineer.

Payment will be made under:

Item P-409-4.1	1.5-Inch Asphalt Surface Course, FDOT SP-12.5mm – per ton
Item P-409-4.1	2.5-Inch Asphalt Surface Course, FDOT SP-12.5mm – per ton

END OF ITEM P-409

ITEM P-411

PERVIOUS PAVEMENT

1.0 DESCRIPTION

1.1 GENERAL. This item shall consist of constructing a pervious pavement consisting of a permeable asphalt concrete pavement, open graded bedding and base aggegate layers, and geotextile fabric on a prepared subgrade, to the lines and grades shown on the plans and to the satisfaction of the Engineer.

2.0 MATERIALS

2.1 Permeable Asphalt Pavement shall be an open graded bituminous asphalt concrete pavement composed of aggregate, asphalt binder, and additives (such as fibers and/or hydrated lime). The specific materials and mix design shall be approved through the shop drawing review process, and shall have a proven record of success as pervious vehicular parking spaces.

2.2 Bedding aggregate layer shall consists of crushed, angular stone meeting No. 89 gradation, with less than 2% passing the No. 200 sieve, and otherwise meeting the requirements of FDOT Section 901 for Coarse Aggregates.

2.3 Base aggregate layer shall consist of crushed, angular stone meeting No. 57 gradation, with les than 2% passing the No. 200 sieve, and otherwise meeting the requirements of FDOT Section 901 for Coarse Aggregates.

2.4 Geotextile fabric shall be a non-woven, needle punched fabric intended for separation and subsurface drainage applications. The geotextile shall be ACF N080 or an approved equal.

3.0 SUBMITTALS

3.1 Product submittals are required for all materials, through the shop drawing review process. The Engineer shall review submittals and provide a written response prior to ordering materials.

4.0 QUALITY ASSURANCE

4.1 The pervious pavement installer shall have sufficient experience with pervious pavement and pervious open graded asphalt concrete. Documentation of such experience shall be provided. The material producer shall meet the plant and equipment requirements of the FDOT. Quality Assurance procedures in accordance with FDOT section 337 FC-5 mixtures shall be required.

4.2 A pre-construction meeting shall be held to discuss project requirements including material storage and installation procedures. This meeting shall include the General Contractor Superintendent, pervious pavement subcontractor foreman, material producer representative and the Engineer.

4.3 Measures shall be taken to insure that materials remain free of sediment and clogging prior to and during installation.

4.4 A mock-up of the paver pattern shall be provided for approval if requested.

4.5 The Engineer shall have an oppurtunity to inspect each layer of the installation prior to it being covered up.
4.6 The prepared subgrade shall be tested for density.
4.7 The base, bedding and pavement layers shall be tested for smoothness and slope.

5.0 CONSTRUCTION METHODS

5.1 EXCAVATION & PREPARED SUBGRADE. Excavation can be achieved through standard means (per Item P-152), but care should be taken not to overcompact the bottom of the excavation and prepared subgrade surface. The prepared subgrade surface shall be unyielding, relatively smooth, to the lines and grades shown on the Plans, and free from organic, objectionable and other unsuitable materials to the satisfaction of the Engineer. The prepared subgrade surface shall have a density between 90-95% of the modified proctor maximum density. Should the soil be overcompacted, then the surface shall be scarified and regraded to meet density requirements. The prepared subgrade shall be approved by the Engineer prior to installation of the geotextile fabric.

5.2 EDGE RESTRAINTS. Edge restraints along the perimeter of the pervious pavement area should be installed prior to installation of geotextile fabric and base aggregate. Edge restraints shall consists of concrete curb (Item 522). If concrete curb is not specified, then an alternative ege restraint method shall be approved by the Engineer.

5.3 GEOTEXTILE FABRIC. Installation shall be in conformance with the manufacturer's recommendations. The geotextile shall be rolled out flat on the prepared subgrade with no wrinkles or folds. Roll sides shall be overlapped a minimum of 18 inches and roll ends shall be overlapped a minimum of 36 inches. Overlaps shall be in the same direction as aggregate placement. Raise the edges to cover the sides of the soil subgrade, and provide for overlap of the edge restraints, as detailed in the Plans. Secure the fabric ends and edges with pins or other approved means prior to placement of base aggregate. No equipment shall be operated on the geotextile fabric. The installed geotextile fabric shalll be approved by the Engineer prior to instllation of the aggregate bedding layer.

5.4 BASE AGGREGATE. Moisten, spread and compact the No. 57 stone base layer in one lift. Compact this layer with a minimum of 2 passes in the vibratory mode and two passes in the static mode with a minimum 10 ton vibratory roller, or approved alternate, until there is no visible movement of the base material. Do not crushe the aggregate. The surface of the base shall be within a +/- 1 inch tolerance of the specified grade. Correct any areas that are not within tolerance by adding or removing base aggregate. The finished based layer surface shalll be approved by the Engineer prior to instllation of the bedding aggregate layer.

5.5 BEDDING AGGREGATE. Moisten, spread and screed the bedding aggregate on the base course in order to obtain a 2 inch thick layer. Fill the voids left by the removed screed rails with bedding aggregate. The screeded surface of the bedding layer shall be within a +/- 3/8 inch tolerance of the specified grade. Correct any areas that are not within tolerance by adding or removing bedding material. Keep the bedding layer loose until pavement is installed. Areas that have been compacted, for whatever reason, shall be scarified, loosened and restored. No traffic shall be alllowed on the bedding layer.

5.6 PERVIOUS OPEN GRADED ASPHALT PAVEMENT. Standard Hot-Mix-Asphalt pavement installtion practices meeting the equipment requirement of FDOT section 320 and general construction requirements of section 330 shall be followed, with appropriate modifcations allowed/required for open-graded pervious asphalt pavement mixtures such as those required by sectiion 337 for FC-5 mixtures.

6.0 MAINTAINANCE, CLEANING & PROTECTION.

6.1 Upon completion of the installation, remove surplus materials, rubbish, tools, and equipment barriers. After work in the section is complete, the Contractor shall be responsible for protecting work from sediment deposition and damage due to subsequent construction activity in the area.

7.0 METHOD OF MEASUREMENT.

7.1 The quantity to be paid shall be the area in square feet of the completed and accepted pervious pavement.

8.0 BASIS OF PAYMENT

8.1 The unit price bid per square foot for pervious pavement shall include the cost of furnishing all equipment, materials, testing, and labor necessary to complete the item as specified, and to the satisfaction of the Engineer.

Payment will be made under:

Item P-411-8.1	Pervious Pavement, complete – per square foot

END OF ITEM P-411

ITEM P-420

CEMENT CONCRETE PAVEMENT

1.0 DESCRIPTION

1.1 GENERAL. This work shall consist of constructing cement concrete pavement to the lines and grades shown on the plans and to the satisfaction of the Engineer.

The requirements of Section 350, including the applicable requirements of all referenced Sections, as specified in the Florida Department of Transportation Standard Specifications shall apply with the following modifications and/or revisions as described below or in the Contract Plans.

2.0 MATERIALS

2.1 Materials shall conform to the requirements listed above**.**

Meet the following requirements except as modified per FDOT Section 350:

Concrete.....Section 346
Curing Materials.....Section 925
Embedded Items.....Section 931
Joint Seal.....Section 932

Submit a mix design to the Engineer for approval prior to use. Provide concrete with a minimum 28 day compressive strength of 3,000 psi and maximum water to cementitious materials ratio of 0.50. The requirements of Sections 346-3 and 346-4 do not apply. Notify the Engineer if any of the component quantities are adjusted. If any material sources change, resubmit the mix design to the Engineer for approval prior to use.

3.0 METHOD OF MEASUREMENT

3.1 The quantity of cement concrete pavement to be paid for will be the area, in square yards, per the Plans or otherwise approved areas, completed and accepted, as outlined in Section 334 of the Florida Department of Transportation Standard Specifications.

4.0 BASIS OF PAYMENT

4.1 The unit price bid per square yard for the pavement shall include the cost of furnishing all equipment, materials, testing, and labor necessary to complete the item as specified, and to the satisfaction of the Engineer.

Payment will be made under:

Item P-420-4.1	8-Inch Reinforced Cement Concrete Pavement – per square yard

END OF ITEM P-420

ITEM P-710

PAINTED PAVEMENT MARKINGS

1.0 DESCRIPTION

1.1 GENERAL. This work shall consist of constructing pavement markings, to the lines shown on the plans and to the satisfaction of the Engineer.

The requirements of Section 710, including the applicable requirements of Section 971 and any other referenced sections, as specified in the Florida Department of Transportation Standard Specifications shall apply with the following modifications and/or revisions as described below or in Contract Plans.

2.0 MATERIALS

2.1 Paint type shall be "Durable Paint" with the associated appropriate glass spheres.

3.0 CONSTRUCTION METHODS

3.1 The final pavement surface (for new pavement surfaces) shall be allowed to cure for a minimum of 30 days prior to final paint application, unless otherwise recommended by the paint manufacturer and approved by the Engineer.

4.0 METHOD OF MEASUREMENT

4.1 The quantity of pavement markings to be paid for shall be the area, in square feet, completed and accepted.

5.0 BASIS OF PAYMENT

5.1 The unit price bid per linear foot shall include the cost of furnishing all equipment, materials, testing, and labor necessary to complete the item as specified, and to the satisfaction of the Engineer.

Payment will be made under:

Item P-710-5.1 Painted Pavement Markings – per square foot

END OF ITEM P-710

ITEM T-904

SODDING

1.0 DESCRIPTION

1.1 This item shall consist of furnishing, hauling, and placing approved live sod on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

2.0 MATERIALS

2.1 SOD. Sod furnished by the Contractor shall have a good cover of living or growing grass. This shall be interpreted to include grass that is seasonally dormant during the cold or dry seasons and capable of renewing growth after the dormant period. All sod shall be obtained from areas where the soil is reasonably fertile and contains a high percentage of loamy topsoil. Sod shall be cut or stripped from living, thickly matted turf relatively free of weeds or other undesirable foreign plants, large stones, roots, or other materials that might be detrimental to the development of the sod or to future maintenance. At least 70% of the plants in the cut sod shall be composed of the species stated in the Contract, and any vegetation more than 6 inches (150 mm) in height shall be mowed to a height of 3 inches (75 mm) or less before sod is lifted. Sod, including the soil containing the roots and the plant growth showing above, shall be cut uniformly to a thickness not less than 1-1/4 inches thick including a 3/4 inch thick layer of roots and topsoil. Unless a particular type of sod is called for in the Plans or elsewhere in the Contract, sod may be either Centipede, Bahia, or Bermuda at the Contractor's option.

2.2 LIME. Lime shall conform to the requirements of 901-2.2.

2.3 FERTILIZER. Fertilizer shall conform to the requirements of 901-2.3.

2.4 WATER. The water shall be sufficiently free from oil, acid, alkali, salt, or other harmful materials that would inhibit the growth of grass. It shall be subject to the approval of the Engineer prior to use.

2.5 SOIL FOR REPAIRS. The soil for fill and topsoiling of areas to be repaired shall conform to the requirements of 901-2.4.

3.0 CONSTRUCTION METHODS

3.1 GENERAL. Areas to be solid, strip, or spot sodded shall be shown on the plans. Areas requiring special ground surface preparation such as tilling and those areas in a satisfactory condition that are to remain undisturbed shall also be shown on the plans.

Suitable equipment necessary for proper preparation of the ground surface and for the handling and placing of all required materials shall be on hand, in good condition, and shall be approved by the Engineer before the various operations are started. The Contractor shall demonstrate to the Engineer before starting the various operations that the application of required materials will be made at the specified rates.

3.2 PREPARING THE GROUND SURFACE. After grading of areas has been completed and before applying fertilizer and limestone, areas to be sodded shall be raked or otherwise

cleared of stones larger than 2 inches (50 mm) in any diameter, sticks, stumps, and other debris which might interfere with sodding, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes occurs after grading of areas and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage. This may include filling gullies, smoothing irregularities, and repairing other incidental damage.

3.3 APPLYING FERTILIZER AND GROUND LIMESTONE. Following ground surface preparation, fertilizer shall be uniformly spread at a rate which will provide not less than the minimum quantity of each fertilizer ingredient, as stated in the Contract. If use of ground limestone is required, it shall then be spread at a rate that will provide not less than the minimum quantity stated in the special provisions. These materials shall be incorporated into the soil to a depth of not less than 2 inches (50 mm) by discing, raking, or other methods acceptable to the Engineer. Any stones larger than 2 inches (50 mm) in any diameter, large clods, roots, and other litter brought to the surface by this operation shall be removed.

3.4 OBTAINING AND DELIVERING SOD. After inspection and approval of the source of sod by the Engineer, the sod shall be cut with approved sod cutters to such a thickness that after it has been transported and placed on the prepared bed, but before it has been compacted, it shall have a uniform thickness of not less than 2 inches (50 mm). Sod sections or strips shall be cut in uniform widths, not less than 10 inches (250 mm), and in lengths of not less than 18 inches (45 cm), but of such length as may be readily lifted without breaking, tearing, or loss of soil. Where strips are required, the sod must be rolled without damage with the grass folded inside. The Contractor may be required to mow high grass before cutting sod.

The sod shall be transplanted within 24 hours from the time it is stripped, unless circumstances beyond the Contractor's control make storing necessary. In such cases, sod shall be stacked, kept moist, and protected from exposure to the air and sun and shall be kept from freezing. Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected. Where the soil is too dry, permission to cut sod may be granted only after it has been watered sufficiently to moisten the soil to the depth the sod is to be cut.

3.5 LAYING SOD. Sodding shall be performed only during the seasons when satisfactory results can be expected. Frozen sod shall not be used and sod shall not be placed upon frozen soil. Sod may be transplanted during periods of drought with the approval of the Engineer, provided the sod bed is watered to moisten the soil to a depth of at least 4 inches (100 mm) immediately prior to laying the sod.

The sod shall be moist and shall be placed on a moist earth bed. Pitch forks shall not be used to handle sod, and dumping from vehicles shall not be permitted. The sod shall be carefully placed by hand, edge to edge and with staggered joints, in rows at right angles to the slopes, commencing at the base of the area to be sodded and working upward. The sod shall immediately be pressed firmly into contact with the sod bed by tamping or rolling with approved equipment to provide a true and even surface, and insure knitting without displacement of the sod or deformation of the surfaces of sodded areas. Where the sod may be displaced during sodding operations, the workmen when replacing it shall work from ladders or treaded planks to prevent further displacement. Screened soil of good quality shall be used to fill all cracks between sods. The quantity of the fill soil shall not cause smothering of the grass. Where the grades are such that the flow of water will be from paved surfaces across sodded areas, the surface of the soil in the sod after compaction shall be set approximately 1 inch (25 mm) below the pavement edge. Where the flow will be

over the sodded areas and onto the paved surfaces around manholes and inlets, the surface of the soil in the sod after compaction shall be placed flush with pavement edges.

On slopes steeper than 1 vertical to 2-1/2 horizontal and in v-shaped or flat-bottom ditches or gutters, the sod shall be pegged with wooden pegs not less than 12 inches (300 mm) in length and have a cross-sectional area of not less than 3/4 square inch (18 square millimeter). The pegs shall be driven flush with the surface of the sod.

3.6 WATERING. Adequate water and watering equipment must be on hand before sodding begins, and sod shall be kept moist until it has become established and its continued growth assured. In all cases, watering shall be done in a manner that will avoid erosion from the application of excessive quantities and will avoid damage to the finished surface.

3.7 ESTABLISHING TURF.

a. General. The Contractor shall provide general care for the sodded areas as soon as the sod has been laid and shall continue until final inspection and acceptance of the work.

b. Protection. All sodded areas shall be protected against traffic or other use by warning signs or barricades approved by the Engineer.

c. Mowing. The Contractor shall mow the sodded areas with approved mowing equipment, depending upon climatic and growth conditions and the needs for mowing specific areas. In the event that weeds or other undesirable vegetation are permitted to grow to such an extent that, either cut or uncut, they threaten to smother the sodded species, they shall be mowed and the clippings raked and removed from the area.

3.8 REPAIRING. When the surface has become bullied or otherwise damaged during the period covered by this contract, the affected areas shall be repaired to re-establish the grade and the condition of the soil, as directed by the Engineer, and shall then be sodded as specified in 904-3.5.

4.0 METHOD OF MEASUREMENT

4.1 This item shall be measured on the basis of the area in square yards (square meters) of the surface covered with sod and accepted.

5.0 BASIS OF PAYMENT

5.1 This item will be paid for on the basis of the contract unit price per square yard (square meter) for sodding, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

Payment will be made under:

Item T-904-5.1 Sodding—per square yard (square meter)

END OF ITEM T-904

ITEM T-905

TOPSOILING

1.0 DESCRIPTION

1.1 This item shall consist of preparing the ground surface for topsoil application, removing topsoil from designated stockpiles or areas to be stripped on the site or from approved sources off the site, and placing and spreading the topsoil on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

2.0 MATERIALS

2.1 TOPSOIL. Topsoil shall be the surface layer of soil with no admixture of refuse or any material toxic to plant growth, and it shall be reasonably free from subsoil and stumps, roots, brush, stones (2 inches or more in diameter), and clay lumps or similar objects. Brush and other vegetation that will not be incorporated with the soil during handling operations shall be cut and removed. Ordinary sods and herbaceous growth such as grass and weeds are not to be removed but shall be thoroughly broken up and intermixed with the soil during handling operations. The topsoil or soil mixture, unless otherwise specified or approved, shall have a pH range of approximately 5.5 pH to 7.6 pH, when tested in accordance with the methods of testing of the association of official agricultural chemists in effect on the date of invitation of bids. The organic content shall be not less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction). There shall be not less than 20% nor more than 80% of the material passing the 200 mesh (0.075 mm) sieve as determined by the wash test in accordance with ASTM C 117.

Natural topsoil may be amended by the Contractor with approved materials and methods to meet the above specifications.

2.2 INSPECTION AND TESTS. Within 10 days following acceptance of the bid, the Engineer shall be notified of the source of topsoil to be furnished by the Contractor. The topsoil shall be inspected to determine if the selected soil meets the requirements specified and to determine the depth to which stripping will be permitted. At this time, the Contractor may be required to take representative soil samples from several locations within the area under consideration and to the proposed stripping depths, for testing purposes as specified in 905-2.1.

3.0 CONSTRUCTION METHODS

3.1 GENERAL. Areas to be topsoiled shall be shown on the plans. If topsoil is available on the site, the location of the stockpiles or areas to be stripped of topsoil and the stripping depths shall be shown on the plans.

Suitable equipment necessary for proper preparation and treatment of the ground surface, stripping of topsoil, and for the handling and placing of all required materials shall be on hand, in good condition, and approved by the Engineer before the various operations are started.

3.2 PREPARING THE GROUND SURFACE. Immediately prior to dumping and spreading the topsoil on any area, the surface shall be loosened by discs or spike-tooth harrows, or by other

means approved by the Engineer, to a minimum depth of 2 inches (50 mm) to facilitate bonding of the topsoil to the covered subgrade soil. The surface of the area to be topsoiled shall be cleared of all stones larger than 2 inches (50 mm) in any diameter and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired planting. Limited areas, as shown on the plans, which are too compact to respond to these operations shall receive special scarification.

Grades on the area to be topsoiled, which have been established by others as shown on the plans, shall be maintained in a true and even condition. Where grades have not been established, the areas shall be smooth-graded and the surface left at the prescribed grades in an even and properly compacted condition to prevent, insofar as practical, the formation of low places or pockets where water will stand.

3.3 OBTAINING TOPSOIL. Prior to the stripping of topsoil from designated areas, any vegetation, briars, stumps and large roots, rubbish or stones found on such areas, which may interfere with subsequent operations, shall be removed using methods approved by the Engineer. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means shall be removed.

When suitable topsoil is available on the site, the Contractor shall remove this material from the designated areas and to the depth as directed by the Engineer. The topsoil shall be spread on areas already tilled and smooth-graded, or stockpiled in areas approved by the Engineer. Any topsoil stockpiled by the Contractor shall be rehandled and placed without additional compensation. Any topsoil that has been stockpiled on the site by others, and is required for topsoiling purposes, shall be removed and placed by the Contractor. The sites of all stockpiles and areas adjacent thereto which have been disturbed by the Contractor shall be graded if required and put into a condition acceptable for seeding.

When suitable topsoil is secured off the airport site, the Contractor shall locate and obtain the supply, subject to the approval of the Engineer. The Contractor shall notify the Engineer sufficiently in advance of operations in order that necessary measurements and tests can be made. The Contractor shall remove the topsoil from approved areas and to the depth as directed. The topsoil shall be hauled to the site of the work and placed for spreading, or spread as required. Any topsoil hauled to the site of the work and stockpiled shall be rehandled and placed without additional compensation.

3.4 PLACING TOPSOIL. The topsoil shall be evenly spread on the prepared areas to a uniform depth of 2 inches (50 mm) after compaction, unless otherwise shown on the plans or stated in the special provisions. Spreading shall not be done when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Spreading shall be carried on so that turfing operations can proceed with a minimum of soil preparation or tilling.

After spreading, any large, stiff clods and hard lumps shall be broken with a pulverizer or by other effective means, and all stones or rocks (2 inches (50 mm) or more in diameter), roots, litter, or any foreign matter shall be raked up and disposed of by the Contractor. after spreading is completed, the topsoil shall be satisfactorily compacted by rolling with a cultipacker or by other means approved by the Engineer. The compacted topsoil surface shall conform to the required lines, grades, and cross sections. Any topsoil or other dirt falling upon pavements as a result of hauling or handling of topsoil shall be promptly removed.

4.0 METHOD OF MEASUREMENT

4.1 Topsoil obtained on the site shall be measured by the number of cubic yards (cubic meters) of topsoil measured in its original position and stripped or excavated. Topsoil stockpiled by others and removed for topsoiling by the Contractor shall be measured by the number of cubic yards (cubic meters) of topsoil measured in the stockpile. Topsoil shall be measured by volume in cubic yards (cubic meters) computed by the method of end areas.

4.2 Topsoil obtained off the site shall be measured by the number of cubic yards (cubic meters) of topsoil measured in its original position and stripped or excavated. Topsoil shall be measured by volume in cubic yards (meters) computed by the method of end areas.

There will be no measurement for topsoiling.

5.0 BASIS OF PAYMENT

5.1 Payment will be made at the contract unit price per cubic yard (cubic meter) for topsoiling (obtained on the site). This price shall be full compensation for furnishing all materials and for all preparation, placing, and spreading of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

5.2 Payment will be made at the contract unit price per cubic yard (cubic meter) for topsoiling (obtained off the site). This price shall be full compensation for furnishing all materials and for all preparation, placing, and spreading of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

There shall be no separate payment for topsoiling, as it is incidental to other items of work where restoration of disturbed areas is required in areas that sod is not specified.

Payment will be made under:

Item T-905-5.1 Topsoiling —per cubic yard

TESTING MATERIALS

ASTM C 117 Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing

END OF ITEM T-905

SECTION 428

POTABLE WATER

1.0 GENERAL

1.1 SCOPE OF WORK: The Contractor shall furnish and install a potable water piping system, complete, tested and ready for operation. The work shall also include such connections, reconnections, temporary service, and all other provisions in regard to the existing operation and modification as is required to perform the new work. Further, all connections, fittings, laterals and sleeves, valves (including air release valves and vaults) and restraints will be incidental for work performed under this pay item. All references to Industry Standards (ASTM, ANSI, AWWA, etc.) shall be to the latest revision unless otherwise stated.

1.2. CONTRACTOR WARRANTY: The Contractor shall supply to the Owner a one (1) year unconditional warranty. The warranty shall include materials and installation and shall constitute complete replacement and delivery to the site of materials and installation of same to replace defective materials or defective workmanship with new materials/workmanship conforming to the specifications.

1.3 SUBMITTALS: Submittals of "Shop and Setting Drawings", "Working Drawings", "Catalog Data", and "Certifications" for review shall be submitted in accordance with appropriate sections of the General Provisions. Submittals and Certifications required are as follows:

A. Catalog Data and Certification showing that the following items meet requirements specified:

1. Valves and accessories.
2. Pipe and fittings
3. Backflow preventor and assemblies.
4. Fire hydrants.
5. Fire department connections.

B. Operation and Maintenance Data: For the following:
1. Valves.
2. Backflow preventers.
3. Protective enclosures.
4. Hydrants.

C. The Contractor shall supply the Engineer water main system shop drawings to be submitted to the **City of Fernandina Beach** prior to scheduling of a pre-construction conference. A pre-construction conference is required regardless of other agencies' requirements.

2.0 INSTALLATION

2.1. REFERENCE POINTS AND LAYOUT: The Contractor shall be responsible for setting all grade, lines and levels. The Contractor or Contractor's Surveyor will provide centerline of construction and will establish a bench mark. Any reference points, points of intersection, property corners, or bench marks, which are disturbed during construction, shall be restored by a Land Surveyor registered to practice in the State of Florida, and all costs thereof shall be

borne by the Contractor. The Contractor shall assume all responsibility for the correctness of the grade and alignment stakes.

2.2. HANDLING AND CUTTING PIPE: Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe, scratching or marring machined surfaces, and abrasion of the pipe coating. The lined Pipe and Fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. If damaged, the material shall be repaired in accordance with the liner manufacturer's recommendations. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. In any pipe showing a distinct crack in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portion, if so approved by the CITY, may be cut off before the pipe is laid so that the pipe used shall be perfectly sound. The cut shall be made in the sound barrel at a point at least 12 inches from the visible limits of the crack. Except as otherwise approved, all cutting shall be done with a power driven cut off saw. All cut ends shall be examined for possible cracks caused by cutting.

3.0 PIPE INSTALLATION:

3.1. GENERAL REQUIREMENTS: Water mains shall be constructed of the materials specified and as shown on the drawings. All PVC C900 / DR18 pipe shall be laid in accordance with AWWA C605. Pipe and fittings shall be carefully handled to avoid damage, and if feasible, while they are suspended over the trench before lowering, they shall be inspected for defects and to detect cracks. Defective, damaged, or unsound pipe or fittings shall be rejected. Each section of the pipe shall rest upon the pipe bed for the full length of its barrel, with recesses excavated to accommodate bells and joints. Any pipe which has its grade or joint disturbed after laying shall be taken up and re-laid. Only suitable soils (no heavy clay) shall be utilized in the backfill operation up to 12 inches above the pipe. The maximum joint deflection shall be limited to 80% of the pipe manufacturer's recommendation. All precautions shall be taken to prevent sand or other foreign material from entering the pipe during installation. If necessary, a heavy, tightly woven canvas bag of suitable size shall be placed over each end of the pipe before lowering into the trench and left there until the connection is made to the adjacent pipe. Any time the pipe installation is not in progress, the open ends of pipe shall be closed by a watertight plug or other method approved by the Engineer. Plugs shall remain in pipe ends until all water is removed from the trench. Any sand or foreign material that enters the pipe shall be removed from the pipe immediately. No pipe shall be installed when trench conditions (standing water, excess mud, etc.) or the weather (rain, etc.) is unsuitable for such work, except by permission of the Engineer. Any section of pipe already laid which is found to be defective or damaged shall be replaced with new pipe. The contractor shall coordinate utility locates with Sunshine State One-Call of Florida, Inc. (#800/432-4770 or web site (www.callsunshine.com), at a minimum. The use of 90 degree bends 24-inch and larger size shall be avoided if possible (two 45 degree bends or other method is preferred).

3.2. SPECIAL CONSTRUCTION REQUIREMENTS FOR 24-INCH AND LARGER PVC PIPE: For PVC pipe 24 inch and larger, unless approved otherwise by the CITY, a foundation bed of granular material (57 stone) shall be placed under and around all ducle iron fittings and valves for additional support of heavy system components. A foundation bed of granular material shall be provided for all valves 20-inch size and larger. For granular materials, the minimum vertical limit is 12 inches under the fitting or valve, up to 1/3 the overall height of the

fitting or valve. The minimum horizontal limits of the granular material shall be 12 inches in all directions beyond the outer edges of the fitting or valve. The compaction of soils below the granular material shall be at 98% of the maximum density. Payment for this work shall be included in the associated fitting or valve unit cost. All spool pieces between 24 inch and larger ductile fittings and valves shall be of ductile plain end pipe (no PVC spool pieces allowed). Where possible, a full joint of pipe (no short pipe lengths) shall be connected to all fillings and valves. No joint deflection shall be allowed at the fillings or valves.

3.3. PIPE COVER: The cover over all piping less than 24-inch size shall be a minimum of 30 inches in unpaved areas and 36 inches in paved areas with a maximum of 60 inches, unless approved otherwise by the CITY. The cover over all piping 24-inch size or greater shall be 36 inches (paved or unpaved areas), with a maximum of 84 inches, unless otherwise approved. Cover for pipe under pavement shall be measured from the finished grade. Any reduction in pipe cover will require approval from the CITY and the Engineer. Greater depths will be permitted where required to miss obstructions only. Lines shall be located as shown on the drawings. The Contractor shall investigate well in advance of pipe laying any conflicts which may require readjustments in planned locations and advise the Engineer of the results of these investigations so that the Engineer may give instructions as to the modifications required.

3.4. INSTALLATION OF IRON PIPING: All iron pipe and fillings shall be laid in accordance with the pipe manufacturer's recommendations and the American Water Works Association Specification AWWA C600.

3.5. THRUST RESTRAINT: All non-flanged fillings and valves shall be restrained using one of the following methods:

3.5.1. Mechanical restraint at fittings and valves and mechanical restraint along adjacent joints of pipe to a length as specified in the Restraint Joint Schedule at a minimum.

3.5.2. Mechanical joint fillings and valves shall be restrained using an approved restraining device and/or tie rods along adjacent joints of pipe to a length as specified in the following chart. All pipe sizes 3 inches - 8 inches in diameter shall have a minimum of 2 tie rods per joint, pipe sizes 10 inches - 12 inches in diameter shall have a minimum of 4 tie rods per joint and pipe sizes 14 inches - 20 inches in diameter shall have 6 tie rods per joint. To connect tie rods to filling, offset eyebolts shall be used. Tie rods (core 10 steel or 316 S.S.) shall be 3/4 inch diameter steel, threaded as required, installed with a washer and nut (same material as the rod) on either side of the joint.

3.5.3. The use of thrust blocks shall be limited to situations such as point repair where exposing several joints of pipe is not feasible due to existing ground conditions and also must be used with mechanical joint restraining devices when, in the judgment of the Engineer, the nature and criticality of an installation is such as to require positive assurance of stability. Concrete collars with tie rods may be used on dead end lines at the Contractors discretion. Concrete used for this purpose shall be 2,500 psi minimum. When applicable, schedule and details for the required thrust blocks are included on the drawings. The CITY Standard Details show minimum size thrust blocks for use in good soil. Poor soils will require larger thrust blocks.

3.5.4. JOINT RESTRAINTS WITHIN CARRIER PIPE: All joints within steel casing pipe shall be restrained with mechanical restraining devices. End joints shall be tie rodded, with the ends of the rods welded to the end of the casing.

3.5.5. CASING SPACER INSTALLATION: All carrier pipes in casings shall utilize casing spacers installed on the carrier pipe, inside the casing pipe. Casing spacers shall be installed one foot on both sides of each carrier pipe joint, and at ten feet intervals along the carrier pipe for pipe up to 48 inches. For carrier pipes larger than 48 inches, casing placement shall be as recommended by the casing spacer manufacturer. A casing spacer shall also be installed within two feet of each of the ends of the casing pipe.

3.5.6. LOCATE WIRE INSTALLATION AND TESTING: Contractor shall furnish and install locate wiring on all PVC, Ductile Iron, and HDPE water main piping, and services larger than 2 inches. No wire shall be installed on above ground installations or water services 2 inches and smaller. Locate wiring shall be 10 gauge, single strand, UF rated (direct burial), copper wire with 30 mil (minimum) insulation. The outside color of the wire shall be either white or yellow.

Locate wire must be attached to the water mains and services with plastic ties at each side of the bell joint or fitting, and at 10 foot intervals along pipeline (at a minimum). Locate wire shall be brought to grade within a valve box or Locating Station box, as required, at 475 foot intervals (maximum). Locate wire shall be installed in either the 1:00 or 11:00 position on the pipe. Connection or splices underground which are not inside a locate box (or valve box), shall be prohibited.

Installed locate wiring shall be tested by the Contractor as part of the final inspection procedure, using a certified tester and approved testing equipment. A tone shall be put on the locate wire. The technician shall trace the entire length of the installed wire and spot paint the location at least at 200-foot intervals. All laterals and sub-outs shall be marked and recorded. A final Locate Wire Report shall be prepared and submitted to the City for review and approval. The report shall include a signed statement from the certified tester which certifies that all installed wire was successfully traced with no open breaks. The report shall include a copy of the project site drawings which indicates all field notes, breaks found/repaired, depths, and other applicable field remarks by the certified tester.

The Contractor is responsible for procuring and completing all necessary testing and reports as required by the City to receive final acceptance and approval of the completed water main, at no cost to the Owner.

4.0 PIPE AND FITTINGS

4.1 MECHANICAL-JOINT, DUCTILE-IRON PIPE: AWWA C151, with mechanical-joint, bell- and plain-spigot end unless grooved or flanged ends are
indicated.

4.1.1 MECHANICAL-JOINT, DUCTILE-IRON FITTINGS: AWWA C110, ductile- ~~or gray-~~iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Glands, Gaskets, and Bolts: AWWA C111, ductile- ~~or gray-~~iron glands, rubber gaskets, and steel bolts.

4.2 PUSH-ON JOINT, DUCTILE-IRON PIPE: AWWA C151, with push-on-joint, bell- and plain-spigot end unless grooved or flanged ends are indicated.

4.2.1 PUSH-ON JOINT, DUCTILE-IRON FITTINGS: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Gaskets: AWWA C111, rubber.

4.3 FLANGED JOINTS, DUCTILE-IRON PIPE (where specified): AWWA C110 and AWWA C115, flanges shall be in accordance with ANSI Specification B16.1, Class 125 with any special drilling and tapping as required to insure correct alignment and bolting. Flanges for flanged joints and flanged specials shall be integrally cast at right angles to the axis, accurately faced, and drilled smooth and true.

4.3.1. GASKETS: Rubber ring type, cloth inserted, minimum thickness of 1/8 inch.

4.3.2. **BOLTS:** Grade B conforming to ASTM Specifications for steel machine bolts, nuts, and tap bolts, designation A307.

4.4 SOFT COPPER TUBE: ASTM B 88, Type K, water tube, annealed temper.

4.4.1 COPPER FITTINGS: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

4.4.2 BRONZE FITTINGS: Compression or Flare Type.

4.5 PE, ASTM PIPE: ASTM D 2239, SIDR Numbers 5.3, 7, or 9; with PE compound number required to give pressure rating not less than 200 psig.

4.5.1 BRONZE FITTINGS: Compression Type with Stainless Steel inserts.

4.6 PVC, AWWA PIPE: AWWA C900, Class 200, with bell end with gasket and spigot end.

4.6.1 Comply with UL 1285 for fire-service mains if indicated.

4.6.2 PVC FABRICATED FITTINGS: AWWA C900, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

4.6.3 PVC MOLDED FITTINGS: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

5.0 JOINING MATERIALS

5.1 Joining materials shall meet all applicable codes.

5.2 BRAZING FILLER METALS: AWS A5.8, BCuP Series.

5.3 SOLDERING FLUX: ASTM B 813, water-flushable type.

5.4 SOLDER FILLER METAL: ASTM B 32, lead-free type with 0.20 percent maximum lead content.

6.0 VALVES

6.1 AWWA, CAST-IRON, GATE VALVES:

6.1.1 NONRISING-STEM, RESILIIENT-SEATED GATE VALVES: AWWA C509, gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.

a. Minimum Working Pressure: 200 psig.
b. 2-inch operating nut.
c. End Connections: Mechanical joint.
d. Interior Coating: Complying with AWWA C5550.

7.0 GATE VALVE ACCESSORIES AND SPECIALTIES

7.1 TAPPING-SLEEVE ASSEMBLIES: Comply with MSS SP-60. Include sleeve and valve compatible with drilling machine.

7.1.1 TAPPING SLEEVE: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.

7.1.2 VALVE: AWWA, cast-iron, non-rising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

7.2 VALVE BOXES: Comply with AWWA M44 for cast-iron valve boxes, sliding type. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," bottom section with base of size to fit over valve, and approximately 5.25-inch diameter barrel.

7.2.1 OPERATING WRENCHES: Steel tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

8.0 8.1 SERVICE-SADDLE ASSEMBLIES: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.

8.1.1 SERVICE SADDLE: Double strap, copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.

8.2 CURB VALVES: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

8.3 SERVICE BOXES FOR CURB VALVES: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," bottom section with base of size to fit over curb valve, and approximately 3-inch-diameter barrel.

8.3.1 SHUTOFF RODS: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve with brass cotter pin.

9.0 BACKFLOW-PREVENTION DEVICES

9.1 GENERAL: ASSE standard, backflow preventers.

9.1.1 WORKING PRESSURE: 150 psig minimum, unless otherwise indicated.

9.1.2 NPS 2 AND SMALLER: Bronze body with threaded ends.

9.1.3 NPS 2-1/2 AND LARGER: Bronze, cast-iron, steel, or stainless-steel body with flanged ends.

9.1.3.1 INTERIOR LINING: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.

9.1.4 INTERIOR COMPONENTS: Corrosion-resistant materials.

9.1.5 EXTERIOR FINISH: Polished chrome plate if used in chrome-plated piping system.

9.2 PIPE-APPLIED, ATMOSPHERIC-TYPE VACUUM BREAKERS: Pipe-Applied, Atmospheric-Type Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.

9.3 REDUCED-PRESSURE-PRINCIPLE BACKFLOW PREVENTERS: AWWA C511, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME A112.1.2, air-gap fitting located between two positive-seating check valves.

9.3.1 MAXIMUM PRESSURE LOSS: 12 psig; 7 psig through middle 1/3 of flow range.

9.4 ANTISIPHON-PRESSURE-TYPE VACUUM BREAKERS: AASSE 1020, suitable for continuous pressure application. Include shutoff valves, spring-loaded check valve, spring-loaded floating disc, test cocks, and atmospheric vent.

1. Maximum Pressure Loss: 5 psig; 3 psig through middle 1/3 of flow range.

10.0 FREESTANDING FIRE HYDRANT

10.1 DRY-BARREL FIRE HYDRANTS: AWWA C502, one NPS 4-1/2 and two NPS 2-1/2 outlets, 5-1/4-inch main valve, drain valve, and NPS 6 mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure, and 150-psig minimum working-pressure design.

10.1.1 OUTLET THREADS: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.

10.1.2 OPERATING AND CAP NUTS: Pentagon, 1-1/2 inches point to flat.

10.1.3 DIRECTION TO OPENING: Open hydrant valve by turning operating nut to left or counterclockwise.
Exterior Finish: Yellow alkyd-gloss enamel paint, unless otherwise indicated

11.0 WATER MAIN AND NON-WATER MAIN SEPARATION REQUIREMENTS:

11.1. It is required that "water mains" be installed, cleaned, disinfected and have a

satisfactory bacteriological survey performed in accordance with the latest applicable AWWA Standards, Chapter 62-555, F.A.C. and latest the CITY Water and Sewer Standards. For the purpose of this Section, the phrase "water mains" shall mean mains, including treatment plant process piping, conveying either raw, partially treated, or finished drinking water; fire hydrant leads; and service lines that have an inside diameter of three (3) inches or greater. In addition, the phrase "reclaimed water" refers to the water regulated under Part III of Chapter 62.210, F.A.C.

11.2. New or relocated, underground water mains shall be laid to provide a horizontal distance of at least three (3) feet between the outside of the water main and the outside of any existing or proposed storm sewer, stormwater force main, or pipeline conveying reclaimed water.

11.3. New or relocated, underground water mains shall be laid to provide a horizontal distance of at least six (6) feet, and preferably ten (10) feet, between the outside of the water main and the outside of any existing or proposed gravity or pressure-type sanitary sewer or wastewater force main. The minimum horizontal separation distance between water mains and gravity-type sanitary sewers may be reduced to three (3) feet where the bottom of the water main is laid at least six (6) inches above the top of the sewer (special case).

11.4. New or relocated, underground water mains crossing any existing or proposed gravity or vacuum-type sanitary sewer or storm sewer shall be laid so the outside of the water main is at least six (6) inches, and preferable twelve (12) inches, above or at least twelve (12) inches below the outside of the other pipeline. However, it is preferable to lay the water main above the other pipeline.

11.5. New or relocated, underground water mains crossing any existing or proposed pressure-type sanitary sewer, wastewater or stormwater force main, or pipeline conveying reclaimed water shall be laid so the outside of the water main is a least twelve (12) inches above or below the outside of the other pipeline. However, it is preferable to lay the water main above the other pipeline.

11.6. At the utility crossings described in paragraphs (4.4.) and (4.5.) above, one full length of water main pipe shall be centered above or below the other pipeline so the water main joints will be as far as possible from the other pipeline. Alternatively, at such crossings, the pipes shall be arranged so that all water main joints are at least three (3) feet from all joints in vacuum-type sanitary sewers, storm sewers, stormwater force mains, or pipelines conveying reclaimed water, and at least six (6) feet from all joints in gravity or pressure-type sanitary sewers or wastewater force mains.

11.7. New or relocated fire hydrants shall be located so that the hydrants are at least three (3) feet from any existing or proposed storm sewer, stormwater force main, or pipeline conveying reclaimed water; at least three (3) feet, and preferably ten (10) feet, from any existing or proposed vacuum-type sanitary sewer; at least six (6) feet, and preferably ten (10) feet, from any existing or proposed gravity or pressure-type sanitary sewer or wastewater force main.

11.8 Where an underground water main is being laid less than the required minimum horizontal distance from another pipeline and where an underground water main is crossing another pipeline and joints in the water main are being located less than the required minimum distance from joints in the other pipeline, the contractor shall consult the design engineer to obtain approval of any alternative construction methods, prior to construction.

11.9. In no case shall a water main be routed through a manhole structure (storm or sanitary sewer manholes) unless approved otherwise by a City manager.

12.0 SYSTEM CONNECTIONS: All connections and ties to the CITY Water System and transfer of services will be performed by the contractor under supervision of the CITY's representative.

12.1. WATER MAIN CONNECTIONS: Unless approved otherwise by THE CITY, tapped connections in the barrel of a pipe shall be less than the diameter of pipe being tapped except 4 inch pipe which may be tapped with a 4 inch tapping sleeve and valve. No taps (all sizes) shall be made within 5 pipe diameters or 5 feet (which ever is smaller) of a joint. When making 2 inch PVC water main connections to water mains, a 4" (minimum) gate valve shall be utilized with a 4" X 2", reducer connecting to the 2" main. No 2" gate valves (on the main) will be allowed.

12.2. WATER SERVICE CONNECTIONS: All water service connections (new and taps into existing mains), shall have a brass corporation stop at the main and connected directly into the service saddle. No taps (all sizes) shall be made within 5 pipe diameters or 5 feet (which ever is smaller) of a joint.

13.0 FIELD TESTING: All testing necessary to receive final approval of the proposed water main system from the City, and any other applicable agencies, shall be procured, and completed by the Contractor at no cost to the Owner.

13.1. <u>Disinfection Tests</u>:

13.1.1. All water pipe and fittings of whatever size and wherever installed on potable water lines shall be thoroughly disinfected prior to being placed in service.

Disinfection shall follow the applicable provisions of the procedure established for the disinfection of water mains as set forth in AWWA Standard C651 entitled "AWWA Standard for Disinfecting Water Mains". Dechlorination of flushing water may be required to be in compliance with the State of Florida Surface water Quality Standards (F.A.C. 62-302.530). Dechlorination is necessary if the flushing of highly chlorinated water is to be discharged directly to a surface water or to a stormwater system. If the water can be sheet flowed over a large area or discharged to a holding pond, dechlorination may be avoided.

13.1.2. The contractor shall prepare a written flushing plan which outlines water supply point and all blow-off points. Due to the limited water supply and operating limitations of the CITY system, the flushing plan must be approved by the CITY representative, prior to

implementation. The contractor shall modify the flushing plan as directed by the CITY representative, at no additional cost. Temporary blow-offs, shall be installed for the purpose of clearing the water main. Blow-offs installed on water mains up to and including 12 inches shall be the same diameter as the water main. Unless approved otherwise by the CITY representative, pipes shall be "flushed" at blow off points and at dead ends to achieve a minimum flow velocity of 3 FPS, and a minimum of 3 turn over of treated water shall be used in the flushing operation. Due to the many operating limitations of the existing water systems, the flushing operation will be scheduled (date and time), by THE CITY and will often require flushing during low water demand periods (10 p.m. to 5 a.m.). The contractor shall anticipate flushing lines during low water demand periods. The flushing operation shall continue until "clear" water samples are obtained at the discharge end of the line and is acceptable to the CITY representative. Blow-offs installed on 16 inch water mains and larger shall be the next smaller size, in diameter, than the water main being tested. Temporary blow-offs shall be removed and plugged after the main is cleared. The CITY Representative shall be present prior to and during the operation of blow-offs. The main shall be flushed prior to disinfection. The Contractor shall be responsible for the proper disposal or discharge of the water during the flushing operation. The contractor shall be responsible (at no cost to the owner) for repairing all damages, due to the flushing operation.

13.1.3. The new water main shall be connected to the existing water main at one point only for flushing purposes (no looping). The new main MUST have a blow off on the end as required previously. After the new main is thoroughly flushed, the open end shall be sealed and restrained and the main shall be thoroughly disinfected. The Contractor may use a separate source of water for flushing purposes. Upon completion of the flushing, the contractor shall proceed with disinfection as specified.

13.1.4. Anytime the new line is reopened, (to repair defective joints or pipe, defective fitting or valve), the complete disinfection process shall be repeated.

13.1.5. Bacteriological testing on the water main shall be scheduled and completed by the CITY. The CITY will collect the water samples and be responsible for completing the water analysis (lab testing).

13.1.6. Once bacteriological clearance (on 2 consecutive days of samples) has been approved, the main may be pressure tested against an existing system valve.

13.1.7. No new water main may be put in service until a Certification of Completion has been approved by the regulatory authority. The contractor must submit As-Builts, accurately depicting installed conditions as required for line clearances. The Contractor shall allow time for this process to be completed.

13.2. PRESSURE AND LEAKAGE TESTS: The Contractor shall test pipelines installed in accordance with these specifications prior to acceptance of the pipeline by the CITY or connecting pipeline to any existing pipeline or facility. All field tests shall be made in the presence of a CITY representative. Except as otherwise directed, all pipelines shall be tested. Pressure testing of PVC and ductile iron pipe (including poly service piping), shall not include HDPE water main piping. Pressure testing of HDPE main piping shall be completed separately with no PVC or ductile iron pipe included in the HDPE test section. Testing of HDPE main piping is detailed in the specification section entitled, "Horizontal Directional Drilling". Pipelines laid in excavation (other than trench excavation), shall be tested prior to the. backfilling of the excavation. All piping to operate under liquid pressure shall be tested in sections of approved length. For these tests, the Contractor shall furnish clean water, suitable

temporary testing plugs or caps, and other necessary equipment, and all labor required. If the Contractor chooses to pressure test against an existing CITY water main/valve, the new water main must be disinfected prior to connection to the CITY line. The CITY will not be responsible for failure of the pressure test due to the existing valve leaking. If positive test results cannot be obtained because the CITY valves will not hold the test pressures, the Contractor shall be required to disconnect from the CITY System and re-test independent of the CITY System and at the Contractor's expense. The CITY may elect to furnish suitable pressure gauges. If not, the contractor will provide the pressure gauges. The gauges shall be calibrated by an approved testing laboratory, with increments no greater than 2 psi and a 4 inch diameter face. Gauges used shall be of such size that pressures tested will not register less than 10% no more than 90% of the gauge capacity. Leakage and pressure testing shall be in accordance with applicable AWWA C600 or AWWA C605 and as outlined below.

13.2.1. Unless it has already been done, the section of pipe to be tested shall be filled with water of approved quality and all air (or most of the air) shall be expelled from the pipe. Unlike water, entrapped air is compressible and is, therefore, very explosive" and represents a very high risk of potential damage or even fatalities. If blow offs or other outlets are not available at high points for releasing air, the Contractor shall make the necessary taps at such points (12:00 position) and shall plug said holes after completion of the test.

The table below is a convenient method to determine the approximate water addition that is required to raise the pressure in the test section from 0 psi to 150 psi with 0% air entrapment. Obviously, the test section will include some amount of air entrapment. The table below will indicate the severity of the amount of air entrapment in the test section. If the actual field test quantities (additional water amount) is over 4 times greater than the listed amounts, the test section may have severe air entrapment. In this case, the contractor should make additional effort to remove the entrapped air.

The table below lists the approximate amount of water which must be added to the pipe to raise the line pressure from 0 psi to 150 psi when no air is present in the pipe,

Pipe Diameter (inch)	Gallons l000 L.F.
6	0.73
8	1.31
10	2.04
12	2.94
14	4.00
16	5.22
18	6.61
20	8.16
24	11.75
30	18.36
36	26.44
42	35.98

13.2.2. For mains larger than 20 inch size, it is highly recommended that the contractor profile (line and grade) the main after installation and prior to pressure and leakage test to accurately locate all high points. Field survey instrument (Level equipment) shall be utilized for this task. Blow off valves shall be installed (at a minimum) at all high points which offset vertically more than two pipe diameters in length (at a minimum). The contractor shall consult the design engineer on any technical questions or concerns.

13.2.3. Hydrostatic testing shall consist of a combined pressure test and leakage test. Specified test pressures, based on the elevation of the highest point of the line or section under test, and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The pump, pipe connection and all necessary apparatus shall be furnished by the Contractor and shall be subject to the approval of the Engineer. All valved sections shall be hydrostatic tested to insure sealing (leak allowance) of all line valves.

13.2.4. All piping shall be pressure and leakage tested for a minimum of 2 hours duration at 150 psi minimum. Pressure tests shall be conducted simultaneously with the leakage test. During the 2-hour test, no pipe will be accepted if pressure loss is greater than 5 psi regardless of the leakage test results. All exposed pipe, fittings, valves and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings or valves that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated until it is satisfactory. Repairing, replacing and retesting shall be done at the Contractor's expense. For new installations, the contractor shall be limited to the number of repair couplings utilized to repair pipe joint leaks. Unless approved otherwise by the CITY, the contractor is limited to two repair couplings (I.E., one joint leak) per 1,000 LF installed (same pipe size).

Should the actual number of joint leaks exceed the above limit, then the CITY may require the contractor to remove and re-install the entire associate main or certain sections of the main at the contractor's expense. For new work, 'bell joint leak clamps" or similar devices are not acceptable for the repair of leaks at the joints.

13.2.5. Leakage tests shall be conducted simultaneously with the pressure tests. At the end of the pressure test, the line will be pumped back to initial test pressure. The quantity of water used to re-pump the line shall be measured and compared to the limitations calculated using the allowable leakage equations below.

Formula No. 1: May be used to determine an allowable leakage amount for PVC pipe, DIP or combination of both. If the actual leakage amount is equal or less than the allowable leakage amount (based upon Formula No. 1), the leakage test is acceptable (test passes and no other calculation are required). If the actual leakage amount is greater than the allowable leakage amount (based upon Formula No. 1), then the allowable leakage amount must be re-calculated based upon the sum total of Formula Nos. 2 and 3.

Formula No. 2: Shall be utilized to determine the allowable leakage amount for the test section constructed with PVC pipe (based upon the number of rubber gaskets).

Formula No. 3: Shall be utilized to determine the allowable leakage amount for the test section constructed with ductile iron pipe (based upon the total linear feet). For a test section, which includes both PVC and ductile iron pipe, the allowable leakage amount would be determined by adding the allowable leakage amount based upon Formula No. 2 (for the PVC pipe test section) and Formula No. 3 (for the DIP test section). No pipe

installation will be accepted if the actual leakage amount (quantity of make-up water) is greater than the allowable leakage amount (based upon the sum total of Formula Nos. 2 and 3). These 3 formulas meet and exceed the requirements of AWWA C600 and AWWA C605. Pressure and Leakage Test forms for each of these 3 formulas are provided in the back of this Section.

Formula No. 1: (PVC and DIP) $\frac{L = SD P^{1/2}}{148,000}$

Formula No. 2: (PVC only) $\frac{L = ND P^{1/2}}{7,400}$

Formula No. 3: (DIP only) $\frac{L = SD P^{1/2}}{133,200}$

$P^{1/2}$ = 12.25, where P = 150 psi

In which L is the allowable leakage amount in gallons per hour; S is the length of pipeline tested, in feet (5,000 L.F. max.); D is the nominal diameter of the pipe, in inches; P is the average test pressure during the leakage test, in pounds per square inch; and N is equal to the number of joints (rubber gaskets) in the PVC pipe test section. If test (based on Formula No. 2 and/or No. 3) discloses leakage greater than that specified above, the Contractor shall, at its own expense, locate and repair the defective material and retest until the leakage is within the specified allowance. The total length of pipe within the test section shall not exceed 5,000 linear feet, unless approved otherwise by the CITY.

13.2.6. In the event a section fails to pass the tests, the Contractor shall do everything necessary to locate, uncover (even to the extent of uncovering the entire section), and replace the defective pipe, valve, fitting or joint. Visible leaks shall be corrected regardless of total leakage. Lines which tail to meet these tests shall be retested as necessary until test requirements are complied with. All testing shall be performed at the Contractor's expense.

13.2.7. If, in the judgment of THE CITY representative, it s impracticable to follow the foregoing procedures exactly for any reason, modifications in the procedure shall be made with approval; but, in any event, the Contractor shall be responsible for the ultimate tightness of the piping within the above requirement. Re-disinfection shall be required if the line is depressurized for repairs prior to tying into the CITY system.

13.2.8. HDPE: For leakage and pressure testing for high density polyethylene (HDPE, PE), Pipe and fittings, see 'Horizontal Directional Drilling", for technical specifications for testing HDPE products. Due to the expansion of HDPE pipe, the pressure testing of HDPE pipe sections must be tested separately from DIP and PVC pipe sections.

13.2.9. LOCATE WIRE TESTING: Contractor shall complete all Locate Wire testing, and complete and submit a Locate Wire Report to the City in accordance with section "3.5.6 Locate Wire Installation and Testing" of this specification.

14.0 INSPECTION: All pipe and fittings shall be subject to inspection at time of delivery and also in the field just prior to installation. All pipe and fittings which in the opinion of the Engineer do not conform to these specifications will be rejected and shall be removed by the Contractor at the Contractor's expense. An authorized CITY representative must be present for all pressure and leakage testing, connections to The CITY's existing lines and the collection of water samples. The CITY representative will pull the water samples and deliver them to the lab.

15.0 BACTERIAL EXAMINATION:

15.1. WATER MAINS: Upon completion of water main flushing, samples shall be submitted by the Contractor until satisfactory results are obtained on two (2) successive working days (Fridays and Mondays are considered successive for this purpose). Great care must be exercised in sampling because if the initial disinfection fails to produce satisfactory results, disinfection must be repeated and samples resubmitted. As outlined above, arrangements shall be made with the CITY and the CITY Water Quality Lab for all collection of bacteriological samples from systems to be connected to the CITY systems and for sampling of privately owned systems. Samples shall be collected in sterile bottles or bags, treated with sodium thiosulfate to neutralize chlorine residual. It is important that the chlorine residual (maximum 4.0 ppm allowed) and pH of the line (main) be taken and recorded in columns (3) and (4) of the Department of Health Form DH 655-1/97 (if the Department of Health Lab is not used for analysis then the lab's substitution form must have the same format). Hoses are not satisfactory sampling points. A suggested sampling tap consists of a standard corporation cock installed in the main with tube goose-neck assembly which may be removed after use or retained for future use as a sampling point. Samples should be taken at all dead ends and at intervals of no greater than 1000 feet on continuous pipe runs. All permitted service stubs (domestic, irrigation or fire) should be sampled at the meter location or the backflow location. Bacteriological test results shall be considered unacceptable it the tests were completed more than 60 days before the Department received the results.

16.0 METHOD OF MEASUREMENT

Payment for the water main, fire hydrant installation will be made on a lump sum basis, which shall include all items required to satisfy this Specification and the requirements of the Plans as they relate to the potable water system.

17.0 BASIS OF PAYMENT:

17.1.1 PAYMENT: The lump sum price shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item in accordance with the Contract Documents. Payment will be made under:

Item 428	Potable & Fire Water Service, Complete, Including Backflow Preventers & All Other Items/Appurtenances – per lump sum

END OF SECTION 428

SECTION 429

SANITARY SEWER

1.0 GENERAL

1.1. SCOPE OF WORK: The Contractor shall furnish and install all gravity sewer lines, fittings, and appurtenances required, including testing, for a complete system as shown on the drawings and in accordance with these Specifications and the requirements of the City of Fernandina Beach Utility Department. The work shall also include such connections, reconnections, temporary service, and all other provisions in regard to existing sewer operations and modifications as is required to perform the new work. All references to Industry Standards (ASTM, ANSI, AWWA, etc.) shall be to the latest revision unless otherwise stated. All materials shall be new.

1.2. CONTRACTOR WARRANTY: The Contractor shall supply to the CITY a one (1) year unconditional warranty. The warranty shall include materials and installation and shall constitute complete replacement and delivery to the site of materials and installation of same to replace defective materials or defective workmanship with new materials/workmanship conforming to the specifications.

1.3 SUBMITTALS: Submittals of "Shop and Setting Drawings", "Working Drawings", "Catalog Data", and "Certifications" for review shall be submitted in accordance with appropriate sections of the General Provisions. Submittals and Certifications required are as follows:

A. Catalog Data and Certification showing that the following items meet requirements specified:
   1. Pipe
   2. Fittings
   3. Cleanouts.
   4. Lateral Pipe
   5. Certifications

B. The Contractor shall supply the Engineer with an additional six (6) copies of sanitary sewer shop drawings to be submitted to the CITY prior to scheduling of a pre-construction conference. A pre-construction conference is required regardless of other agencies' requirements.

2.0 MATERIALS: All material shall be free from defects impairing strength and durability, shall be of the best commercial quality for the purpose specified, shall have structural properties sufficient to safely sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

2.1. PIPE: Pipe for gravity sewage lines shall be ductile iron or polyvinyl chloride (PVC) as shown on the drawings and as herein specified. Pipe to be installed underground shall be PVC push-on joint type. Pipe installed above ground shall be restrained joint ductile iron pipe or flanged ductile iron pipe as described in these specifications. PVC pipe shall not be used in above ground applications. The "depth of cut" shall be defined as the vertical distance from pipe invert to finish grade. Pipe and fittings sizes and applications shall conform to the following chart.

PIPE AND FITTINGS	PIPE SIZE	JOINT TYPE	ACCEPTABLE BURY DEPTHS	APPLICATION
Ductile Iron	6 Inches & larger	Mechanical joint, push-on joint, flanged joint, ball joint, etc.	Any depth	Gravity mains & laterals above ground or otherwise exposed in r/w & easements
PVC DR18	6 Inches & larger	Push-on joint	Any depth	Gravity mains & laterals & jack & bore carrier pipe in r/w & easements
PVC SDR26	6 Inches & larger	Push-on joint	Any depth	Gravity mains & laterals in r/w & easements
PVC SDR35	6 Inches & larger	Push-on joint	"Depth of cut" greater than 4 ft. & less than 12 ft. (note 1)	Gravity mains & laterals in r/w
Fiberglass Mortar Pipe	24 inches & larger	Bell-spigot joint	Any depth	Gravity mains with no laterals (above or below ground)
Steel	6 inches & larger	Welded	Any depth	Casing only

Note No. 1: The maximum "Depth of Cut" for PVC SDR-35 pipe may be deeper than 12 feet only to complete a section run of pipe (between two manholes) which began with a depth less than 11-1/2 feet. Depth of cut is defined as the vertical distance, in feet, from pipe invert to finish grade elevation.

2.1.1. DUCTILE IRON PIPE: Ductile iron pipe wall thickness and pressure class shall conform to ANSI Specification A21.50 (AWWA C150) and ANSI A21.51 (AWWA C151) with pressure class 150 as a minimum. Pipe shall also be certified by ISO 9000 by an accredited registrar. Pipe shall be clearly marked with the name of the manufacturer, location of the foundry, pressure rating, thickness or pressure class, nominal pipe diameter, weight of pipe without lining, maximum depth of bury and length. All pipe furnished by the manufacturer shall be cast and machined at one foundry location to assure quality control and provide satisfactory test data. All ductile iron pipe shall be externally coated and internally lined as specified in this specification. All ductile iron pipe shall be color coded green by field painting a green stripe, 3 inches wide, along the crown of the pipe barrel.

2.1.2. POLYVINYL CHLORIDE (PVC) PIPE: Each length shall be clearly marked with the name of the manufacturer, location of the plant, pressure rating, nominal pipe diameter and length. All PVC sanitary sewer pipe shall be green. Storage and handling of PVC pipe shall be in accordance with chapter 6 of AWWA Manual M23.

2.1.2.1. PVC 1120, CLASS 150, DR 18 PIPE: Pipe shall conform to AWWA Standard C900 for 6 inch through 12-inch diameter pipe, and AWWA Standard C905 for 14 inch through 36-inch diameter pipe. All pipe shall be hydrastatically proof tested at the factory in conformance with UNI-B-1 I standards. In case of conflict between standards specified herein, the requirements of AWWA Standard C900 and C905 shall prevail. Pipe is to be manufactured to ductile iron pipe equivalent outside diameters. The pipe material shall be clean, virgin, National Sanitation Foundation approved, Class 12454-B PVC compound conforming to ASTM resin specification D1784. Pipe shall be rated for potable water and shall have a bell type coupling with a thickened wall section integral with the pipe barrel in accordance with ASTM D3139. Elastomeric seals shall meet ASTM F477. The pipe shall be designed to pass without failure a sustained pressure test of 500 psi in conformance with ASTM D1598 and a quick burst test of 755 psi in conformance with ASTM D1599.

2.1.2.2. PVC 1120, CLASS 160, SDR 26 PIPE: Pipe shall conform to ASTM D3034 for sizes 4 inch thru 15-inch diameter pipe and ASTM F679 for 18 inch through 36-inch diameter pipe. The pipe material shall be clean, virgin, National Sanitation Foundation approved, Class 12454-B PVC compound conforming to ASTM resin specification D1784 with wall thickness T-1. Pipe shall have a bell type coupling with a thickened wall section integral with the pipe barrel in accordance with ASTM D3212. Elastomeric seals shall meet ASTM F477 or ASTM F913. The pipe shall be designed to pass without failure a sustained pressure test of 340 psi in conformance with ASTM D1598 and a quick burst test of 400 psi in conformance with ASTM D1599.

2.1.2.3. PVC 1120, CLASS 118, SDR 35 PIPE: Pipe shall conform to ASTM D3034 for sizes 4 inch thru 15-inch diameter pipe and ASTM F679 for 18 inch through 36-inch diameter pipe. The pipe material shall be clean, virgin, National Sanitation Foundation approved. Class 12454-B PVC compound conforming to ASTM resin specification D1784 with wall thickness T-1. Pipe shall have a bell type coupling with a thickened wall section integral with the pipe barrel in accordance with ASTM D3212. Elastomeric seals shall meet ASTM F477 or ASTM F913.

2.1.3. FIBERGLASS REINFORCED POLYMER MORTAR PIPE:

2.1.3.1. PRODUCTS

2.1.3.1.1 MATERIALS:

2.1.3.1.1.1. RESIN SYSTEMS: The manufacturer shall use only polyester resin systems with a proven history of performance in this particular application. The history data shall have been acquired from a composite material of similar construction and composition as the proposed product.

2.1.3.1.1.2. GLASS REINFORCEMENTS: The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins.

2.1.3.1.1.3. SILICA SAND: Sand shall be minimum 98% silica with a maximum moisture content of 0.2%.

2.1.3.1.1.4. ADDITIVES: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used shall not detrimentally affect the performance of the product.

2.1.3.1.1.5. ELASTOMERIC GASKETS: Gaskets shall be supplied by qualified gasket manufacturers and be suitable for the service intended.

2.1.3.1.2. MANUFACTURE AND CONSTRUCTION:

2.1.3.1.2.1. PIPES: Manufacture (CCFRPM) pipe by the centrifugal casting process to result in a dense, non-porous, corrosion-resistant, consistent composite structure. No exterior pipe color required.

2.1.3.1.2.2. JOINTS: Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets made of EPDM rubber compound as the sole means to maintain joint watertightness. The joints must meet the performance requirements of ASTM D4161. Joints at tie-ins, when needed, may utilize fiberglass, gasket-sealed closure couplings.

2.1.3.1.2.3. Fittings: Flanges, elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed. They shall be contact molded or manufactured from mitered sections of pipe joined by glass-fiber-reinforced overlays. If approved by ENGINEER, properly protected standard ductile iron fittings may also be used.

2.1.3.1.2.4. ACCEPTABLE MANUFACTURER: HOBAS Pipe USA, Inc., or ENGINEER approved equal.

2.1.3.1.3. DIMENSIONS:

2.1.3.1.3.1. DIAMETERS: The actual outside diameter (18" to 48") of the pipes shall be in accordance with ASTM D3262. For other diameters, CD's shall be per manufacturer's literature.

2.1.3.1.3.2. LENGTHS: Pipe shall be supplied in nominal lengths of 20 feet. Actual laying length shall be nominal +1, -4 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.

2.1.3.1.3.3. WALL THICKNESS: The minimum wall thickness shall be the stated design thickness (class SN 36 minimum).

2.1.3.1.3.4. END SQUARENESS: Pipe ends shall be square to the pipe axis with a maximum tolerance of 1/8". Pipes shall be manufactured and tested in accordance with ASTM D3262.

2.1.3.1.4. TESTING:

2.1.3.1.4.1 PIPES: Pipes shall be manufactured and tested in accordance with ASTM D3262.

2.1.3.1.4.2. JOINTS: Coupling joints shall meet the requirements of ASTM D4161.

2.1.3.1.4.3. STIFFNESS: Minimum pipe stiffness when tested in accordance with ASTM D2412 shall normally be 36 psi.

2.1.4. STEEL CASING PIPE: Pipe to be used as a casing shall conform to either ASTM Standard A139 for "Electric Fusion (arc) Welded Steel Pipe" with minimum yield strength of 35,000 psi or "API Specification API-5LX, Grade X-42 Welded Steel Pipe". Wall thickness shall meet the requirements of the latest Revision of the American Railway Engineering Association Manual of Recommended Practice or the Florida Department of Transportation Standard Specification for Road and Bridge Construction. For street uses which are not DOT or railroad, use DOT casing thickness unless otherwise indicated by Engineer. All pipe furnished by the manufacturer shall be cast and machined at one foundry location to assure quality control and provide satisfactory test data. Full pipe length shall be provided. No short pipe lengths less than 8 feet long will be allowed unless approved by ENGINEER. The pipe ends shall be tapered where welding is required.

2.2. FITTINGS: Fittings shall be pressure rated (DR & SDR rated) and have joints that match the type of pipe furnished (at a minimum) except as follows or as otherwise specified. Fittings 6 inches and larger on PVC pipe installed underground shall be of the same PVC type as the pipe with joints to match the pipe being installed. Fittings 6 inches and larger on push-on joint ductile:

2.2.1. DUCTILE IRON FITTINGS: Ductile iron fittings shall have a minimum working pressure of 250 psi. Fittings shall conform to ANSI Specification A21.10 (AWWA C110), A21.11 (AWWA C111), A21.15 (AWWA C115) and/or A21.53 (AWWA C153). Fittings shall also be certified by ISO 9000W an accredited registrar. Compact fittings shall normally be installed. Long body fittings shall be used where the drawings specifically call for long body fittings, where compact fittings are not available, or at the option of the Contractor when the laying length is not controlled by compact fitting patterns. All fittings shall be UL/FM approved and shall conform to NSF Standard 61, as applicable. All fittings furnished by the approved manufacturer shall be cast and machined at one foundry location to assure quality control and provide satisfactory test data. Fittings shall have cast on them the pressure rating, nominal diameter of openings, manufacturer's name, foundry location, plant code and degrees or fraction of the circle. Cast letters and figures shall be on the outside body of the fitting. ENGINEER may require random ductile testing of manufacturers fittings. All ductile iron fittings shall be externally coated and internally lined as specified in this specification.

2.2.2. POLYVINYL CHLORIDE FITTINGS: Fittings shall match the type of pipe (pressure rating and joint) and shall conform to the applicable sections of this specification for PVC pipe and PVC joints. The interior finish shall be smooth with no rough edges which may cause line stoppages. Saddle tees or saddle wyes shall not be permitted.

2.2.2.1. PVC 1120, CLASS 150, DR 18 FITTINGS: PVC fittings 4 inches thru 12 inches may be used with PVC C900 pipe. Fittings shall be PVC injection molded, made from materials meeting or exceeding the requirements of cell class 12454-B material as defined in ASTM D1784. All PVC fittings must comply with, or exceed, AWWA C907. All fittings must be designed to the pressure class of DR 18, with a pressure rating of 150 psi and a 2.5 to 1 factor of safety. Virgin materials only shall be used in the manufacture of PVC pressure fittings. These fittings must have UL-FM approval and shall comply with or exceed all ASTM Standards for PVC fittings. All fittings must have NSF-61 approval. The elastomeric gasket shall comply with the requirements specified in ASTM F477.

2.2.2.2. PVC 1120, CLASS 160, SDR 26 FITTINGS: Fittings shall meet the requirements of ASTM D3034 and ASTM F1336 for sizes 4 inch through 15-inch diameter and ASTM F679 and ASTM F1336 for 18 inch through 36-inch diameter with minimum wall thickness of SDR 26. Fittings shall be gasket joint type meeting the requirements of ASTM D3212. Elastomeric gaskets shall conform to ASTM F477 or ASTM F913. PVC material shall have a cell classification of 12454-B in accordance with ASTM D1784.

2.2.2.3. PVC 1120, CLASS 118, SDR 35 FITTINGS: Fittings shall meet the requirements of ASTM D3034 and ASTM F1336 for sizes 4 inch through 15-inch diameter and ASTM F679 and ASTM F36 for 18 inch through 36-inch diameter with minimum wall thickness of SDR 35. Fittings shall be gasket joint type meeting the requirements of ASTM D3212. Elastomeric gaskets shall conform to ASTM F477 or ASTM F913. PVC material shall have a cell classification of 12454-B in accordance with ASTM D1784.

2.2.3. NON-STANDARD FITTINGS AND WALL CASTINGS: Fittings having non-standard dimensions and cast specifically for this project shall be of approved design. They shall be manufactured to meet the requirements of the same specifications and shall have the same diameter and thickness as standard fittings, but their laying lengths and types of ends shall be determined by their positions in the pipelines and by the particular piping to which they connect. Wall castings shall be of the size and types indicated on the drawings. Flanges, facing, and drilling shall conform to the 125-pound American National Standard. Flanges shall be drilled and tapped for studs. Other dimensions shall be substantially equal to corresponding parts of standard bell and spigot fittings.

2.3. JOINTS: Type of joint used shall be approved by the Engineer prior to installation. Joints shall be made in accordance with approved printed instructions of the manufacturer and shall be absolutely watertight.

2.3.1. MECHANICAL JOINTS: All jointing materials for mechanical joints shall be provided by the pipe and/or fitting manufacturer. Material assembly and bolting shall be in accordance with ANSI Specification A21.11 (AWWA C111). All glands shall be made of ductile iron only. Mechanical joint gaskets shall be of a composition suitable for exposure to sewage, sludge or scum within the pipe.

2.3.2. PUSH-ON JOINTS:

2.3.2.1. DUCTILE IRON: Ductile iron pipe push-on joints shall be in accordance with ANSI Specification A21.11 (AWWA C111). All joint material shall be provided by the pipe manufacturer and installation shall be in accordance with the manufacturers recommended practice.

2.3.2.2. POLYVINYL CHLORIDE (PVC): PVC push-on joints shall have a bell type coupling with a thickened wall section integral with the pipe barrel. Joints for PVC DR 18 pipe shall be in accordance with ASTM D3139. Joints for PVC SDR 26 and SDR 35 shall be in accordance with ASTM D3212. Elastomeric gaskets shall conform to ASTM F477 for PVC DR 18. Elastomeric gaskets for SDR 26 and SDR 35 fittings shall conform to ASTM F477 or ASTM F913.

2.3.3. FLANGED JOINTS: Ductile iron flanged joints shall conform to ANSI A21.10 (AWWA C110) and ANSI A21.15 (AWWA C115). Flanges shall be in accordance with ANSI Specification B16.1, Class 125 with any special drilling and tapping as required to insure correct alignment and bolting. Screwed flanges shall be screwed in tight at the foundry by machine before they are faced and drilled. Flanges for flanged joints and flanged specials shall be integrally cast at right angles to the axis, accurately faced, and drilled smooth and true. Gaskets shall be rubber ring type, cloth inserted, and a minimum thickness of 1/16 inch and shall be used on all flanges. The entire gasket, including the retainer and sealing ring, shall be one continuous piece. Retainers glued together will not be accepted. Flanged joints shall be made with bolts, bolt studs with a nut on each end, or studs with nuts where the flange is tapped. The number and size of bolts shall conform to the same ANSI standard as the flanges. Bolts and nuts shall be of Grade B conforming to the ASTM A307 Specifications for steel machine bolts and nuts and tap bolts. Bolt studs shall be of the same quality as machine bolts. Bolts shall be tightened so as to distribute evenly the stress in the bolts and bring the pipe in alignment. The contractor shall provide suitable filling rings where the layout of the flange piping is such as to necessitate their use. In materials, workmanship, facing and drilling, such rings shall conform to ANSI 8161 Class 125.

2.3.4. STEEL CASING PIPE JOINTS: Steel casing pipe joints shall be electric fusion (arc) welded by operators whose qualifications meet the requirements of the American Welding Society Standard procedures and in conformance with AWWA C206.

2.3.5. RESTRAINED JOINTS:

2.3.5.1. RESTRAINERS: The restrainer shall be manufactured of ductile iron and shall meet or exceed all the requirements of ANSI A21.11 (AWWA C111) and ASTM A536. The restrainer system shall provide anchoring of PVC pipe to mechanical joint fittings or bell to spigot PVC pipe joints. Restraints shall provide a full 360 degree contact with sufficient gripping action to secure the clamp to the pipe and be designed so that restraint action is increased as a result of increases in line pressure. The restrainer shall accommodate the full working pressure rating of the pipe plus surge allowance.

2.3.6. FLANGE ADAPTERS: Flange adapters shall be ductile iron manufactured to ASTM A536 standards. Bolt circles and bolt holes shall meet ANSI B16.1 for 125 pounds. Adapter flanges shall meet or exceed all test requirements of AWWA C900, ASTM D2241 and ASTM D1599.

2.3.7. PIPE COUPLINGS: The Contractor shall furnish and install pipe couplings as required to complete the work. Pipe couplings used to join two pieces of ductile iron pipe or PVC pipe shall be sized to suit the outside diameter of the pipeline. Transition couplings shall be used to join pipes of different outside diameters. The coupling sleeve shall be manufactured of ductile iron conforming to ASTM A536 and be coated with 14 mils of epoxy. The bolts shall be manufactured of a metal of high corrosion resistance and shall conform to ANSI 21.11 (AWWA C111). Gaskets shall be wedge-type and manufactured of virgin SBR for water and sewer service. The installation of all couplings shall be in accordance with manufacturers recommendations. After installation, all coupling surfaces including bolts and nuts shall be coated with an approved coating as specified in these specifications.

2.3.8. FULL CIRCLE REPAIR CLAMPS: Full circle repair clamps shall have type 304 stainless steel shell, lugs, bolts, nuts and waters as per ASTM A193, A194, A240, or shall have type 304 stainless steel shell per ASTM A240, ductile iron lugs as per ASTM A536, and 304 stainless steel bolts, washers and nuts. Gaskets for both types shall be virgin SBR as per ASTM D2000 for water and sewer service.

2.4. CORROSION PROTECTION FOR DUCTILE IRON PIPE:

2.4.1. INTERIOR LINING: The interior of all ductile iron pipe and fittings shall be furnished with an approved amine cured novalac epoxy coating. Acceptable coatings include protection 401 ceramic epoxy, SP 2000 ceramic epoxy, poly bond plus or ENGINEER approved equal.

2.4.1.1. LINING MATERIAL: The material shall be an amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment. The lining material shall comply with the following properties:

2.4.1.1.1. A permeability rating of 0.00 when tested according to the procedure described in Method A of ASTM E96-93, Procedure A with a test duration of 30 days.

2.4.1.1.2. The following test must be run on coupons from factory lined Ductile Iron Pipe.

2.4.1.1.2.1. ASTM B 117-85 Salt Spray (scribed panel) — Results to equal 0.0 undercutting after two years.

2.4.1.1.2.2. ASTM G95-87 Cathodic Disbondment (1.5 volts@ 77°F) — Results to equal no more than 0.5mm under-cutting after 30 days.

2.4.1.1.2.3. Immersion Testing rated using ASTM D714-87.

2.4.1.1.2.3.1. 20% Sulfuric Acid — No effect after two years

2.4.1.1.2.3.2. 140°F-25% Sodium Hydroxide — No effect after two years.

2.4.1.1.2.3.3. 160°F Distilled Water— No effect after two years.

2.4.1.1.2.3.4. 120°F Tap Water (scribed panel) — 0.0 undercutting after two years with no effect.

2.4.1.1.3. ABRASION RESISTANCE: Less than 4 mils loss after one million cycles on a + 22.5° sliding aggregate slurry abrasion tester using a sharp natural siliceous gravel with a particle size between 2mm and 10mm.

2.4.1.2. APPLICATION:

2.4.1.2.1. APPLICATOR: The lining shall be applied by a competent firm, who has been certified acceptable by the manufacturer with a successful history of applying linings to the interior of ductile Iron Pipe and Fittings.

2.4.1.2.2. SURFACE PREPARATION: Prior to abrasive blasting, the entire area to receive the protective compound shall be inspected for oil, grease, etc. Any areas where oil or grease is present, or any substance with can be removed by solvent, shall be solvent cleaned using the guidelines outlined in DIPRA-1 Solvent Cleaning. After the surface has been made free of grease, oil or other substances, all areas to receive the protective compounds shall be abrasive blasted using compressed air nozzles with sand or grit abrasive media. The entire surface to be lined shall be struck with the blast media so that all rust, loose oxides, etc, are removed from the surface. Only slight stains and tightly adhering annealing oxide may be

left on the surface. Any area where rust reappears before lining must be re-blasted. Abrasive blasting of previously lined pipe or fitting (including cement lined materials), is not acceptable. Only virgin metal materials will be utilized in the lining process.

2.4.1.2.3. LININGS: Within 8 hours of surface preparation, the interior of the pipe shall receive 40 mils (minimum), normal dry film thickness of the approved lining. No lining shall be applied when the substrate or ambient temperature is below 40 degrees Fahrenheit. The surface also must be dry and dust free. If flange pipe or fittings are included in the project, the lining shall not be used on the face of the flange.

2.4.1.2.4. NUMBER OF COATS: The number of coats of lining material applied shall be as recommended by the lining manufacturer. However, in no case shall this material be applied above the dry thickness per coat recommended by the lining manufacturer in printer literature. The maximum or minimum time between coats shall be that time recommended by the lining material manufacturer. No material shall be used for lining which is not indefinitely recoatable with itself without roughening of the surface.

2.4.1.2.5. TOUCH UP AND REPAIR: Joint Compound shall be used for touch-up or repair in accordance with liner manufacturer's recommendations.

2.4.1.3. INSPECTION AND CERTIFICATION:

2.4.1.3.1. ENGINEER may require the contractor to provide the following inspection if a quality concern existing in the field.

2.4.1.3.2. Ductile Iron Pipe and Fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPCPA-2 Film Thickness Rating.

2.4.1.3.3. The interior lining of all pipe and fittings shall be tested for pinholes with a nondestructive 2,500 volt test. Any defects found shall be repaired.

2.4.1.3.4. Each pipe joint and fitting shall be marked with the date of application of the lining system along with its numerical sequence of application on that date and records maintained by the applicator of his work.

2.4.1.4. HANDLING (AT THE FACTORY AND IN THE FIELD): The lined Pipe and Fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. If damaged, the material shall be repaired in accordance with the liner manufacturer's recommendations.

2.4.1.5. WARRANTY: A one (1) year warranty shall be furnished by the manufacturer on the serviceability of the lining. This warranty shall include but not be limited to, statements that at any time up to the end of the year from the date of project acceptance:

2.4.1.5.1. The lining shall not have disbonded.

2.4.1.5.2. The lining shall not have suffered any appreciable underfilm migration.

2.4.1.5.3. The interior pipe metal, at points of pinholes or holidays, shall not have suffered detrimental deterioration.

2.4.1.5.4. The lining shall have maintained its smooth surface characteristics. The Contractor and/or manufacturer shall not make any exemption or exception to the above stated conditions or warranty within the limits as stated in this section of these specifications.

2.4.2. EXTERIOR COATING: All ductile iron pipe and fittings, except as otherwise noted, shall receive an exterior bituminous coating as specified in ANSI A21.51. The finish coating shall be continuous smooth, neither brittle when cold nor sticky when exposed to the sun, and be strongly adherent to the fitting. If the pipe is installed in corrosive soils, then all bolts, nuts, studs and other uncoated parts of joints for underground installation shall be coated with asphalt or coal-tar prior to backfilling. Corrosive soil shall be defined as described in AWWA C105, appendix "A".

2.5. PIPING SUPPORTS:

2.5.1. The Contractor shall furnish and install all special pipe supports as shown on the drawings and as necessary to hold the piping and appurtenances in a firm, substantial manner at the lines and grades indicated on the drawings or as specified. Special pipe supports shall be worked out in the field and approved by the Engineer to suit local conditions and emergencies.

2.5.2. Pipe saddles shall be shaped to fit the pipe with which they will be used and shall be capable of screw adjustment. Concrete piers shall conform accurately to the bottom one-third to one-half of the pipe. Piping supports shall be placed so as to provide a uniform slope in the pipe without sagging. Supports shall be located wherever necessary, and in no case shall they exceed 8 feet on centers for ductile iron pipe and 4 feet on centers for PVC pipe.

2.5.3. CASING SPACERS: Casing spacers shall be a two-piece prefabricated unit by a single manufacturer. All casing spacers in a single casing pipe crossing shall be by the same manufacturer. Casing spacers shall have a shell made from either 304 stainless steel, 14 gauge mild steel which has been heat fusion coated with PVC plastic, (PVC coating shall be .01 inch thick over the entire band including the runner studs) or high density polyethylene. Casing spacers on 16 inch and smaller carrier pipe shall have 8-inch wide steel bands and casing spacers on 18 inch and larger carrier pipe shall have 12-inch wide steel bands, except high density polyethylene spacers shall have high density polyethylene bands. All casing spacers for 14 inch and smaller pipe size shall have four 10 gauge or 14-gauge steel risers with runners and casing spacers for 16 inch and larger pipe shall have six 10 gauge or 14-gauge steel risers with runners (two top and four bottom), except high density polyethylene spacers shall have one riser for every diameter inch of carrier pipe. The runners (risers) shall be either glass reinforced plastic, UHMW polymer or high density polyethylene. All nuts, bolts and washers shall be 304 stainless steel. All risers over 2 inches in height shall be reinforced. Wooden skids are not an acceptable alternate.

3.0 INSTALLATION

3.1. REFERENCE POINTS AND LAYOUT: The Contractor shall be responsible for setting all grade lines, centerline of construction, and locating property lines. ENGINEER or the Owner will provide a bench mark. Any reference points, points of intersection, property corners, or bench marks, which are disturbed during construction, shall be restored by a Land Surveyor registered to practice in the State of Florida, and all costs thereof shall be borne by the Contractor. The Contractor shall assume all responsibility for the correctness of the grade and alignment stakes.

3.2. HANDLING AND CUTTING PIPE: Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe, scratching or marring machined surfaces, and abrasion of the pipe coating. The lined Pipe and Fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. If damaged, the material shall be repaired in accordance with the liner manufacturer's recommendations. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. In any pipe showing a distinct crack in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portion, if so approved by ENGINEER, may be cut off before the pipe is laid so that the pipe used may be perfectly sound. The cut shall be made in the sound barrel at a point at least 12 inches from the visible limits of the crack. Except as otherwise approved, all cutting shall be done with a power driven cut off saw. All cut ends shall be examined for possible cracks caused by cutting.

3.3. PIPE INSTALLATION:

3.3.1. GENERAL: The pipe laying shall proceed upgrade, beginning at the lower end of the sewer, with all bell ends upgrade. In no case shall the pipe be walked on either before or after the joints have been made. Extreme care shall be taken to keep the pipe in exact alignment and elevation. Pipe shall be laid to conform accurately to the lines and grades indicated on the drawings. It shall be the Contractors responsibility to locate all underground utilities in advance of construction, to insure that no conflicts occur with the proposed line and grade. The contractor shall coordinate utility locates with Sunshine State One-Call of Florida, Inc. (#800 /432-4770 or web site www.callsunshine.com), at a minimum. If approved by the Engineer, minor changes in the alignment but not the grade will be permitted to avoid underground facilities, provided that straight alignment can be maintained between manholes. However, if a conflict is found between an existing utility and proposed grade, the Contractor is to furnish the Engineer all pertinent information so that remedial design can be performed.

3.3.2. LAYING AND JOINTING: The pipe shall be laid on an unyielding foundation with uniform bearing under the full length of the barrel of the pipe. Suitable excavations shall be made to receive the bell of each pipe, which shall be carefully laid true to line and grade. All adjustments to line and grade must be made by scraping away or filling in under the barrel of the pipe and not by wedging and blocking up any portion of the pipe. The spigot end of each pipe shall abut against the base of the socket of the adjacent pipe in such a manner that there will be no unevenness of any kind along the bottom halves of the pipes. Just before jointing the pipes, the mating ends shall be thoroughly cleaned of all dirt, debris, and foreign material.

The pipe shall be jointed in accordance with the recommendations of the manufacturer of the pipe and gasket. The trench must be dewatered when joints are made and kept dewatered with a dry trench bottom, until pipe trench has been backfilled. The pipe shall not be driven down to grade by striking it with any unyielding object. The Contractor shall take all necessary precautions to prevent flotation of the pipe due to flooding of the trench.

3.3.3. PIPE COVER: The cover over all piping shall be a minimum of 30 inches in unpaved areas and 36 inches in paved areas.

3.3.4. JOINTING PVC TO VITRIFIED CLAY PIPE: Unless specifically indicated otherwise, connections of PVC to vitrified clay pipe in the run of the sewer line shall be made with an approved cast coupling.

3.3.5. PLUGS: Openings such as stubs, tees, or services along the lines shall be securely closed by means of an approved plug that fits into the bell of the pipe and is recommended by the pipe manufacturer. This plug shall be installed in such a manner that it may be removed at some future time without injury to the pipe itself. At the close of each day's work, and at other times when pipe is not being laid, the end of the pipe shall be temporarily closed with a plug.

3.3.6. CLEANING: All necessary precautions shall be taken to prevent the entrance of mud, sand or other obstructing material into the pipelines. As the work progresses, the interior of the sewer shall be cleaned of all dirt, and foreign material. The Contractor shall flush all sewer lines constructed with clean water, prior to final inspection, to assure complete removal of all debris and foreign material.

3.3.7. BEDDING AND BACKFILL: Immediately after the pipe has been jointed and inspected, sufficient backfill shall be performed to protect the pipe adequately from injury and movement. Unsuitable material shall be removed and replaced with AASHO Class A-3 soil upon approval of the Engineer. A-3 soil and native material backfilled shall be compacted to the requirements of Section 120 of these specifications.

3.4. GRAVITY SEWER MAIN AND WATER MAIN SEPARATION REQUIREMENTS:

3.4.1. REQUIREMENTS: The minimum separation requirements between gravity sewer and potable water mains shall be as outlined in plans.

3.5. SYSTEM CONNECTIONS: All connections and ties to ENGINEER's Sewer System will be performed by the Contractor under supervision of ENGINEER.

3.6. CARRIER PIPES IN CASINGS: All carrier pipes in casings shall utilize casing spacers installed on the carrier pipe, inside the casing pipe. Casing spacers shall be installed one foot on both sides of each carrier pipe joint, and at ten foot intervals along the carrier pipe for pipe up to 48 inches with 20-foot laying lengths. Casing spacers shall be installed one foot on both sides of each carrier pipe joint for pipe up to 48 inches with 13-foot laying lengths. For carrier pipes larger than 48 inches, casing placement shall be as recommended by the casing spacer manufacturer. A casing spacer shall also be installed within two feet of each of the ends of the casing pipe. All joints within steel casing pipe shall be restrained with mechanical restraining devices. End joints shall be tie rodded, with the ends of the rods welded to the end of the casing.

3.7. LATERAL CONNECTIONS: Types of lateral connections shall be as shown on the drawings. Although the general location of lateral connections may be shown on the drawings, the actual location shall be determined by the Contractor, subject to approval by the Engineer. Each lateral connection shall be accurately recorded by stationing on the As-Built drawings which shall be furnished to the Engineer. Unless authorized by the Engineer in writing, or shown on the drawings, lateral connections shall be limited to 2 ties into new or existing dead end manholes. All lateral connections shall be terminated at the property line unless indicated otherwise on the drawings or directed otherwise by the Engineer. All active lateral connections on sanitary sewers to be replaced shall be connected to the new sanitary sewer. Contractor shall be responsible for locating lateral connections prior to

construction. Unless approved otherwise by the ENGINEER, no gravity sewer main with sewer service laterals shall be constructed with a "depth of cut" greater than 20 feet.

3.7.1. TAPPING SADDLES: When authorized for use, tapping saddles may be used in lieu of tees, for lateral connections to 14 inch and larger ductile iron pipe. Tapping saddles shall be installed in accordance with the manufacturer's recommendations, unless otherwise specified. Under no condition shall the circular opening in the pipe wall be made with a cutting torch. It shall be accomplished by a cutting machine method subject to the approval of the Engineer. Should the ductile iron pipe lining be damaged during the culling of the pipe to receive the saddle, the defective area shall be repaired.

3.7.2. MARKING SERVICE LINES: An "S" shall be cut in the curb (painted green) directly over each service line or in the street side of a sidewalk where no curb is available.

In addition, for new development areas where the sewer lateral is "not in use", a landscape timber (3" x 3" minimum PT. timber, top painted green) shall be installed to mark the location of the 6-inch plug. For septic tank phase out projects only where no concrete curb exist, an electronic marker is required for all laterals which are 'NOT IN USE". The electronic marker shall be a mid-range type as manufactured by Scotch Mark or ENGINEER pre-approved equal. During the final inspection or project acceptance inspection, the contractor shall assist in the field to locate services required to complete this test.

3.8. STUB-OUTS: Where shown on the drawings, stub-outs shall be provided for the connection of future sewer lines to manholes. The end of each stub out shall be provided with a bell end which shall be closed by an approved plug as previously specified. Each stub-out shall be accurately referenced to the center of the manhole, and the actual invert elevation of each end of the stub out shall be accurately recorded on the As-Built drawings.

3.9. YARD PIPING: Yard piping shall be defined as the sewer service piping and appurtences privately owned and located entirely on private property. All yard piping shall conform to local plumbing code and all applicable building codes. No work shall be done on private property without written consent of property owner (Temporary Construction Easement). Contractor must obtain plumbing permit prior to work,

4.0 FIELD TESTING: All work constructed shall be subject to visual inspection for faulty alignment, defects, or leaks. Any such deviation or omission shall be corrected at once. All tests shall be made by the Contractor who shall provide necessary equipment for TV testing and lamping the system in the presence of, and under the supervision and instructions of the ENGINEER's representative. All costs for testing defined below shall be borne by the Contractor.

4.1. LAMPING: Lamp tests shall be observed first hand by ENGINEER's representative to assure proper horizontal alignment. Upon completion, each section of sewer line shall show a full circle of light when lamped between manholes.

4.2. TELEVISION INSPECTION:

4.2.1. SCOPE: Television inspection will be required on all new and/or replacement sewers constructed. The Contractor shall provide this service. ENGINEER shall instruct the Contractor when this requirement shall be performed. The newly constructed sewers shall be televised in the presence of ENGINEER's representative.

Unless approved otherwise by ENGINEER, prior to T-V inspections, all manhole inverts must be built and roadways shall be limerocked, primed and have density test completed. Gravity sewer in easements must be compacted backfill to final grade. For areas which require "Special Pavement" all base material shall be compacted ready for asphalt pavement prior to TV work.

4.2.2. QUALITY ASSURANCE: Inspection Operation shall be conducted by experienced personnel trained in locating and identifying structural defects in pipe, leaks, obstruction, faulty alignment or any abnormalities detrimental to the proper functioning of the sewer system. Contractor shall have a minimum of four (4) years' experience with internal examination of sewer lines using CCTV equipment. Unless approved otherwise by ENGINEER, experienced in CCTV inspections shall be present during all inspection operations.

4.2.3. VIDEO INSPECTION EQUIPMENT: The CCTV inspection camera shall be specifically designed and constructed for sewer line inspections, and shall be self-contained audio-visual system complete with winches. (power or mechanical) or be self propelled, with a minimum of 500 feet of cable, monitor, video tape recorder, and suitable measuring devices accurate to ± 1.0% of the total length (e.g. accurate within 5.0 feet for 500 feet total length) to determine the position of the camera in the line being inspected at all times, and all necessary equipment for the successful completion of the video inspection. The video inspector system shall have the ability to superimpose the measured footage onto the monitor screen and be recorded visually by the video tape recorder. The camera shall be operative in 100 percent humidity conditions and shall be capable of producing a full-color picture at a remote monitor. Lighting and camera quality shall be suitable to allow a clear, in-focus picture of a minimum of 6 linear feet of the entire inside periphery of the sewer pipe. The camera shall have a minimum resolution if 320 lines to ensure peak picture quality throughout all conditions encountered during the investigation, a variable intensity control of the lights and remote control adjustments for focus and iris shall be located at the monitoring station. The camera shall be equipped with a rotating head enabling a view of 90 degrees to the axis to be inspected so that service connections can be properly inspected.

4.2.4. COLOR VIDEO MONITORS: Color video monitor shall be located within a temperature controlled studio that will allow seating for two authorized viewing personnel, (Contractor representative and ENGINEER field representative) in addition to the operating technician. All persons shall have a clear and comfortable view of the monitor. Monitor shall have a resolution capability of no less than 650 lines.

Continuously displayed on the monitor as recorded by the video camera shall be the date of the survey, number designation of the manhole to manhole pipe segment being surveyed, and a continuous forward and reverse read out of camera distance from the reference manhole. Audio descriptions of the operating technician's observations shall be recorded on the video tape. Picture quality and definition shall be to the satisfaction of the ENGINEER. If the picture quality is unsatisfactory, the video equipment shall be replaced.

4.2.5. GENERAL REQUIREMENTS: Pipe to be televised shall be free of any dirt, sand or debris, prior to beginning CCTV inspection. The sewer line shall be introduced with water at the high point in the system in the presence of an authorized ENGINEER representative immediately prior to TV inspection. Underdrains if used shall be plugged and other ground water drainage (i.e. well point systems) shall be stopped to permit the ground water to return to normal levels insofar as practicable. If possible, service connections at the right-of-way shall not be made until after TV test have been successfully completed. The contractor shall provide at no additional cost to ENGINEER a temporary plug and/or by-pass pumping on sewers with

active sewer service laterals, if deemed necessary by the ENGINEER representative to assure a quality TV inspection. If required by ENGINEER, the contractor shall eliminate active flow in sewer laterals by shutting off the water supply service to the contributing house(s). Contractor shall comply with current CITY water outage procedures for shutting off customers' water service. A mandrel is required on PVC SDR-35 pipe (all sizes) and PVC SDR-26 (12-inches and smaller). The mandrel shall be pulled through the pipe ahead of the TV camera at a rate of speed slow enough not to displace any standing water. A mandrel is not required for gravity sewer pipes larger than 12-inch size and constructed of PVC SDR-26 or DR-18 Pipe. A full report, as to the condition of pipe, type, depth, location of services, length, type joint, and distance between manholes, etc., shall be furnished to the ENGINEER prior to the final acceptance of the main. In addition to the written report, A VHS type tape of the TV inspection shall be provided to ENGINEER for review. The tape shall become the property of the AUTHORITY. Any pipe found to have defects, including but not limited to, leaks, cracks, pipe deflection from external pressures, rolled or pinched gaskets, joint gaps (wider than 1 inch), or holding water greater than the following limits (a "dip") or otherwise defective shall be removed and replaced with new pipe at no additional cost to AUTHORITY.

4.2.5.1. A "dip" is defined as any water holding depth which is equal or greater than the minimum depth as listed below. There shall not be any more than 1 "dip" per 135 linear feet of sewer pipe installed (1 minimum). The defective pipe sections, or those "dip/sections over the allowable limit, shall be removed and replaced.

Each run of pipe, between two manholes, shall be evaluated independently for compliance. Any "dip" which is greater than the "maximum" "dip" depths listed below are not acceptable and shall be removed and replaced at no cost. Regardless of the number of "dips" in the line section, if, in the opinion of the ENGINEER, the number and/or location of the "dips" is believed to create an unacceptable operating condition, than the defective pipe section(s) shall be removed and replaced at no cost to ENGINEER. Any deviation from these "dip" limitations must be approved by a ENGINEER.

Pipe Size	**Minimum**	**Maximum**
8 inch -10 inch	0.50	1.00
12 inch - 15 inch	0.75	1.50
18 inch -21 inch	1.00	2.00
24 inch and greater	1.25	2.50

4.2.6. DEFORMATION/DEFLECTION LIMITS: Pipe shall be tested with a mandrel for deformation or deflection. Any pipe found to be deformed and/or deflected in excess of 7.5% of the nominal diameter of the pipe shall be removed and replaced with new pipe at no additional cost. All mandrels used in testing shall be available to be checked for proper sizing by use of truing rings at the request of a ENGINEER. Results of the test shall be submitted to ENGINEER for review and approval. The use of a re-rounding device or other similar equipment is not permitted to correct deflected (egg shape) pipe.

4.2.7. MANHOLE INSPECTION: All manholes shall be inspected for leaks and any defects that may cause infiltration, or weaken the structural integrity. Before the final inspection,

manholes shall be trimmed of any excess Ram-Nek joint sealant. Any voids in pre-cast shall be filled with non-shrink grout and the manhole shall be thoroughly painted, excluding invert and bench, as required. The gasket on the manhole cover shall be inspected for cuts, tears, scraps and proper fit. If found damaged, the entire gasket seal shall be replaced in accordance with the manufacturer's recommendation, at contractor's expense.

5.0 SEWER ABANDONMENT: Abandonment of all existing gravity sewer lines falling within the limits of street, alley or highway right-of-ways shall be treated in the following manner. Existing gravity sewer lines will not be classified as abandoned until such time as all existing lateral connections have been transferred to a new operating sewer line.

5.1. SEALED: All abandoned sewer lines where called for on the Contract Drawings to be sealed, shall be sealed at each end and at every break in the line, Seals for all pipe sizes shall be of Class "C" concrete or concrete grout and rubble and shall extend into the sewer for at least 12 inches.

5.2. GROUT FILLED: All abandoned sewer lines where called for on the Contract Drawings to be grout filled shall be accomplished by the following procedure. Lines to be grout filled shall be completely filled with a sand-cement grout by pumping the mixture into the pipelines from downstream or low end of the line with an approved grout pump. The Contractor shall clean the line of all sand and debris prior to grout filling. Grout for filling abandoned sewer lines shall consist of at least 15 percent Portland Cement by volume and shall be mixed to a consistency suitable for pumping.

6.0 REMOVE EXISTING: Where shown on the drawings or called for elsewhere in the Contract Documents to remove existing, shall mean the complete removal and disposal of the sewer pipe as specified by the Engineer. Excavation and backfill shall be as specified in Section 120 of these specifications.

6.1. REMOVE AND CONSTRUCT PIPING: Where shown on the drawings or called for elsewhere in the Contract Documents shall mean the complete removal of the existing sewer pipe and constructing a new sewer pipe in the same trench, but not necessarily at the same elevation. The existing pipe shall be disposed of as specified by the Engineer.

6.2. SEAL AT EXISTING STRUCTURES: When sewers that are to be abandoned or existing lines to be removed fall above or below the new line to be constructed, the opening left in the existing manhole wall shall be thoroughly plugged with non-shrinking mortar applied and cured in strict conformance with the manufacturers recommendations. The mortar shall be finished smooth and flush with the adjoining interior manhole wall surface.

7.0 STATE HIGHWAY CROSSINGS: Permits for all work within the right-of-way of a state highway will be obtained by the Engineer. The Contractor shall, however, verify the existence of the permit before commencing work in this area. All work related to the state highway crossings shall be in full compliance with the terms of the permit and in accordance with the Utility Accommodation Guide and standard specifications, of the Florida State Department of Transportation. Unless otherwise shown on the drawings or specified herein, State Highway crossings shall be made by jacking a steel pipe casing, of the size shown on the drawings, under the highway at the elevations and locations shown. The sanitary sewer main shall then be placed in the casing with approved casing spacers as specified in this section. All joints within the carder pipe shall be mechanically restrained joints. After inspection, the ends of the casing shall be filled with 2500 psi concrete not less than eight inches thick.

8.0 RAILROAD CROSSINGS: Permits for all work within the right-of-way of a railroad will be obtained by the Engineer. The Contractor shall, however, verify existence of a permit before commencing work in this area. All work related to the railroad crossings shall be in full compliance with the terms of the permit and AREA Specifications for Pipeline Crossings under Railway Tracks for Non-Flammable Substances. The carrier pipe shall be placed in steel casing pipe under the railroad crossing by jacking and boring. The sewer main shall then be placed in the casing with approved casing spacers as specified in this section. All joints within carder pipe shall be mechanically restrained joints. After inspection by the Engineer, the ends of the casing shall be sealed with 2,500 psi. concrete not less than 12 inches thick. Upon completion and prior to final acceptance, the Contractor shall place crossing markers of a type acceptable to the Railroad Company at each end of the crossing at the railroad right-of-way.

9.0 METHOD OF MEASUREMENT:

9.1 The length of pipe, quantity of manholes, connections, adjustments, and laterals be paid for under this item shall be made on a lump sum basis for all items installed and completed, in place, ready for operation and accepted by the Engineer.

10.0 BASIS OF PAYMENT:

10.1 Payment will be made at the Contract lump sum price for the sanitary sewer manhole, connection, manhole connection, and service laterals, as specified, and installed in place by the Contractor and accepted by the Engineer. The Contractor is responsible for procuring and completing all testing required to complete the sanitary sewer installation, and receive final acceptance from the CITY, at no cost to the Owner. This price shall be full compensation for furnishing all materials and for all preparation, assembly, connections, testing (televised inspection), and installation of these materials and for all labor, equipment, tools and incidentals necessary to complete this item.

Payment will be made under:

Item 429 Sanitary Sewer, Complete, Including Directional Drilling, Grinder Pump Station, Oil/Water Separator and All Other Items/Appurtenances – per lump sum

END OF SECTION 429

ITEM D-701

PIPE FOR STORM DRAINS AND CULVERTS

1.0 DESCRIPTION

1.1 This item shall consist of the construction of pipe culverts and storm drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

2.0 MATERIALS

2.1 Materials shall meet the requirements shown on the plans and specified below.

2.2 Pipe: The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements:

AASHTO M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
ASTM D2241	Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series)
ASTM C507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe

2.3 Concrete: Concrete for pipe cradles shall have a minimum compressive strength of 2000 psi (13.8 MPa) at 28 days and conform to the requirements of ASTM C94.

2.4 Rubber Gaskets: Rubber gaskets for rigid pipe shall conform to the requirements of ASTM C443. Rubber gaskets for PVC pipe, polyethylene, and polypropylene pipe shall conform to the requirements of ASTM F477. Rubber gaskets for zinc-coated steel pipe and precoated galvanized pipe shall conform to the requirements of ASTM D1056, for the "RE" closed cell grades. Rubber gaskets for steel reinforced thermoplastic ribbed pipe shall conform to the requirements of ASTM F477.

2.5 Joint Mortar: Pipe joint mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

2.6 Joint Fillers: Poured filler for joints shall conform to the requirements of ASTM D6690.

2.7 Plastic Gaskets: Plastic gaskets shall conform to the requirements of AASHTO M198 (Type B).

2.8. Controlled Low-Strength Material (CLSM): Controlled low-strength material shall conform to the requirements of Item P-153. When CLSM is used all joints shall have gaskets.

3.0 CONSTRUCTION METHODS

3.1 Excavation: The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but

it shall not be less than the external diameter of the pipe plus 6 inches (150 mm) on each side. The trench walls shall be approximately vertical.

The Contractor shall comply with all current Federal, state and local rules and regulations governing the safety of men and materials during the excavation, installation and backfilling operations. Specifically, the Contractor shall observe that all requirements of the Occupational Safety and Health Administration (OSHA) relating to excavations, trenching and shoring are strictly adhered to. The width of the trench shall be sufficient to permit satisfactorily jointing of the pipe and thorough compaction of the bedding material under the pipe and backfill material around the pipe, but it shall not be greater than the widths shown on the plans trench detail. The trench bottom shall be shaped to fully and uniformly support the bottom quadrant of the pipe.

Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least 8 inch (200 mm) or 1/2 inch (12 mm) for each foot of fill over the top of the pipe (whichever is greater) but for no more than three-quarters of the nominal diameter of the pipe. The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay or loam, and lightly compacted in layers not over 6 inches (150 mm) in uncompacted depth to form a uniform but yielding foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The Engineer shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

The excavation for pipes placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans.

3.2 Bedding: The pipe bedding shall conform to the class specified on the plans. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe. When no bedding class is specified or detailed on the plans, the requirements for Class C bedding shall apply.

a. Rigid Pipe: Class A bedding shall consist of a continuous concrete cradle conforming to the plan details.

Class B bedding shall consist of a bed of granular material having a thickness of at least 6 inches (150 mm) below the bottom of the pipe and extending up around the pipe for a depth of not less than 30% of the pipe's vertical outside diameter. The layer of bedding material shall be shaped to fit the pipe for at least 10% of the pipe's vertical diameter and shall have recesses shaped to receive the bell of bell and spigot pipe. The bedding material shall be sand or select sandy soil with 100% passing a 3/8 inch (9 mm) sieve and not more than 10% passing a No. 200 (0.075 mm) sieve.

Class C bedding shall consist of bedding the pipe in its natural foundation material to a depth of not less than 10% of the pipe's vertical outside diameter. The bed shall be shaped to fit the pipe and shall have recesses shaped to receive the bell of bell and spigot pipe.

b. Flexible Pipe: For flexible pipe, the bed shall be roughly shaped to fit the pipe, and a bedding blanket of sand or fine granular material shall be provided as follows:

Pipe Corrugation Depth		Minimum Bedding Depth	
inch	**mm**	**inch**	**mm**
1/2	12	1	25
1	25	2	50
2	50	3	75
2-1/2	60	3-1/2	90

c. PVC, Polyethylene, and Polypropylene Pipe: For PVC, polyethylene, and polypropylene pipe, the bedding material shall consist of coarse sands and gravels with a maximum particle size of 3/4 inches (19 mm). For pipes installed under paved areas, no more than 12% of the material shall pass the No. 200 (0.075 mm) sieve. For all other areas, no more than 50% of the material shall pass the No. 200 (0.075 mm) sieve. The bedding shall have a thickness of at least 6 inches (150 mm) below the bottom of the pipe and extend up around the pipe for a depth of not less than 50% of the pipe's vertical outside diameter.

3.3 Laying Pipe: The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

Paved or partially lined pipe shall be placed so that the longitudinal center line of the paved segment coincides with the flow line.

Elliptical and elliptically reinforced concrete pipes shall be placed with the manufacturer's reference lines designating the top of the pipe within five degrees of a vertical plane through the longitudinal axis of the pipe.

3.4 Joining Pipe: Joints shall be made with (1) Portland cement mortar, (2) Portland cement grout, (3) rubber gaskets, (4) plastic gaskets, or (5) coupling bands.

Mortar joints shall be made with an excess of mortar to form a continuous bead around the outside of the pipe and shall be finished smooth on the inside. Molds or runners shall be used for grouted joints to retain the poured grout. Rubber ring gaskets shall be installed to form a flexible watertight seal.

a. Concrete Pipe: Concrete pipe may be either bell and spigot or tongue and groove. The method of joining pipe sections shall be so the ends are fully entered and the inner surfaces are reasonably flush and even. Joints shall be thoroughly wetted before applying mortar or grout.

b. Metal Pipe: Metal pipe shall be firmly joined by form-fitting bands conforming to the requirements of ASTM A760 for steel pipe and AASHTO M196 for aluminum pipe.

c. PVC, Polyethylene and Polypropylene Pipe: Joints for PVC, Polyethylene, and Polypropylene pipe shall conform to the requirements of ASTM D3212 when water tight joints are required. Joints for PVC and Polyethylene pipe shall conform to the requirements of AASHTO M304 when soil tight joints are required. Fittings for polyethylene

pipe shall conform to the requirements of AASHTO M252 or ASTM M294. Fittings for polypropylene pipe shall conform to ASTM F2881, ASTM F2736, or ASTM F2764.

3.4.1 Joining New or Existing Pipes to Existing Structures or New Pipes. Each connection of a new pipe or existing pipe shall be made as shown on the drawings. Openings in existing structures or pipes shall be made with saws appropriate for the opening to be made. Holes in pipes shall be made with core drills. Openings in concrete structures shall be made with core drills or saws by neatly cutting the required minimum opening sizes. Care shall be taken to insure the integrity of the structure is intact at the completion of the connection. Connection openings shall be mortar sealed to a width at least equaling the structure wall width.

3.5 Backfilling: Pipes shall be inspected before any backfill is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and re-laid or replaced at the Contractor's expense.

Material for backfill shall be fine, readily compatible soil or granular material selected from the excavation or a source of the Contractor's choosing or shall meet the requirements of Item P-153, if certified by the contractor. It shall not contain frozen lumps, stones that would be retained on a 2-inch (50 mm) sieve, chunks of highly plastic clay, or other objectionable material. Granular backfill material shall have 95% or more passing the a 1/2 inch (12 mm) sieve, with 95% or more being retained on the No. 4 (4.75 mm) sieve.

When the top of the pipe is even with or below the top of the trench, the backfill shall be compacted in layers not exceeding 6 inches (150 mm) on each side of the pipe and shall be brought up one foot (30 cm) above the top of the pipe or to natural ground level, whichever is greater. Thoroughly compact the backfill material under the haunches of the pipe without displacing the pipe. Material shall be brought up evenly on each side of the pipe for the full length of the pipe.

When the top of the pipe is above the top of the trench, the backfill shall be compacted in layers not exceeding 6 inches (150 mm) and shall be brought up evenly on each side of the pipe to one foot (30 cm) above the top of the pipe. The width of backfill on each side of the pipe for the portion above the top of the trench shall be equal to twice the pipe's diameter or 12 feet (3.7 m), whichever is less.

For PVC, polyethylene, and polypropylene pipe, the backfill shall be placed in two stages; first to the top of the pipe and then at least 12 inches (300 mm) over the top of the pipe. The backfill material shall meet the requirements of paragraph 701-3.2c.

All backfill shall be compacted to the density required under Item P-152.

It shall be the Contractor's responsibility to protect installed pipes and culverts from damage due to construction equipment operations. The Contractor shall be responsible for installation of any extra strutting or backfill required to protect pipes from the construction equipment.

3.6 Restoration. Restoration of disturbed areas, where sodding is not specified, with three inches minimum topsoil and seeding is included in this item.

4.0 METHOD OF MEASUREMENT

4.1 The length of pipe shall be measured in linear feet (m) of pipe in place, completed, and approved. It shall be measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. The several classes, types and size shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipe being measured.

4.2 The volume of concrete for pipe cradles shall be the number of cubic yards (cubic meters) of concrete that is completed in place and accepted.

4.3 The volume of rock shall be the number of cubic yards (cubic meters) of rock excavated. No payment shall be made for the cushion material placed for the bed of the pipe.

4.4 Connections shall be measured as each connection type completed and accepted by the engineer. No separate payment shall be made for pipe connections.

5.0 BASIS OF PAYMENT

5.1 Payment will be made at the contract unit price per linear foot (meter) for each kind of pipe of the type and size designated.

These prices shall fully compensate the Contractor for furnishing all materials and for all preparation, excavation, backfill, installation of these materials and restoration; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item D-701-5.1	8-Inch SDR-21 Storm Sewer Roof Leaders, Including Cleanouts - per linear foot
Item D-701-5.2	8-inch HDPE Storm Sewer with Concrete Backfill In Paved Areas - per linear foot
Item D-701-5.3	12-inch HDPE Storm Sewer with Concrete Backfill In Paved Areas - per linear foot

END ITEM D-701

ITEM D-751

MANHOLES, CATCH BASINS, INLETS and INSPECTION HOLES

1.0 DESCRIPTION

1.1 This item shall consist of construction of manholes, catch basins, inlets, and inspection holes, in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the plans or required by the Engineer.

2.0 MATERIALS

2.1 Brick. The brick shall conform to the requirements of ASTM C32, Grade MS.

2.2 Mortar. Mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

2.3 Concrete. Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610.

2.4 Precast Concrete Pipe Manhole Rings. Precast concrete pipe manhole rings shall conform to the requirements of ASTM C478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36 inches (90 cm) nor more than 48 inches (120 cm). There shall be a gasket between individual sections and sections cemented together with mortar on the inside of the manhole.

2.5 Corrugated Metal. Corrugated metal shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M36.

2.6 Frames, Covers, and Grates. The castings shall conform to one of the following requirements:

- **a.** ASTM A48, Class 35B: Gray iron castings
- **b.** ASTM A47: Malleable iron castings
- **c.** ASTM A27: Steel castings
- **d.** ASTM A283, Grade D: Structural steel for grates and frames
- **e.** ASTM A536, Grade 65-45-12: Ductile iron castings
- **f.** ASTM A897:Austempered ductile iron castings

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading, specified.

Each frame and cover or grate unit shall be provided with fastening members to prevent it from being dislodged by traffic but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

2.7 Steps. The steps or ladder bars shall be gray or malleable cast iron or galvanized steel. The steps shall be the size, length, and shape shown on the plans and those steps that are not galvanized shall be given a coat of bituminous paint, when directed.

2.8 Precast inlet Structures. Manufactured in accordance with and conforming to ASTM C1433.

3.0 CONSTRUCTION METHODS

3.1 Unclassified Excavation.

a. The Contractor shall excavate for structures and footings to the lines and grades or elevations, shown on the plans, or as staked by the Engineer. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximately only; and the Engineer may direct, in writing, changes in dimensions or elevations of footings necessary for a satisfactory foundation.

b. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. Where concrete will rest on a surface other than rock, the bottom of the excavation shall not be disturb and excavation to final grade shall not be made until immediately before the concrete or reinforcing is placed.

c. The Contractor shall do all bracing, sheathing, or shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the structure.

d. All bracing, sheathing, or shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall not disturb or damage finished masonry. The cost of removal shall be included in the unit price bid for the structure.

e. After excavation is completed for each structure, the Contractor shall notify the Engineer. No concrete or reinforcing steel shall be placed until the Engineer has approved the depth of the excavation and the character of the foundation material.

3.2 Brick Structures.

a. Foundations. A prepared foundation shall be placed for all brick structures after the foundation excavation is completed and accepted. Unless otherwise specified, the base shall consist of reinforced concrete mixed, prepared, and placed in accordance with the requirements of Item P-610.

b. Laying Brick. All brick shall be clean and thoroughly wet before laying so that they will not absorb any appreciable amount of additional water at the time they are laid. All brick shall be laid in freshly made mortar. Mortar not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted. An ample layer of mortar shall be spread on the beds and a shallow furrow shall be made in it that can be readily closed by the laying of the brick. All bed and head joints shall be filled solid with mortar. End joints of stretchers and side or cross joints of headers shall be fully buttered with mortar and a shoved joint made to squeeze out mortar at the top of the joint. Any bricks that may be loosened after the mortar has taken its set, shall be removed, cleaned, and relaid with fresh mortar. No broken or chipped brick shall be used in the face, and no spalls or bats shall be used except where necessary to shape around irregular openings or edges; in which case, full bricks shall be placed at ends or corners where possible, and the bats shall be used in the interior of the course. In making closures, no piece of brick shorter than the width of a whole brick shall be used; and wherever practicable, whole brick shall be used and laid as headers.

c. Joints. All joints shall be filled with mortar at every course Exterior faces shall be laid up in advance of backing. Exterior faces shall be plastered or parged with a coat of mortar not less than 3/8 inch (9 mm) thick before the backing is laid up. Prior to parging, all joints on the back of face courses shall be cut flush. Unless otherwise noted, joints shall be not less than 1/4 inch (6 mm) nor more than 1/2 inch (12 mm) wide and the selected joint width shall be maintained uniform throughout the work.

d. Pointing. Face joints shall be neatly struck, using the weather-struck joint. All joints shall be finished properly as the laying of the brick progresses. When nails or line pins are used the holes shall be immediately plugged with mortar and pointed when the nail or pin is removed.

e. Cleaning. Upon completion of the work all exterior surfaces shall be thoroughly cleaned by scrubbing and washing with water. If necessary to produce satisfactory results, cleaning shall be done with a 5% solution of muriatic acid which shall then be rinsed off with liberal quantities of water.

f. Curing and Cold Weather Protection. The brick masonry shall be protected and kept moist for at least 48 hours after laying the brick. Brick masonry work or pointing shall not be done when there is frost on the brick or when the air temperature is below 50°F (10°C) unless the Contractor has, on the project ready to use, suitable covering and artificial heating devices necessary to keep the atmosphere surrounding the masonry at a temperature of not less than 60°F (16°C) for the duration of the curing period.

3.3 Concrete Structures. Concrete structures shall be built on prepared foundations, conforming to the dimensions and shape indicated on the plans. The construction shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the Engineer before the concrete is placed.

All invert channels shall be constructed and shaped accurately to be smooth, uniform, and cause minimum resistance to flowing water. The interior bottom shall be sloped to the outlet.

3.4 Precast Concrete Structures. Precast concrete structures shall conform to ASTM C478. Precast concrete structures shall be constructed on prepared or previously placed slab foundations conforming to the dimensions and locations shown on the plans. All precast

concrete sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall be smoothed to a uniform surface on both interior and exterior of the structure. The top of the upper precast concrete section shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause minimum resistance to flow. The metal steps that are embedded or built into the side walls shall be aligned and placed at vertical intervals of 12 inches (300 mm). When a metal ladder replaces the steps, it shall be securely fastened into position.

3.5 Corrugated Metal Structures. Corrugated metal structures shall be prefabricated. All standard or special fittings shall be furnished to provide pipe connections or branches with the correct dimensions and of sufficient length to accommodate connecting bands. The fittings shall be welded in place to the metal structures. The top of the metal structure shall be designed so that either a concrete slab or metal collar may be attached to allow the fastening of a standard metal frame and grate or cover. Steps or ladders shall be furnished as shown on the plans. Corrugated metal structures shall be constructed on prepared foundations, conforming to the dimensions and locations as shown on the plans. When indicated, the structures shall be placed on a reinforced concrete base.

3.6 Inlet and Outlet Pipes. Inlet and outlet pipes shall extend through the walls of the structures a sufficient distance beyond the outside surface to allow for connections. They shall be cut off flush with the wall on the inside surface of the structure, unless otherwise directed. For concrete or brick structures, mortar shall be placed around these pipes to form a tight, neat connection.

3.7 Placement and Treatment of Castings, Frames, and Fittings. All castings, frames, and fittings shall be placed in the positions indicated on the plans or as directed by the Engineer, and shall be set true to line and elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

When frames or fittings are placed on previously constructed masonry, the bearing surface of the masonry shall be brought true to line and grade and shall present an even bearing surface so the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the plans or as directed by the Engineer. All units shall set firm and secure.

After the frames or fittings have been set in final position, the concrete or mortar shall be allowed to harden for seven (7) days before the grates or covers are placed and fastened down.

3.8 Installation of Steps. The steps shall be installed as indicated on the plans or as directed by the Engineer. When the steps are to be set in concrete, they shall be placed and secured in position before the concrete is placed. When the steps are installed in brick masonry, they shall be placed as the masonry is being built. The steps shall not be disturbed or used until the concrete or mortar has hardened for at least seven (7) days. After seven (7) days, the steps shall be cleaned and painted, unless they have been galvanized.

When steps are required with precast concrete structures, they shall be cast into the side of the sections at the time the sections are manufactured or set in place after the structure is erected by drilling holes in the concrete and cementing the steps in place.

When steps are required with corrugated metal structures, they shall be welded into aligned position at a vertical spacing of 12 inches (300 mm).

Instead of steps, prefabricated ladders may be installed. For brick or concrete structures, the ladder shall be held in place by grouting the supports in drilled holes. For metal structures, the ladder shall be secured by welding the top support to the structure and grouting the bottom support into drilled holes in the foundation or as directed by the Engineer.

3.9 Backfilling.

a. After a structure has been completed, the area around it shall be backfilled with approved material, in horizontal layers not to exceed 8 inches (200 mm) in loose depth, and compacted to the density required in Item P-152. Each layer shall be deposited evenly around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the Engineer.

b. Backfill shall not be placed against any structure until approved by the Engineer. For concrete structures, approval shall not be given until the concrete has been in place seven (7) days, or until tests establish that the concrete has attained sufficient strength to withstand any pressure created by the backfill and placing methods.

c. Backfill shall not be measured for direct payment. Performance of this work shall be considered an obligation of the Contractor covered under the contract unit price for the structure involved.

d. When structures are located within the runway safety area, POFA, RPZ, etc., the elevation of the structures shall be set to meet the grading requirements of these areas. Structures shall not exceed 3 inches (75 mm) above the elevation the surrounding areas.

3.10 Cleaning and Restoration of Site. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as approved by the Engineer. The Contractor shall restore all disturbed areas to their original condition. The Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

4.0 METHOD OF MEASUREMENT

4.1 Manholes, catch basins, inlets, and inspection holes shall be measured by the unit.

5.0 BASIS OF PAYMENT

5.1 The accepted quantities of manholes, catch basins, inlets, and inspection holes will be paid for at the contract unit price per each in place when completed. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials; furnishing and installation of such specials and connections to pipes and other structures as may be required to complete the item as shown on the plans; and for all labor equipment, tools and incidentals necessary to complete the structure.

Payment will be made under:

Item D-751-5.1	12" Yard Drain, per each
Item D-751-5.2	FDOT Type C Inlet (Modified, Pond Control Structure), per each
Item D-751-5.3	FDOT U-Type Endwall, Index 430-011, Modified for 8-Inch Pipe, 4:1 Slope, with Baffles
Item D-751-5.4	FDOT MES, Index 430-021, Modified for 8-Inch Pipe, 4:1 Slope, per each
Item D-751-5.5	FDOT U-Type Endwall, Index 430-011, Modified for 12-Inch Pipe, 4:1 Slope, with Baffles

MATERIAL REQUIREMENT

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C32	Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C478	Standard Specification for Precast Reinforced Concrete Manhole Sections
ASTM C1433	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
AASHTO M36	Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains

END OF ITEM D-751

ITEM L-108: UNDERGROUND POWER CABLE FOR AIRPORTS

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the RPR. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

EQUIPMENT AND MATERIALS

108-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications submitted electronically in pdf format. The RPR reserves the

right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in accordance with AC 150/5340-26, *Maintenance Airport Visual Aid Facilities*, paragraph 5.1.3.1, Insulation Resistance Test.

108-2.2 Cable. Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type B, Type C, 5,000 volts, non-shielded, with ethylene propylene insulation, cross-linked polyethylene insulation. Conductors for use on 20 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #6 AWG, L-824 Type B, Type C, 5,000 volts, non-shielded, with ethylene propylene insulation, cross-linked polyethylene insulation. L-824 conductors for use on the L-830 secondary of airfield lighting series circuits shall be sized in accordance with the manufacturer's recommendations. All other conductors shall comply with FAA and National Electric Code (NEC) requirements. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type THWN-2, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors, pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

108-2.3 Bare copper wire (counterpoise, bare copper wire ground and ground rods). Wire for counterpoise or ground installations for airfield lighting systems shall be No. 6 AWG bare

solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare copper wire. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be copper copper-clad steel**.** The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 8 feet (2.4 m) long and 5/8 inch (16 mm) in diameter.

108-2.4 Cable connections. In-line connections or splices of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

a. The cast splice. A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3M™ Company, "Scotchcast" Kit No. 82-B, or an approved equivalent, used for potting the splice is acceptable.

b. The field-attached plug-in splice. Field attached plug-in splices shall be installed as shown on the plans. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant shall be in accordance with the manufacturer's requirements. Primary Connector Kits manufactured by Amerace, "Super Kit", Integro "Complete Kit", or approved equal is acceptable.

c. The factory-molded plug-in splice. Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

d. The taped or heat-shrink splice. Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

108-2.5 Splicer qualifications. Every airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 volts AC. The Contractor shall submit to the RPR proof of the qualifications of each proposed cable splicer for the airport

cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

108-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

108-2.7 Flowable backfill. Flowable material used to backfill trenches for power cable trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

108-2.8 Cable identification tags. Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

108-2.9 Tape. Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2 inch (38 mm) wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch (50 mm) wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

108-2.10 Electrical coating. Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

108-2.11 Existing circuits. Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the RPR. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

108-2.12 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

CONSTRUCTION METHODS

108-3.1 General. The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable

runs without connections unless otherwise authorized in writing by the RPR or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than 3 feet (1 m) of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot (30 cm) vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the RPR.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch (6 mm) in size. The cable circuit identification shall match the circuits noted on the construction plans.

108-3.2 Installation in duct banks or conduits. This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall

be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the RPR prior to any cable installation. If required by the RPR, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the RPR. Cable pull tensions shall be recorded by the Contractor and reviewed by the RPR. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the RPR, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

108-3.3 Installation of direct-buried cable in trenches. Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted.

Where cables must cross over each other, a minimum of 3 inches (75 mm) vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

a. Trenching. Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 18 inches (0.5 m) below finished grade per NEC Table 300.5, except as follows:

- When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches (91 cm) unless otherwise specified.

- Minimum cable depth when crossing under a railroad track, shall be 42 inches (1 m) unless otherwise specified.

The Contractor shall excavate all cable trenches to a width not less than 6 inches (150 mm). Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill material may alternatively be used.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

(1) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

(2) Trenching, etc., in cable areas shall then proceed, with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

b. Backfilling. After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall encompass all cables ; be 3 inches (75 mm) deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. This layer shall not be compacted. The second layer shall be 5 inches (125 mm) deep, loose measurement, and shall contain no particles that would be retained on a one inch (25.0 mm) sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches (20 cm) of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches (100 mm) maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent material. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be **[**to a minimum of 100 percent of ASTM D1557**.**

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of per the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the RPR. If not shown on the plans, the warning tape shall be located 6 inches (150 mm) above the direct-buried cable or the counterpoise wire if present. A 3-6 inch (75 - 150 mm) wide polyethylene film detectable tape, with a metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a continuous legend as indicated on the plans. The tape shall be installed 8 inches (200 mm) minimum below finished grade.

c. Restoration. Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the seeding, topsoiling**,** and sodding as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557**.**

108-3.4 Cable markers for direct-buried cable. The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet (60 cm) square and 4-6 inch (10 - 15 cm) thick, extending approximately one inch (25 mm) above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet (61 m) along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word “CABLE” and directional arrows on each cable marking slab. The letters shall be approximately 4 inches (100 mm) high and 3 inches (75 mm) wide, with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word “SPLICE” on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the RPR. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the RPR. Furnishing and installation of cable markers is incidental to the respective cable pay item.

108-3.5 Splicing. Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

a. Cast splices. These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer’s instructions and to the satisfaction of the RPR.

b. Field-attached plug-in splices. These shall be assembled per the manufacturer’s instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1)

wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

c. Factory-molded plug-in splices. These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) Wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint. (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

d. Taped or heat-shrink splices. A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches (75 mm) on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer’s instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminates prior to application.

e. Assembly. Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer’s recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch (6.4 mm) beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials

used in the connection. Repair painted/coated surface to original condition after completing the connection.

108-3.6 Bare counterpoise wire installation for lightning protection and grounding. If shown on the plans or included in the job specifications, bare solid **[** #6 AWG **]** copper counterpoise wire shall be installed for lightning protection of the underground cables. The RPR shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

a. Equipotential. [The counterpoise size is as shown on the plans. The equipotential method is applicable to all airfield lighting systems; i.e. runway, taxiway, apron – touchdown zone, centerline, edge, threshold and approach lighting systems. The equipotential method is also successfully applied to provide lightning protection for power, signal and communication systems. The light bases, counterpoise, etc – all components - are bonded together and bonded to the vault power system ground loop/electrode.

Counterpoise wire shall be installed in the same trench for the entire length of buried cable, conduits and duct banks that are installed to contain airfield cables. The counterpoise is centered over the cable/conduit/duct to be protected.

The counterpoise conductor shall be installed no less than 8 inches (200 mm) minimum or 12 inches (300 mm) maximum above the raceway or cable to be protected, except as permitted below:

(1) The minimum counterpoise conductor height above the raceway or cable to be protected shall be permitted to be adjusted subject to coordination with the airfield lighting and pavement designs.

(2) The counterpoise conductor height above the protected raceway(s) or cable(s) shall be calculated to ensure that the raceway or cable is within a 45-degree area of protection, (45 degrees on each side of vertical creating a 90 degree angle).

The counterpoise conductor shall be bonded to each metallic light base, mounting stake, and metallic airfield lighting component.

All metallic airfield lighting components in the field circuit on the output side of the constant current regulator (CCR) or other power source shall be bonded to the airfield lighting counterpoise system.

All components rise and fall at the same potential; with no potential difference, no damaging arcing and no damaging current flow.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Equipotential Method of lightning protection.

Reference FAA STD-019E, Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment, Part 4.1.1.7.

b. Isolation. Counterpoise size is as shown on the plans. The isolation method is an alternate method for use only with edge lights installed in turf and stabilized soils and raceways installed parallel to and adjacent to the edge of the pavement. NFPA 780 uses 15 feet to define “adjacent to”.

The counterpoise conductor shall be installed halfway between the pavement edge and the light base, mounting stake, raceway, or cable being protected.

The counterpoise conductor shall be installed 8 inches (203 mm) minimum below grade. The counterpoise is not connected to the light base or mounting stake. An additional grounding electrode is required at each light base or mounting stake. The grounding electrode is bonded to the light base or mounting stake with a 6 AWG solid copper conductor.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Isolation Method of lightning protection.][not used]

c. Common Installation requirements. When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

When a nonmetallic light base is used, the grounding electrode shall be bonded to the metallic light fixture or metallic base plate with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet (150 m) apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.

Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

d. Parallel Voltage Systems. Provide grounding and bonding in accordance with NFPA 70, National Electrical Code.

108-3.7 Counterpoise installation above multiple conduits and duct banks. Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

108-3.8 Counterpoise installation at existing duct banks. When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring

shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

108-3.9 Exothermic bonding. Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the RPR. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the RPR, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

a. All slag shall be removed from welds.

b. Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

c. If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

108-3.10 Testing. The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the RPR. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the RPR. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

a. Earth resistance testing methods shall be submitted to the RPR for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the RPR. All such testing shall be at the sole expense of the Contractor.

b. Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The RPR shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the RPR the following:

c. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

d. That all affected circuits (existing and new) are free from unspecified grounds.

e. That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than 25 megohms. Verify continuity of all series airfield lighting circuits prior to energization.

f. That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 100 megohms.

g. That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

h. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

i. That the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the RPR prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the RPR. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved "repair" procedures for items that have failed testing other than complete replacement.

METHOD OF MEASUREMENT

108-4.1 Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet (meters) installed and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. The measurement for this item shall not include additional quantities required for slack. The cost of all excavation, backfill, dewatering and restoration regardless of the type of material encountered shall be included in the unit price bid for the work.

108-4.3 Ground rods shall be measured by each 8-foot section installed complete.

BASIS OF PAYMENT

108-5.1 Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the RPR. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

Item L-108-5.1 – Airfield Electrical Demolition – per linear foot

Item L-108-5.2 – NO. 8 AWG, 5KV, L-824C CABLE, INSTALLED IN CONDUIT – per linear foot

Item L-108-5.3 – BARE COUNTERPOISE WIRE, INSTALLED IN TRENCH OR DUCT BANK, INCLUDING GROUND RODS AND GROUND CONNECTORS – per linear foot

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description

A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)
A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic

ASTM International (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM D4388	Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes

Mil Spec

MIL-PRF-23586F	Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical
MIL-I-24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems

American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Federal Aviation Administration Standard

FAA STD-019E	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment

END OF ITEM L-108

ITEM L-110: AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS

DESCRIPTION

110-1.1 This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits and removal of existing duct banks. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

EQUIPMENT AND MATERIALS

110-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, that comply with these specifications, at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all

equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

110-2.2 Steel conduit. Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory-bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mils of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions. In lieu of PVC coated RGS, corrosion wrap tape shall be permitted to be used where RGS is in contact with direct earth."

110-2.3 Plastic conduit. Plastic conduit and fittings-shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.
- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

a. Type I–Schedule 40 and Schedule 80 PVC suitable for underground use either direct-buried or encased in concrete.

b. Type II–Schedule 40 PVC suitable for either above ground or underground use.

c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.

d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

110-2.4 Split conduit. Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

110-2.5 Conduit spacers. Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

110-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

110-2.7 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program. Precast concrete structures shall conform to ASTM C478.

110-2.8 Flowable backfill. Flowable material used to back fill conduit and duct bank trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

110-2.9 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber optic cabling) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item.

CONSTRUCTION METHODS

110-3.1 General. The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The RPR shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches (50 mm) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches (75 mm) per 100 feet (30 m). On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches (0.5 m) below the subgrade; in other locations, the top of the duct bank or underground conduit shall be be not less than 18 inches (0.5 m) below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch (6 mm) smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound (90 kg) test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet (1.5 m).

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxilanes, ramps and aprons. When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flowable fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill may alternatively be used

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (60 cm).

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the RPR, the unsuitable material shall be removed per Item P-152 and replaced with suitable material. Additional duct bank supports shall be installed, as approved by the RPR.

All excavation shall be unclassified and shall be considered incidental to Item L-110. Dewatering necessary for duct installation, and erosion per federal, state, and local requirements is incidental to Item L-110.

Unless otherwise specified, excavated materials that are deemed by the RPR to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the RPR and compacted per Item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables) cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

a. Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

b. Trenching, etc., in cable areas shall then proceed with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

110-3.2 Duct banks. Unless otherwise shown in the plans, duct banks shall be installed so that the top of the concrete envelope is not less than 18 inches (0.5 m) below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches (0.5 m) below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet (1 m) beyond the edges of the pavement or 3 feet (1 m) beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches (75 mm) thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches (75 mm) apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches (75 mm) thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot (1.5-m) intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches (75 to 150 mm) wide tape, 8 inches (200 mm) minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch (75-mm) wide tape only for single conduit runs. Utilize the 6-inch (150-mm) wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches (600 mm) in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the RPR shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the RPR.

110-3.3 Conduits without concrete encasement. Trenches for single-conduit lines shall be not less than 6 inches (150 mm) nor more than 12 inches (300 mm) wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches (100 mm) thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch (6.3 mm) sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches (0.5 m) below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches (60 cm) below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and lot less than 6 inches (150 mm) apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

110-3.4 Markers. The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet (60 cm) square and 4 - 6 inches (100 - 150 mm) thick extending approximately one inch (25 mm) above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (61 m) along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word “DUCT” or “CONDUIT” on each marker slab. Impression of letters shall be done in a manner, approved by the RPR, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the RPR. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the RPR. The letters shall be 4 inches (100 mm) high and 3 inches (75 mm) wide with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

110-3.5 Backfilling for conduits. For conduits, 8 inches (200 mm) of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 except that material used for back fill shall be select material not larger than 4 inches (100 mm) in diameter.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.6 Backfilling for duct banks. After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 “Excavation and Embankment” except that the material used for backfill shall be select material not larger than 4 inches (100 mm) in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement,

one moisture/density test per lift shall be made for each 250 linear feet (76 m) of duct bank or one work period's construction, whichever is less.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.7 Restoration. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include topsoiling, seeding, and sodding as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

110-3.8 Ownership of removed cable. All removed cable shall become property of the contractor and may be sold for scrap.

METHOD OF MEASUREMENT

110-4.1 Underground conduits and duct banks shall be measured by the linear feet (meter) of conduits and duct banks installed, including encasement, locator tape, trenching and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

BASIS OF PAYMENT

110-5.1 Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

Payment will be made under:

Item L-110-5.1 – ELECTRICAL CONDUIT (4) 2 INCH PVC SCH. 40, INSTALLED IN TRENCH – per linear foot

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circular (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 1242	Electrical Intermediate Metal Conduit Steel
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

END OF ITEM L-110

ITEM L-115: ELECTRICAL MANHOLES AND JUNCTION STRUCTURES

DESCRIPTION

115-1.1 This item shall consist of electrical manholes and junction structures (hand holes, pull boxes, junction cans, etc.) installed per this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the RPR. This item shall include the installation of each electrical manhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, ladders, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the RPR, including removal of existing manholes and junction structures as shown on the plans

EQUIPMENT AND MATERIALS

115-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications**.** The Contractor's submittals shall be **[** electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from the

date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

115-2.2 Concrete structures. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures. Cast-in-place concrete structures shall be as shown on the plans.

115-2.3 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another engineer approved third party certification program. Provide precast concrete structures where shown on the plans.

Precast concrete structures shall be an approved standard design of the manufacturer. Precast units shall have mortar or bitumastic sealer placed between all joints to make them watertight. The structure shall be designed to withstand 60,000 lb aircraft loads, unless otherwise shown on the plans. Openings or knockouts shall be provided in the structure as detailed on the plans.

Threaded inserts and pulling eyes shall be cast in as shown on the plans.

If the Contractor chooses to propose a different structural design, signed and sealed shop drawings, design calculations, and other information requested by the RPR shall be submitted by the Contractor to allow for a full evaluation by the RPR. The RPR shall review per the process defined in the General Provisions.

115-2.4 Junction boxes. Junction boxes shall be L-867 Class 1 (non-load bearing) or L-868 Class 1 (load bearing) airport light bases that are encased in concrete. The light bases shall have a L-894 blank cover, gasket, and stainless steel hardware. All bolts, studs, nuts, lock washers, and other similar fasteners used for the light fixture assemblies must be fabricated from 316L (equivalent to EN 1.4404), 18-8, 410, or 416 stainless steel. If 18-8, 410, or 416 stainless steel is utilized it shall be passivated and be free from any discoloration. Covers shall be 3/8-inch (9-mm) thickness for L-867 and 3/4-inch (19-mm) thickness for L-868. All junction boxes shall be provided with both internal and external ground lugs.

115-2.5 Mortar. The mortar shall be composed of one part of cement and two parts of mortar sand, by volume. The cement shall be per the requirements in ASTM C150, Type I. The sand shall be per the requirements in ASTM C144. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15% of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C206. Water shall be potable, reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product.

115-2.6 Concrete. All concrete used in structures shall conform to the requirements of Item P-610, Concrete for Miscellaneous Structures.

115-2.7 Frames and covers. The frames shall conform to one of the following requirements:

a. ASTM A48 Gray iron castings

b. ASTM A47 Malleable iron castings

c. ASTM A27 Steel castings

d. ASTM A283, Grade D Structural steel for grates and frames

e. ASTM A536 Ductile iron castings

f. ASTM A897 Austempered ductile iron castings

All castings specified shall withstand a maximum tire pressure of 4000 psi and maximum load of 60,000 lbs.

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings specified.

Each frame and cover unit shall be provided with fastening members to prevent it from being dislodged by traffic, but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

Each cover shall have the word "ELECTRIC" or other approved designation cast on it. Each frame and cover shall be as shown on the plans or approved equivalent. No cable notches are required.

Each manhole shall be provided with a "DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" safety warning sign as detailed in the Contract Documents and in accordance with OSHA 1910.146 (c)(2).

115-2.8 Ladders. Ladders, if specified, shall be galvanized steel or as shown on the plans.

115-2.9 Reinforcing steel. All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A615, Grade 60.

115-2.10 Bedding/special backfill. Bedding or special backfill shall be as shown on the plans.

115-2.11 Flowable backfill. Flowable material used to backfill shall conform to the requirements of Item P-153, Controlled Low Strength Material.

115-2.12 Cable trays. Cable trays shall be of galvanized steel**.** Cable trays shall be located as shown on the plans.

115-2.13 Plastic conduit. Plastic conduit shall comply with Item L-110, Airport Underground Electrical Duct Banks and Conduits.

115-2.14 Conduit terminators. Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

115-2.15 Pulling-in irons. Pulling-in irons shall be manufactured with 7/8-inch (22 mm) diameter hot-dipped galvanized steel or stress-relieved carbon steel roping designed for concrete applications (7 strand, 1/2-inch (12 mm) diameter with an ultimate strength of 270,000 psi (1862 MPa)). Where stress-relieved carbon steel roping is used, a rustproof sleeve shall be installed at the hooking point and all exposed surfaces shall be encapsulated with a polyester coating to prevent corrosion.

115-2.16 Ground rods. Ground rods shall be one piece, copper or copper clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 8 feet (2.4 m) long nor less than 5/8 inch (16 mm) in diameter.

CONSTRUCTION METHODS

115-3.1 Unclassified excavation. It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in excavating, shall be repaired or replaced to the satisfaction of the RPR without additional expense to the Owner.

The Contractor shall perform excavation for structures and structure footings to the lines and grades or elevations shown on the plans or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown.

All excavation shall be unclassified and shall be considered incidental to Item L-115. Dewatering necessary for structure installation and erosion per federal, state, and local requirements is incidental to Item L-115.

Boulders, logs and all other objectionable material encountered in excavation shall be removed. All rock and other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped or serrated, as directed by the RPR. All seams, crevices, disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

The Contractor shall provide all bracing, sheeting and shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheeting and shoring shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing, sheeting and shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the RPR. Structures shall be placed after the RPR has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 6 inches (150 mm) of sand or a material approved by the RPR as a suitable base to receive the structure. The base material shall be compacted and graded level and at proper elevation to receive the structure in proper relation to the conduit grade or ground cover requirements, as indicated on the plans.

115-3.2 Concrete structures. Concrete structures shall be built on prepared foundations conforming to the dimensions and form indicated on the plans. The concrete and construction methods shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the RPR before the concrete is placed.

115-3.3 Precast unit installations. Precast units shall be installed plumb and true. Joints shall be made watertight by use of sealant at each tongue-and-groove joint and at roof of manhole. Excess sealant shall be removed and severe surface projections on exterior of neck shall be removed.

115-3.4 Placement and treatment of castings, frames and fittings. All castings, frames and fittings shall be placed in the positions indicated on the Plans or as directed by the RPR and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

Field connections shall be made with bolts, unless indicated otherwise. Welding will not be permitted unless shown otherwise on the approved shop drawings and written approval is granted by the casting manufacturer. Erection equipment shall be suitable and safe for the workman. Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and fitting of parts shall be reported immediately to the RPR and approval of the method of correction shall be obtained. Approved corrections shall be made at Contractor's expense.

Anchor bolts and anchors shall be properly located and built into connection work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately.

Pulling-in irons shall be located opposite all conduit entrances into structures to provide a strong, convenient attachment for pulling-in blocks when installing cables. Pulling-in irons shall be set directly into the concrete walls of the structure.

115-3.5 Installation of ladders. Ladders shall be installed such that they may be removed if necessary. Mounting brackets shall be supplied top and bottom and shall be cast in place during fabrication of the structure or drilled and grouted in place after erection of the structure.

115-3.6 Removal of sheeting and bracing. In general, all sheeting and bracing used to support the sides of trenches or other open excavations shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheeting extending below the top of a structure shall be withdrawn, unless otherwise directed, before more than 6 inches (150 mm) of material is placed above the top of the structure and before any bracing is removed. Voids left by the sheeting shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.

The RPR may direct the Contractor to delay the removal of sheeting and bracing if, in his judgment, the installed work has not attained the necessary strength to permit placing of backfill.

115-3.7 Backfilling. After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches (150 mm) in thickness measured after compaction to the density requirements in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the RPR.

Backfill shall not be placed against any structure until approval is given by the RPR. In the case of concrete, such approval shall not be given until tests made by the laboratory under supervision of the RPR establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

Where required, the RPR may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be

responsible for all damage or injury done to conduits, duct banks, structures, property or persons due to improper placing or compacting of backfill.

115-3.8 Connection of duct banks. To relieve stress of joint between concrete-encased duct banks and structure walls, reinforcement rods shall be placed in the structure wall and shall be formed and tied into duct bank reinforcement at the time the duct bank is installed.

115-3.9 Grounding. A ground rod shall be installed in the floor of all concrete structures so that the top of rod extends 6 inches (150 mm) above the floor. The ground rod shall be installed within one foot (30 cm) of a corner of the concrete structure. Ground rods shall be installed prior to casting the bottom slab. Where the soil condition does not permit driving the ground rod into the earth without damage to the ground rod, the Contractor shall drill a 4-inch (100 mm) diameter hole into the earth to receive the ground rod. The hole around the ground rod shall be filled throughout its length, below slab, with Portland cement grout. Ground rods shall be installed in precast bottom slab of structures by drilling a hole through bottom slab and installing the ground rod. Bottom slab penetration shall be sealed watertight with Portland cement grout around the ground rod.

A grounding bus of 4/0 bare stranded copper shall be exothermically bonded to the ground rod and loop the concrete structure walls. The ground bus shall be a minimum of one foot (30 cm) above the floor of the structure and separate from other cables. No. 2 American wire gauge (AWG) bare copper pigtails shall bond the grounding bus to all cable trays and other metal hardware within the concrete structure. Connections to the grounding bus shall be exothermic. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. Hardware connections may be mechanical, using a lug designed for that purpose.

115-3.10 Cleanup and repair. After erection of all galvanized items, damaged areas shall be repaired by applying a liquid cold-galvanizing compound per MIL-P-21035. Surfaces shall be prepared and compound applied per the manufacturer's recommendations.

Prior to acceptance, the entire structure shall be cleaned of all dirt and debris.

115-3.11 Restoration. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt and rubbish from the site. The Contractor shall restore all disturbed areas equivalent to or better than their original condition. All sodding, grading and restoration shall be considered incidental to the respective Item L-115 pay item.

The Contractor shall grade around structures as required to provide positive drainage away from the structure.

Areas with special surface treatment, such as roads, sidewalks, or other paved areas shall have backfill compacted to match surrounding areas, and surfaces shall be repaired using materials comparable to original materials.

Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clear and in good condition.

115-3.12 Inspection. Prior to final approval, the electrical structures shall be thoroughly inspected for conformance with the plans and this specification. Any indication of defects in materials or workmanship shall be further investigated and corrected. The earth resistance to ground of each ground rod shall not exceed 25 ohms. Each ground rod shall be tested using the fall-of-potential ground impedance test per American National Standards Institute / Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81. This test shall be performed prior to establishing connections to other ground electrodes.

115-3.13 Manhole elevation adjustments. The Contractor shall adjust the tops of existing manholes in areas designated in the Contract Documents to the new elevations shown. The Contractor shall be responsible for determining the exact height adjustment required to raise or lower the top of each manhole to the new elevations. The existing top elevation of each manhole to be adjusted shall be determined in the field and subtracted/added from the proposed top elevation.

The Contractor shall remove/extend the existing top section or ring and cover on the manhole structure or manhole access. The Contractor shall install precast concrete sections or grade rings of the required dimensions to adjust the manhole top to the new proposed elevation or shall cut the existing manhole walls to shorten the existing structure, as required by final grades. The Contractor shall reinstall the manhole top section or ring and cover on top and check the new top elevation.

The Contractor shall construct a concrete slab around the top of adjusted structures located in graded areas that are not to be paved. The concrete slab shall conform to the dimensions shown on the plans.

115-3.14 Duct extension to existing ducts. Where existing concrete encased ducts are to be extended, the duct extension shall be concrete encased plastic conduit. The fittings to connect the ducts together shall be standard manufactured connectors designed and approved for the purpose. The duct extensions shall be installed according to the concrete encased duct detail and as shown on the plans.

METHOD OF MEASUREMENT

115-4.1 Electrical manholes and junction structures shall be measured by each unit completed in place and accepted. The following items shall be included in the price of each unit: All required excavation and dewatering:; sheeting and bracing; all required backfilling with on-site materials; restoration of all surfaces and finished grading and turfing; all required connections; temporary cables and connections; and ground rod testing

115-4.2 Manhole elevation adjustments shall be measured by the completed unit installed, in place, completed, and accepted. Separate measurement shall not be made for the various types and sizes.

BASIS OF PAYMENT

115-5.1 The accepted quantity of electrical manholes and junction structures will be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the

materials, furnishing and installation of appurtenances and connections to duct banks and other structures as may be required to complete the item as shown on the plans and for all labor, equipment, tools and incidentals necessary to complete the structure.

115-5.2 Payment shall be made at the contract unit price for manhole elevation adjustments. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary, including but not limited to, spacers, concrete, rebar, dewatering, excavating, backfill, topsoil, sodding and pavement restoration, where required, to complete this item as shown in the plans and to the satisfaction of the RPR.

115-5.3 The accepted quantity of electrical manholes and junction structures will be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials, furnishing and installation of appurtenances and connections to duct banks and other structures as may be required to complete the item as shown on the plans and for all labor, equipment, tools and incidentals necessary to complete the structure.

Payment will be made under:

Item L-115-5.1 – 30 INCH SQUARE AIRFIELD ELECTRICAL PULLBOX WITH FRAME AND COVER – per each unit

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Advisory Circular (AC)

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation)

ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C206	Standard Specification for Finishing Hydrated Lime

FAA Engineering Brief (EB)

EB #83	In Pavement Light Fixture Bolts

Mil Spec

MIL-P-21035	Paint High Zinc Dust Content, Galvanizing Repair

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

END OF ITEM L-115

ITEM F-162 CHAIN-LINK FENCES

162-1 DESCRIPTION. This item shall consist of furnishing and erecting a chain-link fence, chain-link cantilever gates, gate operator and access control systems, keypad, pedestal, bollards including all electrical connections and incidentals, in accordance with these specifications and the details shown on the plans.

MATERIALS

162-2.1 FABRIC. The fabric shall be polyvinyl chloride (PVC)-coated steel wire in a 2-inch (50 mm) mesh and shall meet the requirements of ASTM F668, Class 2b. The fabric shall be woven from a 6 gauge aluminum-coated steel wire in a 2-inch (50 mm) mesh and shall conform to the requirements of ASTM A491. The color of the coating shall be black.

162-2.2 BARBED WIRE. Barbed wire shall be 2-strand 12-1/2 gauge aluminum-coated wire with 4-point barbs and shall conform to the requirements of ASTM A 121, Class II.

162-2.3 POSTS, RAILS AND BRACES. Line posts, rails, and braces shall conform to the requirements of ASTM F1043 or ASTM F1083 as follows:

Galvanized tubular steel pipe shall conform to the requirements of Group IA, (Schedule 40) coatings conforming to Type A, or Group IC (High Strength Pipe), External coating Type B, and internal coating Type B or D.

Aluminum Pipe shall conform to the requirements of Group IB.

Vinyl or polyester coated steel shall conform to the requirements of ASTM F 1043, Paragraph 7.3 Optional Supplemental Color Coating.

Composite posts shall conform to the strength requirements of ASTM F 1043 or ASTM F 1083. The strength loss of composite posts shall not exceed 10 percent when subjected to 3,600 hours of exposure to light and water in accordance with ASTM G 23, ASTM G 26, and ASTM G-53.

Posts, rails, and braces furnished for use in conjunction with aluminum alloy fabric shall be aluminum alloy or composite.

Posts, rails, and braces, with the exception of galvanized steel conforming to F 1043 or ASTM F 1083, Group 1A, Type A, or aluminum alloy, shall demonstrate the ability to withstand testing in salt spray in accordance with ASTM B 117 as follows:

External: 1,000 hours with a maximum of 5% red rust.

Internal: 650 hours with a maximum of 5% red rust.

The dimensions of the posts, rails, and braces shall be in accordance with Tables I through VI of Fed. Spec. RR-F-191/3.

162-2.4 GATES. Gate frames shall consist of aluminum alloy and shall conform to the specifications for the same material under paragraph 162-2.3. The fabric shall be of the same type material as used in the fence.

162-2.5 GATE OPERATOR. The gate operator shall meet the following the requirements: hydraulic slide gate operator, commercial duty, 2 hp, 1.7 ft/sec hydraulic drive, add on ups battery back-up, gate front edge obstruction control, stuck open relay with security notification, compatible emergency access device, hy-security, slide driver 30f, or equal.

162-2.6 WIRE TIES AND TENSION WIRES. Wire ties for use in conjunction with a given type of fabric shall be of the same material and coating weight identified with the fabric type. Tension wire shall be 7-gauge marcelled steel wire with the same coating as the fabric type and shall conform to ASTM A 824.

All material shall conform to Fed. Spec. RR-F-191/4.

162-2.7 MISCELLANEOUS FITTINGS AND HARDWARE. Miscellaneous steel fittings and hardware for use with aluminum-coated steel fabric shall be of commercial grade steel or better quality, wrought or cast as appropriate to the article, and sufficient in strength to provide a balanced design when used in conjunction with fabric posts, and wires of the quality specified herein. Miscellaneous aluminum fittings for use with aluminum alloy fabric shall be wrought or cast aluminum alloy. Barbed wire support arms shall withstand a load of 250 pounds applied vertically to the outermost end of the arm.

162-2.8 CONCRETE. Concrete shall be of a commercial grade with a minimum 28-day compressive strength of 2500 psi.

162-2.9 MARKING. Each roll of fabric shall carry a tag showing the kind of base metal (steel, aluminum, or aluminum alloy number), kind of coating, the gauge of the wire, the length of fencing in the roll, and the name of the manufacturer. Posts, wire, and other fittings shall be identified as to manufacturer, kind of base metal (steel, aluminum, or aluminum alloy number), and kind of coating.

CONSTRUCTION METHODS

162-3.1 CLEARING FENCE LINE. All trees, brush, stumps, logs, and other debris which would interfere with the proper construction of the fence and gate in the required location shall be removed a minimum width of 2 feet on each side of the fence centerline before starting fencing operations. The cost of removing and disposing of

the material shall not constitute a pay item and shall be considered incidental to fence construction.

162-3.2 INSTALLING POSTS. All posts shall be set in concrete at the required dimension and depth and at the spacing shown on the plans. Posts should be spaced not more than 10 feet apart and should be set a minimum of 36 inches in concrete footings The posts holes shall be in proper alignment so that there is a minimum of 3 inches of concrete on all sides of the posts.

The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish slightly higher than the ground and sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within 7 days after the individual post footing is completed.

Should rock be encountered at a depth less than the planned footing depth, a hole 2 inches larger than the greatest dimension of the posts shall be drilled to a depth of 12-inches. After the posts are set, the remainder of the drilled hole shall be filled with grout, composed of one part Portland cement and two parts mortar sand. Any remaining space above the rock shall be filled with concrete in the manner described above.

In lieu of drilling, the rock may be excavated to the required footing depth. No extra compensation shall be made for rock excavation.

162-3.3 INSTALLING TOP RAILS. The top rail shall be continuous and shall pass through the post tops. The coupling used to join the top rail lengths shall allow for expansion.

162-3.4 INSTALLING BRACES. Horizontal brace rails, with diagonal truss rods and turnbuckles, shall be installed at all terminal posts or at all locations where the proposed fence meets the existing fence.

162-3.5 INSTALLING FABRIC. The wire fabric shall be firmly attached to the posts and braced in the manner shown on the plans. All wire shall be stretched taut and shall be installed to the required elevations. The fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than 1 in (25 mm) or more than 4 in (100 mm) from the ground surface.

At locations of small natural swales or drainage ditches and where it is not practical to have the fence conform to the general contour of the ground surface, longer posts may be used and multiple strands of barbed wire stretched thereon to span the opening below the fence. The vertical clearance between strands of barbed wire shall be 6 inches or less.

162-3.6 ELECTRICAL GROUNDS. Electrical grounds shall be constructed at 500-foot intervals. The ground shall be accomplished with a copper clad rod 8 feet long and a minimum of 5/8 inch in diameter driven vertically until the top is 6 inches below the

ground surface. A No. 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded. Installation of ground rods, connectors, grounding wires/cables shall not constitute separate pay items however shall be considered incidental to fence construction.

162-4.1 **METHOD OF MEASUREMENT**. No separate measurement will be made for work under this item. This item shall be paid for by lump sum.

162-5.1 **BASIS OF PAYMENT**. Payment shall be made at the contract lump sum for the complete installation of the chain-link fence, chain-link cantilever gates, gate operator and access control systems, keypad, pedestal, bollards including all electrical connections and incidentals.

Payment will be made under:

Item F-162-5.1 - Motorized Sliding Gate with Access Control System, Complete - Per Each

MATERIAL REQUIREMENTS

ASTM A 121	Zinc-Coated (Galvanized) Steel Barbed Wire
ASTM A 123	Zinc (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
ASTM A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 392	Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A 446	Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
ASTM A 491	Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A 56	Steel, Carbon (0.15 Maximum, Percent), Hot Rolled Sheet and Strip Commercial Quality
ASTM A 570	Hot-Rolled Carbon Steel Sheet and Strip Structural Quality
ASTM A 572	High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality
ASTM A 585	Aluminum-Coated Steel Barbed Wire

ASTM A 824	Metallic-Coated Steel Marcelled Tension Wire for Use with Chain Link Fence
ASTM B 117	Standard Test Method of Salt Spray (Fog) Testing
ASTM B 221	Aluminum-Alloy Extruded Bars, Rods, Wire Shapes and Tubes
ASTM F 668	Poly (vinyl Chloride)(PVC)-Coated Steel Chain-Link Fence
ASTM F 1043	Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework
ASTM F 1083	Pipe, Steel, Hot-Dipped Zinc-coated (galvanized) Welded, for Fence Structures
ASTM F 1183	Aluminum Alloy Chain Link Fence Fabric
ASTM F 1234	Protective Coatings on Steel Framework for Fences
ASTM G 23	Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials
ASTM G 26	Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials
ASTM G 53	Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials
Fed. Spec.	Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and RR-F-191/3 Braces)
Fed. Spec. RR-F-191/4	Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)

END OF ITEM F-162

ITEM 521

WHEEL STOP

1.0 GENERAL

1.1 SUBMITTALS

A. **Product Data:** Catalog cuts, specifications, and installation instructions for precast concrete wheel stops, or approved equal.

B. **Quality Control Submittals:** Test Reports: Random freeze thaw tests shall be conducted by the manufacturer. Test specimens shall retain 60 percent of its initial modulus of elasticity after 300 cycles. Furnish test results to the Director upon request.

2.0 PRODUCTS

2.1 MATERIALS

A. **Precast Concrete (or approved equal):** Normal weight, 5000 psi, air entrained concrete. Air content shall be 6 percent by volume within an allowable tolerance of plus or minus 1.5 percent.

B. **Bar Reinforcement:** ASTM A 615, Grade 40, deformed.

C. **Setting Pins:** 3/4 x 18 inches galvanized steel.

2.2 FABRICATION

A. Wheel stops shall be cast at the manufacturer's plant, not at the job site. Castings shall have plane smooth surfaces, true to line and face, free from defects and sharp arises. Overall dimensions for castings shall not vary more than 1/16 inch from those indicated.

3.0 EXECUTION

3.1 INSTALLATION

A. Center each unit between parking bay lines, at location shown in plans.

B. Anchor each wheel stop with two setting pins driven through precast or drilled holes into the subgrade or pavement below.

4.0 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Precast units shall be measured as the number of units installed complete and accepted by the owner.

4.2 PAYMENT

A. Precast Concrete Wheel stops, or approved equal, shall be paid at the unit price bid for each installed, completed and accepted and shall be full compensation for labor, materials, equipment and incidentals necessary to complete the work.

B. Payment will be made under

Item 521 Wheel stops – Per Each

END OF ITEM 521

ITEM 522

CONCRETE SIDEWALK

1.0 DESCRIPTION.

1.1 GENERAL. This work shall consist of constructing concrete sidewalk to the lines and grades shown on the plans, and to the satisfaction of the Engineer.

The requirements of Section 522, including the applicable requirements of Section 520, as specified in the Florida Department of Transportation Standard Specifications shall apply with the following modifications and/or revisions as described belowor in Contract Plans.

2.0 METHOD OF MEASUREMENT.

2.1 The quantity of concrete sidewalk to be paid for will be the square yards, completed and accepted, as outlined in Section 522 of the Florida Department of Transportation Standard Specifications.

3.0 BASIS OF PAYMENT.

3.1 The unit price bid per square yard for the concrete sidewalk shall include the cost of furnishing all equipment, materials, testing, and labor necessary to complete the item as specified, and to the satisfaction of the Engineer. Excavation and embankment shall be paid under Item P-152.

Payment will be made under:

Item 522	4" Concrete Sidewalk, Complete, Including ADA Ramps & Detectable Warnings – Per Square Yard

END OF ITEM 522

SECTION 581

IRRIGATION SYSTEM

1.0 GENERAL

1.1 SCOPE OF WORK

A. This Section shall govern the furnishing of all labor, materials, and equipment for a complete operating system for lawn irrigation as specified herein and shown on the applicable drawings.

1.2 SUBMITTALS

A. Material List: No substitution of the irrigation equipment shall be made without the written consent of the owner and notification to the Landscape Architect/Irrigation Designer.

B. Maintenance Items: Provide the following:

1. Two (2) sets of sprinkler wrenches for adjusting, cleaning or dis-assembling each type of sprinkler.

2. Two (2) service manuals for all equipment installed. Manuals shall be loose leaf and show drawings or exploded views of equipment and catalog numbers and current prices.

3. Operating instructions for all equipment installed.

C. Project Record Documents: Correct daily to indicate changes from Contract Documents.

1. Horizontally at 90 degree angles, dimension the location of the following items from two permanent points of reference, i.e. curb junctures, light standards, building corners, survey hub points, or coordinates with a tolerance of 12-inch maximum.
Sprinkler main lines routing.
Connections to the existing water supply lines.
Sprinkler control valves.
Gate valves.
Electrical control wire path diagrammatically, controller and rain sensors.

2. Vertical dimensions shall be given for mains when site conditions require installation deeper than 24 inches.

1.3 PRODUCT HANDLING

A. Exercise care in handling, loading, unloading and storing irrigation system materials to avoid damage. Store under cover.

1.4 PROJECT CONDITIONS

A. The Contractor shall make all temporary repairs as necessary to keep installed/existing portions of the irrigation system in operating condition. This exercise shall not affect the requirements to be performed under the Contract Documents.

B. Coordinate work with that of other trades, all underground improvements, the location, bed lines and planting of specimen trees and all other planting. Location of all planting requiring excavations 24 inch in diameter and larger shall be verified with Owner prior to installation of mainlines.

1.5 INSPECTION

A. Verify dimensions and grades at Job Site.

B. Contractor shall make himself/herself completely familiar with all site conditions, including all underground utilities.

2.0 MATERIALS

A. Plastic pipe: Extruded from 100% American made Virgin Polyvinyl Chloride (PVC). Purple pipe shall be used if the water source is reclaimed water.

1. Plastic pipe (mainline) installed on pressure side of valves. (PVC) ASTM D2241 Class 200 or as noted on details.

2. Plastic pipe installed on non-pressure side of valves. (PVC) ASTM D2241 Class 200.

B. Plastic Fittings. (PVC)1120 ASTM D1785, Type 2, IPS, Schedule 40, NSF.

C. Solvent & Cleaner: WELDON 737 OR RED HOT CHRISTY'S BLUE GLUE.

D. Automatic Controller: Refer to Drawings.

E. Sprinkler Heads: Refer to Drawings.

F. Wire: Copper, UL approved direct burial wire. Minimum of 14 gauge or as specified on the drawings.

G. Remote Control Valve Boxes: Armor 11"x17" Rectangular with green locking lids. Box lids shall be marked "R.C.V.". All boxes shall be purple when using reclaimed water.

1. Valve boxes for gate valves 3" and smaller: Ametek 10" round with locking lid, extensions as needed.

2. Gate valve box lids shall be permanently marked "Irri. Gate" or "Water".

H. Conduit for Control Wires. (PVC) ASTM D1785, Schedule 40 gray with sweep ells in locations as indicated. All control wire shall be installed in conduit where it can not be installed under the mainline.

I. Miscellaneous Materials: As hereinafter specified and as necessary to complete this work and as shown on Drawings.

3.0 EXECUTION

3.1 EXCAVATION AND BACKFILLING

A. Trenching - General:

1. Dig trenches straight.

2. Provide continuous support of the pipe by the bottom of trench. Lay pipe to even grade. Bottom of trench shall be free from rocks or other sharp edge objects.

3. Trenching shall follow layout indicated.

4. Minimum cover: Pressure Lines: 18 inches
Non-pressure Lines: 12 inches
Control wires: 18 inches

5. All lines shall have a 6" minimum clearance from each other and from lines of other crafts. Do not install lines directly over another line.

6. Maintain 1" minimum between lines which cross at angles of 45 degrees to 90 degrees.

7. Exercise care in excavating, trenching and working near existing utilities.

B. Backfilling:

1. Compact to dry density equal to adjacent undisturbed soils.

2. Conform to adjacent grades without dips, sunken areas, humps, or other irregularities.

3. Initial backfill on plastic lines shall be pulverized native soil no larger than 2" in diameter and free of foreign matter.

4. Restore grades and repair damage where settling occurs.

C. Routing of Piping:

1. Pressure and non-pressure piping lines are routed diagrammatically on Drawings.

2. Coordinate specimen trees and shrubs with routing of lines. Planting shall take precedence over sprinkler and piping location. Report any major deviation from routing indicated to Landscape Architect or Owner.

3. Install lines in such manner as to conform with Drawings without offsetting the various assemblies from the pressure supply line.

3.2 INSTALLATION

A. Water Supply: Connect to water sources indicated.

B. Cathodic Protection: Provide in the piping systems where required by installing insulating couplings, flanges or unions between copper or brass pipe or tubing and steel or cast iron pipe.

C. Plastic Pipe: Install plastic pipe in accord with manufacturer's recommendations. Install sprinkler head on plastic pipe as indicated.

1. All welded joints shall be cleaned with manufacturer's cleaner prior to applying solvent.

    a. Welded joints shall be given at least 15 minutes' set-up curing time before moving or handling.
    b. Pipe shall be partially center loaded to prevent arching and shifting under pressure.
    c. No water shall be permitted in pipe until a period of at least four hours has elapsed for solvent weld setting or curing, or as required by solvent manufacturer.

2. Backfilling shall be done when pipe is not in expanded condition due to heat.

    a. Cooling of pipe can be accomplished by operating the system for a short time before backfill, or by backfilling in the early part of the morning before the heat of the day.

3. Curing: When the temperature is above 80`F., soluble weld joints shall be given at least 24 hours curing time before water is introduced under pressure.

D. Automatic Controller:

1. Install controller in accord with the Drawings and the manufacturer's instructions, and place readily accessible. Install electrical wiring in accord with applicable code.

2. An operating diagram or schedule clearly indicating the sequence of operation shall be posted in the controller to facilitate the selection of the valve to be operated and setting of controller.

E. Remote Control Valves:

1. Install at sufficient depth to provide not more than 6" nor less than 4" cover from the top of the valve to finish grade. Provide clearance for control valve as needed.

2. Install valves in a plumb position with 24" minimum clearance from other equipment for proper maintenance.

3. All valves shall be installed in appropriate sized valve boxes with cover.

F. Wire Connections: All underground wire connections to electric remote control valves shall be made by using DBR-Y connectors as manufactured by 3M.

G. Gate Valves:

1. Line size and install where indicated and sufficient clearance from other materials for proper maintenance.

2. Equip valves, sizes 3" and smaller, with standard hand operating wheel for operation. Valve bonnet packing shall be checked and tightened before backfill. All valves shall be 150 psi rated.

3. All valves shall be installed in appropriate sized valve boxes with cover.

4. Gate Valves shall be manufactured in the USA of American made materials.

H. Sprinkler Heads:

1. Install in a plumb position at intervals not to exceed the maximum spacing indicated.

2. Heads shall be installed a minimum of 12" away from hard surfaces where heads are installed along walks, roads, etc. The spray pattern on all heads shall be adjusted to avoid any spray onto a building wall.

I. Flushing of System:

1. Flush main and lateral systems to clean out all debris and sediment prior to installation of heads.

2. This does not relieve requirements of future adjustments of system or re-flushing system.

3. Any zone requiring repair from broken lateral lines shall be flushed prior to being returned to service.

3.3 ELECTRICAL

A. Connect timeclock to the 120-volt power source per manufacturer recommendations. Be responsible for making electrical connections to the automatic controller and wire circuits from remote control valves to controllers. All wiring shall be in accord with applicable codes.

B. Minimize control wire splices. All wire splices must occur within splice boxes (Ametek 10" round box with green locking lid), using wire connectors as specified in Section 3.02 F above.

C. Provide for an earth ground per manufactures recommendations, but not more than 10ohms to ground.

3.4 PRESSURE TEST

A. Test all pressure lines under hydrostatic pressure of 155 lbs. per square inch for a minimum of two hours and all non-pressure lines shall be tested under the existing static pressure and both be proven watertight.

B. Connect a calibrated pressure gauge to mainline. Pressure shall be sustained in the lines for not less than two hours. Should mainline lose pressure, the leak shall be found and repaired, or joints shall be replaced and the test repeated until the entire system is proven watertight.

C. Perform tests prior to backfill.

3.5 LOWERING OF HEADS

A. All sprinklers installed in lawn areas unless otherwise noted shall be lowered to finish grade within ten days following notification by the Owner.

B. At the time of lowering heads, completely check and adjust the entire system and make any repairs that are necessary to complete this work.

3.6 ADJUST AND CLEAN

A. Installations and Operations: Make such adjustments and repairs as requested as necessary for acceptance at no additional cost to the Owner. Field conditions may require minor adjustments to design to achieve 100% coverage.

3.7 COMPLETION AND ACCEPTANCE

A. Completion of work shall mean the full and exact compliance and conformity with provisions expressed or implied in the drawings and specifications.

B. All work under this contract shall not be finally accepted until expiration of the guarantee period.

C. The Irrigation Contractor shall demonstrate and fully acquaint the Owner and/or Owner's Representative with the entire system, proving that all remote-control valves are properly balanced, that all heads are properly adjusted for radius and arc of coverage, and that the system is workable, clean, and efficient. This shall be a requirement for acceptance of the work.

D. Contractor shall upon request for final payment, give Owner three sets of bond copies of the as-built irrigation system. All valves, and heads indicated as installed. The exact location of the valves, controller and water source shall be given by measurements.

E. Irrigation Contractor shall provide a letter (on his letterhead) to the Owner, stating that there are no outstanding liens against the property that may have resulted from any aspect of his work. This includes, but is not limited to, construction liens, material liens, or labor liens.

3.8 GUARANTEE AND REPLACEMENT

A. The Irrigation Contractor shall furnish warranties in writing certifying that the quality and workmanship of all materials and installation furnished is in accordance with these specifications and in accordance with original manufacturer's warranties. Irrigation Contractor shall further see to the fulfillment of all manufacturers' warranties. Irrigation Contractor shall warrant the installation workmanship for a period of one (1) year from date of completion or acceptance of the job, or any accepted portion of the job.

B. Should the Irrigation Contractor be notified that work or replacements are warranted under these conditions, he shall provide the required service and/or replacements promptly within two (2) days.

END OF SECTION 581

ITEM 615

BOLLARDS

DESCRIPTION

1.1 This work shall consist of installing steel bollards as shown on the plans and as directed by the Engineer.

MATERIALS

2.1 STEEL BOLLARDS: Steel bollards shall be as specified in the plans, new galvanized steel pipe with steel acorn caps, painted safety yellow.

2.2 C**ONCRETE:** Concrete shall meet the requirements of Section 03310, Concrete Work.

CONSTRUCTION DETAILS

3.1 Tops of bollards shall be uniform in height and line. Interior surface of post cap in contact with the bollard shall be coated with epoxy, prior to being wedged into place. Prior to installation of the post cap, the bollard shall be filled with concrete. Bollards shall be set in concrete 3 feet 6 inches deep, with 3 inch all around encasement. The top of the concrete encasement shall be flush with finish grade.

METHOD OF MEASUREMENT

4.1 The quantity of bollards to be measured for payment shall be the number of bollards installed and accepted by the Engineer.

BASIS OF PAYMENT

5.1 Payment will be made at the Contract unit price for each bollard installed and accepted by the Engineer. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfill, and for all labor, equipment, tools and incidentals necessary to complete the Item.

Payment will be made under:

Item 615	Bollards – Per Each

END OF ITEM 615

ITEM 700

SITE SIGNS

1.0 DESCRIPTION

1.1 GENERAL: This work shall consist of furnishing and installing Roadside Traffic Signs, and other site signage, with supporting posts, or columns, and any required foundations, at the locations shown in the plans, and to the satisfaction of the Engineer.

The requirements of Section 700, including the applicable requirements of Sections 460, 562, 962, and 994, as specified in the Florida Department of Transportation Standard Specifications shall apply with the following modifications and/or revisions as described below or in Contract Plans.

2.0 METHOD OF MEASUREMENT

2.1 The quantity of sign installations to be paid for will be the number of each, completed and accepted, as outlined in Section 700-7 of the Florida Department of Transportation Standard Specifications.

The quantity of existing signs to be removed shall be paid as the number of each removed, and disposed of off airport property by the Contractor, completed and accepted by the Engineer.

3.0 BASIS OF PAYMENT

3.1 The unit price bid per each for new sign installations, or removal of existing signs, shall include the cost of furnishing all equipment, materials, testing, disposal costs, and labor necessary to complete the item as specified, and to the satisfaction of the Engineer.

Payment will be made under:

Item 700-1 Handicapped Parking Sign on Steel Post, Complete – Per Each
Item 700-2 Stop Sign on Steel Post, Complete – Per Each
Item 700-3 Emergency Vehicle Traffic Control FLahsing Signal – RRFB, Complete – per Each

END OF ITEM 700

ITEM 710

FLAG POLES

1.0 DESCRIPTION

1.1 GENERAL. This work shall consist of furnishing and installing flag poles, including concrete foundations, at the locations shown in the plans, and to the satisfaction of the Engineer and Owner. Flag pole types shall be approved by Owner prior to installation. Exact locations of flag poles shall be coordinated, and approved by Owner.

2.0 MATERIALS

2.1 FLAG POLES. Flag Poles shall be approved by Owner prior to installation. Flag Poles shall be a minimum height of 30', In Ground pole style as manufactured by Regal Flags & Poles, Inc. of Del Ray Beach, FL or equal, and be designed to withstand a wind speed of 110 mph. Installation shall include all accessories and fittings for flag attachment, raising and lowering.

2.2 CONCRETE BASES FOR FLAG POLES. Concrete shall meet requirements of Item P-610. Foundation size and depth shall be per manufacturers requirements, and designed to withstand a wind speed of 110 mph.

3.0 METHOD OF MEASUREMENT

3.1 The quantity of flag pole installations to be paid for will be the number of each, completed, and approved by the Engineer and Owner, including foundations, accessories, fittings, and attachments ready for use.

4.0 BASIS OF PAYMENT

4.1 The unit price bid per each for flag poles shall include the cost of furnishing all equipment, materials, testing, grounding, and labor necessary to complete the item as specified, and to the satisfaction of the Owner. Cost shall include foundations, accessories, fittings, and attachments ready for use.

Payment will be made under:

Item 710 Flag Pole, including Concrete Base, Complete – Per Each

END OF ITEM 710