

CITY OF FERNANDINA BEACH

INVITATION TO BID # 21-01



FERNANDINA BEACH MUNICIPAL AIRPORT

Hangars 6 and 7 Development Project

FDOT GRANT PROJECT FIN: 434909-1-94-20

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INVITATION TO BID 21-01
AIRPORT HANGAR 6 AND 7 EXPANSION/DEVELOPMENT

INTRODUCTION

The City of Fernandina Beach, Florida is accepting competitive sealed bids for **AIRPORT HANGAR 6 AND 7 EXPANSION/DEVELOPMENT**.

The City will receive sealed bids at the location stated below not later than **Friday, March 12, 2021 at 2:00 PM (EST)**.

A **mandatory** pre-bid meeting will be held **Friday, February 12, 2021 at 2:00 PM (EST)** at the Fernandina Beach Municipal Airport Terminal Conference Room, located at 700 Road, Fernandina Beach FL 32034.

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 Submittal 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 in the fiscal year 2020-2021 budget, and authorization and appropriation of funds issued under Florida Department of Transportation Public Transportation Grant Agreement 434909-1-94-20, which provides grant funding in support of this project.

BIDDERS ARE REFERRED TO THE ATTACHED GENERAL CONDITIONS OF INVITATION TO BID FOR OTHER IMPORTANT INFORMATION REGARDING THE ITB AND BID PROCESS AND EXHIBITS.

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 #21-01** and addressed to:

City of Fernandina Beach
Attn: City Clerk's Office – **ITB #21-01**
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 Bid Forms (**1 original, 3 copies, and 1 electronic copy, CD or thumb drive**), hereto attached as "**Attachment A**" and "**Attachment B**". 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 "**Contact Sheet**", herein provided as "**Exhibit 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 Acknowledgments and Agreements**", herein provided as "**Exhibit E**", "**Conflict of Interest**", herein provided as, "**Exhibit F**", "**Non-Collusion Affidavit**", herein provided as "**Exhibit G**" and "**Dispute Disclosure**", herein provided as "**Exhibit H**", **Bidders Qualifications**, herein provided as **Exhibit "I"**, and **Addenda Receipt**, herein provided as **Exhibit "J"**.

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SCOPE OF SERVICES

The scope of this project is as described within the project synopsis outlined in “Attachment A” and in accordance with any relevant plans and specifications included within this invitation to bid.

CONTRACT TIME

The Owner has established a contract performance time of **270 calendar** days from the date of the Notice-to-Proceed. All project work shall be substantially completed within the stated timeframe. This project is subject to liquidated damages, if the work is not completed within the specified time, of **\$500 per calendar day** as further prescribed within the Template Contract Agreement.

QUALIFICATIONS

Bidders must submit with the Bid Submittal evidence of capabilities to complete the Fernandina Beach Hangar Expansion 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. Successful Bidder is required to have a Business License in the city where their home office is located and a Florida Contractors’ License in the State of Florida, according to Ch. 489 Florida Statutes. 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 can be downloaded online at www.fbfl.us/bids and at www.demandstar.com. Any questions regarding the bid package can be directed to Wanda Weaks, Purchasing Agent at wweaks@fbfl.org or (904) 310-3331 and Airport Director Nathan Coyle at ncoyale@fbfl.org or 904-310-3436.

CONTACT

Bidder questions during the bid period shall be submitted in writing to Nathan Coyle, ncoyale@fbfl.org, and Wanda Weaks, wweaks@fbfl.org. Phone inquiries can be directed to (904) 310-3331.

Firms 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 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.

BIDDER SHALL SIGNIFY RECEIPT OF ADDENDA (IF ANY). Failure to Acknowledge Receipt of any Addendum may result in rejection of the bid.

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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.

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GENERAL CONDITIONS OF INVITATION TO BID

1. **PREPARATION OF BID** - INVITATION TO BID will be prepared in accordance with the following:
 - a. The enclosed Contact Sheet/Bid Form attached hereto as "Exhibit A", must be used when submitting your INVITATION TO BID.
 - b. All information required by the Contact Sheet/Bid Form must be furnished. The Bidder must print or type his/her name and manually sign the Form and any continuation sheet on which an entry is made.
 - c. Unit prices must be shown and where there is an error in extension of price, the unit price will 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 must 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 must 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 must 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 must 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 will be the sole judge of the submittals. The City's decision will 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.

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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 must 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 will result in a binding contract without further action by either party.
- d. Unless otherwise noted in the specifications, the length of the agreement will 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 will 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.

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- 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 must enclose a Certified Check or Bid Bond with each bid. A Certified Check or Bid Bond must be for an amount not less than five percent (5%) of the Bid price and must 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 must be in accordance with Section 255.05 of Florida Statutes. Failing to do so, Bidder will forfeit its bid security.

Payment and Performance Bond must 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 must 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 must 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.

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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 must 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 will survive termination of this Agreement and will 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 must assume control of the defense of any claim asserted by a third party against the City and, in connection with such defense, must appoint lead counsel, in each case at the CONTRACTOR's expense. The City will 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 must 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 must not assume or maintain control of the defense of any third party claim, but must 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 must cooperate, and cause its agents to cooperate, in the defense or prosecution of any third party claim and must 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 will 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.

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INSURANCE

Prior to commencement of any work under this Contract and until completion and final acceptance of the work, the CONTRACTOR/VENDOR must, 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, will 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) 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 do 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) 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-

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performance on account of any error, omission, or other provable negligence caused by the Contractor/Vendor. The amount of insurance must 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) must 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 must furnish to the Owner and Contractor (your company) Certificates of Insurance and other required documentation evidencing the following coverage which will provide for the interests of [Name of Owner] , [Name of General Contractor] and (your company) to be named as Loss Payees and will 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 must 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 will not be construed to be a limitation of the liability on the part of the Subcontractor or any of its Subcontractors.
- J. The Contractor must file certificates of insurance prior to the commencement of work with the Owner and the General Contractor which will 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 must be its own responsibility and at its own expense.
- L. The carrying of the insurance described will 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 must 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 must apply under this contract to each Subcontractor, however, the retained Subcontractor must 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.

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14. PAYMENT

Payment due hereunder must 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" Bid Form 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. The Federal Government's Excluded Parties List System (EPL) is located at, including but not limited to, <https://www.sam.gov>. CONTRACTOR/VENDOR must include copy of search results with bid submittal.

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 must not contact any Commission Member and/or any requesting or evaluating Department/Office personnel during said black-out period. All questions and procedural matters must 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.

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CITY OF FERNANDINA BEACH
TEMPLATE CONTRACT AND GENERAL CONDITIONS
FOR
CONSTRUCTION SERVICES

This Agreement is made on the ____ day of _____ in the year 2021 between CITY OF FERNANDINA BEACH, 204 Ash Street, Fernandina Beach, FL 32034 (hereinafter referred to as “Owner” or “City”) and the Contractor, CONTRACTOR NAME, CONTRACTOR ADDRESS

PROJECT: AIRPORT HANGAR 6 AND 7 EXPANSION/DEVELOPMENT
ITB 21-01

CONTRACTOR: CONTRACTOR NAME

ARCHITECT/ENGINEER: PASSERO ASSOCIATES

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The OWNER and CONTRACTOR agree as follows:

ARTICLE 1 – CONTRACT DOCUMENTS

1. Enumeration of Contract Documents

Contract Documents comprise this Agreement, materials contained in City of Fernandina Beach Bid Number 21-01, and Contractor’s scope and specifications provided in its proposal dated _____ as Attachment A. Documents comprising Bid Number 18-06 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 fourteen (14) calendar days from the date of Notice to Proceed. The Contractor shall achieve Substantial Completion of the Work not later than 270 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 fifteen (15) 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.

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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 extends 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 by the Contractor, 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-Owner 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-Owner after the Application date fixed above, payment shall be made 15 days after the Owner received the Application for Payment is received.

Each Application for Payment shall be based upon the Schedule of Values submitted by the Contractor in

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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 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. 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 Owner 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 Owner may require. This Schedule of Values shall be reviewed 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 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 Owner 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 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

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- 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 Owner, will issue a Certificate for Payment for an amount the 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 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 Owner's opinion Contractor representations to the Owner are not supported or are deemed inaccurate. If the Contractor and Owner cannot agree on a revised amount, the Owner will promptly issue a Certificate of Payment for the amount to which the 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;
- 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 all Work executed and for any proven loss sustained upon any materials, equipment, tools, construction equipment, and machinery including reasonable profit and damages 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:

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- 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 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 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.

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 including for any proven loss sustained upon any materials, equipment, tools, construction equipment, and machinery including reasonable profit and damages. Termination Expenses are those jobsite costs directly attributable to termination (such as jobsite demobilization costs).

ARTICLE 9 - EXECUTION OF THE PROJECT

B. OBLIGATIONS OF THE OWNER

1. Project Manager

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The Owner will designate a Project Manager, through which the City will communicate with the 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, or otherwise expressly set forth in the Contract Documents.

3. Permits

Unless otherwise provided in the Contract Documents, the Owner 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

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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 effected by a Change Order signed by the Contractor-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 Contract Documents

The Contractor shall carefully review Contract Documents and information provided by the Owner, and shall at once report to the Owner 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 Owner, 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 Owner 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 Owner.

The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The

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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 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 for a period of one (1) year from date of substantial completion. If within the warranty period the materials are found to be defective, the Owner must provide written notice of such defects within ten (10) days from the date the defects are discovered. Owner's sole and exclusive remedy for defective materials and workmanship is limited to the repair or replacement of the defective item by Contractor. Contractor is not liable for consequential or incidental damages resulting from such defects. Contractor hereby disclaims any and all implied warranties, including but not limited to warranties of merchantability or fitness for a particular purpose. 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 Owner 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

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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 Owner 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 Owner; 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 Owner Shop Drawings, Product Data, Samples, and other Submittals required by the Contract Documents for approval by the Owner 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 Owner. 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

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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 has not specifically requested prior observation, the Owner 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 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 Owner 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.

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15. Acceptance of Non-Conforming Work

The Owner may at his option accept Work which is not in accordance with the requirements of the Contract 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 affected 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 Contract 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 Owner 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 Owner.

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 Owner 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

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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

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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 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:

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- 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, expeditors, 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 Owner. 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 Owner 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. Neither party shall be liable for any delay or inability to perform caused by named storms which arise and is not within the direct control of a party. However, the foregoing shall not relieve either party of its obligations to pay sums due or to indemnify the other party pursuant to this Agreement.

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

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same period in the prior year or delay caused by named storms. 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 Owner 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 Owner will promptly investigate 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

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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. 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 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 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 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 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 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

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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 Substantially Complete, the Contractor shall prepare and submit to the Owner 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 Substantially Complete. If the Owner's inspection discloses any item, whether or not included on the Contractor's list, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Owner.

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 Substantially 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

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- 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 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 Owner shall promptly inspect the Work. When the Owner finds the Work acceptable under the Contract Documents and the Contract fully performed, the Owner 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 payment 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 in 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.

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- 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

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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.

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

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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 at least thirty (30) days prior to any cancellation, 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.

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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~~ include Owner as an additional insured 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:

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- 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 Statutes, 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.

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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.

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

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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.

CONTRACTOR: CONTRACTOR NAME

OWNER: The City of Fernandina Beach

Signature

Dale L. Martin, City Manager

ATTEST:

Print Name

Caroline Best, City Clerk

Title/Officer
LEGALITY:

APPROVED AS TO FORM &

Witness Signature

Tammi E. Bach, City Attorney

Printed Name

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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 Contract Documents.

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

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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 Contract 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.

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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 Contract 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 that 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 that 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

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by the Contractor in fulfillment of obligations under the Contract. The work may constitute the whole Project or part of the Project.

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EXHIBITS

| | |
|--------------------|---|
| EXHIBIT "A" | Contact Sheet |
| 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 |
| EXHIBIT "J" | Addenda Receipt |

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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 SUBMITTAL

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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 Submittal 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, must be a prim 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 must be considered an affiliate.
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"

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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 must:

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 SUBMITTAL

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EXHIBIT "D"
E-VERIFY STATEMENT

Bid Number: _____

Project Description: _____

I/FIRM acknowledges and agrees to the following:

I/FIRM will 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 SUBMITTAL

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EXHIBIT “E”

PROPOSER ACKNOWLEDGEMENTS AND AGREEMENTS

The undersigned, as an employee or agent of the Submitter, 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. SUBMITTAL INSTRUCTIONS, TERMS AND CONDITIONS
Understands and agrees to all terms.
3. EVALUATION AND CONTRACT OVERVIEW
Understands and agrees to all terms.
4. SUBMITTER’S RESPONSE: SUBMITTAL INFORMATION
Understands and agrees to all terms.
5. SUBMITTER’S RESPONSE: PROPOSED TEAM
Understands and agrees to all terms.
6. SUBMITTER’S RESPONSE: PROPOSED COMPENSATION
Understands and agrees to all terms.

Name: _____ Title: _____

Signature: _____ Date: _____

THIS FORM MUST BE INCLUDED WITH BID SUBMITTAL

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EXHIBIT "G"

NON-COLLUSION AFFIDAVIT

This sworn statement is submitted with Bid Submittal 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 Proposer 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.

Notary Signature

My Commission expires: _____

THIS FORM MUST BE INCLUDED WITH BID SUBMITTAL

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EXHIBIT "H"
DISPUTES DISCLOSURE FORM

Answer the following questions by placing an "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 must be cause for forfeiture of rights for further consideration of this submittal for the City of Fernandina Beach.

Firm _____ Date _____

Authorized Signature _____ Printed or Typed Name and Title _____

THIS FORM MUST BE INCLUDED WITH BID SUBMITTAL

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EXHIBIT "I"

STATEMENT OF BIDDER'S QUALIFICATIONS

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
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

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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 (5) 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 (3) projects completed in the past three (3) 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 (3) projects completed in the past three (3) years:

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

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 (3) projects completed in the past three (3) 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 (3) projects completed in the past three (3) years:

1. Scope (size, type of construction, dollar-value) of the projects:

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EXHIBIT "J"

ADDENDA RECEIPT

Receipt of the following Addenda is acknowledged:

ADDENDUM NO.: _____ DATED: _____

ADDENDUM NO.: _____ DATED: _____

ADDENDUM NO.: _____ DATED: _____

(Firm or Corporation Making Bid)

(Signature of Authorized Person)

P. O. Address

Dated

The full names and residences of all persons interested in this bid as principals are as follows:

THIS FORM MUST BE INCLUDED WITH BID SUBMITTAL

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Attachment A - Project Bid Synopsis

PROJECT BID SYNOPSIS

The contractor shall be responsible to secure all permits including associated fees. The existing Hangars #6 and #7 Expansion Improvements at the Fernandina Beach Municipal Airport shall consist of the following:

BASE BID DESCRIPTION

Will require site clearing and demolition to prepare the existing site as required per civil documents including preparing all elements and utilities to receive new work. **New Work** – Contractor will include all items required for fully working and complete system that meets all required current codes including but not limited to the following:

- Expansion of asphalt Taxi-lane and aprons.
- Regrading of site, retention ponds with underdrain system.
- Concrete sidewalks, gravel beds and Utilities.
- Expansion of existing Hangar #7 by constructing a (3) Unit PEMB Box Hangar addition for a total of 5,377 Sq.Ft. with Powered Hydraulic Hangar Swing Door System.
- Expansion of existing Hangar #6 by constructing a (3) Unit PEMB T-Hangar addition for a total of 4,709 Sq.Ft. with Powered Hydraulic Hangar Swing Door System; Storage Room with coiling door; Toilet Room (tiled) with exterior fire rated door and fire damper louver; interior fire rated barrier wall and a portion of exterior fire rated barrier wall with exterior fire rated door and breeze way connector.

CONTRACT TIME

The Owner has established a contract performance time of **270 calendar** days from the date of the Notice-to- Proceed. All project work shall be substantially completed within the stated timeframe. This project is subject to liquidated damages, if the work is not completed within the specified time, of **\$500 per calendar day** as further prescribed within the Template Contract Agreement.

BID SUMMARY - BASE BID TOTAL (Lump Sum)

| | |
|--------------------------|--|
| Price in Words: | |
| Price in Numbers: | |

BID ADDITIVE “A” DESCRIPTION (Sheet C-101)

Will require preparing the existing asphalt surfaces as required to receive new work. **New Work** – Contractor will include all items required for providing (7) Parallel Parking Spaces including non-movement area and taxi-lane centerline markings on an existing asphalt Taxi-lane and Apron.

THIS FORM MUST BE INCLUDED WITH BID SUBMITTAL

CITY OF FERNANDINA BEACH
INVITATION TO BID 21-01
AIRPORT HANGAR 6 AND 7 EXPANSION/DEVELOPMENT

BID SUMMARY - BID ADDITIVE "A" TOTAL (Lump Sum)

| | |
|--------------------------|--|
| Price in Words: | |
| Price in Numbers: | |

Attachment A - Project Bid Synopsis

BID ALTERNATE "1" DESCRIPTION (Sheets A-100A and A-200A)

New Work – Contractor will include all items required for fully working and complete system that meets all required current codes including but not limited to the following:

- Expansion of existing Hangar #6 by constructing a (3) Unit PEMB T-Hangar addition for a total of 3,581 Sq.Ft. with Sliding Hangar Door System; Storage Room with coiling door; Toilet Room (tiled) with exterior door and louver; interior fire rated barrier wall and a portion of exterior fire rated barrier wall with exterior fire rated door and breeze way connector.

BID SUMMARY - BID ALTERNATE "1" TOTAL (Lump Sum)

| | |
|--------------------------|--|
| Price in Words: | |
| Price in Numbers: | |

NOTE: Contractor will include all items required for fully working and complete system that meets all required current codes including revisions to MEP and Site layout accordantly to accommodate the alternate t-hangar building footprint. Therefore, Bid Alternate "1" Total (Lump Sum) will include debits or credits for all other items effected but not limited to: Mechanical, Plumbing, Electrical, Civil, etc. as required for a complete project.

GENERAL BID SUMMARY NOTES:

The Owner reserves the right to accept Base Bid, Bid Additive, Bid Alternate in any order or combination which, in the judgement of the Owner, best serves the Owner's interest.

The Owner intends to award the contract to the lowest bidder but reserves the right to award in any manner deemed in his sole discretion to be in the Owner's best interest.

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Attachment B - Project Bid Forms

BID SUMMARY - HANGARS #6 and #7 EXPANSION

BASE BID

(PRICE BID IN WORDS, LUMP SUM) (PRICE BID

IN NUMBERS, LUMP SUM)

BID ADDITIVE "A"

(PRICE BID IN WORDS, LUMP SUM) (PRICE BID

IN NUMBERS, LUMP SUM)

BID ALTERNATE "1"

(PRICE BID IN WORDS, LUMP SUM) (PRICE BID

IN NUMBERS, LUMP SUM)

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CITY OF FERNANDINA BEACH
 INVITATION TO BID 21-01
 AIRPORT HANGAR 6 AND 7 EXPANSION/DEVELOPMENT

BID FORM

| BASE BID - HANGARS #6 & #7 EXPANSION | | | | |
|---|-----------------|---|---------------------------------|--------------|
| ITEM NUMBER | NUMBER OF UNITS | DESCRIPTION AND UNIT PRICE IN WORDS | UNIT PRICE IN NUMBERS | TOTAL AMOUNT |
| 428 | 1 LS | POTABLE WATER SERVICE, COMPLETE, INCLUDING BACKFLOW PREVENTER & ALL | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LS | | |
| 429-1 | 1 LS | SANITARY SEWER, COMPLETE INCLUDING ALL ITEMS/APPURTENANCES EXTERIOR TO | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LS | | |
| 429-2 | 1 LS | SANITARY SEWER ALTERNATE FORCEMAIN ADDITIONAL COSTS | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LS | | |
| 450 | 1 LS | ELECTRICAL SERVICE FEEDER, COMPLETE | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LS | | |
| 522 | 150 SY | 4-INCH THICK CONCRETE SIDEWALK | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER SY | | |
| 901 | 110 SY | 4-INCH THICK GRAVEL BED WITH GEOTEXTILE | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER SY | | |

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CITY OF FERNANDINA BEACH
 INVITATION TO BID 21-01
 AIRPORT HANGAR 6 AND 7 EXPANSION/DEVELOPMENT

BID FORM

| BASE BID - HANGARS #6 & #7 EXPANSION | | | | |
|---|-----------------|--|--------------------------|--------------|
| ITEM NUMBER | NUMBER OF UNITS | DESCRIPTION AND UNIT PRICE IN WORDS | UNIT PRICE IN NUMBERS | TOTAL AMOUNT |
| C-102-5.1 | 1 LS | TEMPORARY SOIL EROSION AND SILTATION CONTROL | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LS | | |
| C-105-6.1 | 1 LS | MOBILIZATION / GENERAL CONDITIONS | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LS | | |
| C-106-4.1 | 1 LS | MAINTENANCE AND PROTECTION OF TRAFFIC | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LS | | |
| C-108-8.1 | 1 LS | PROJECT SURVEY AND STAKEOUT | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LS | | |
| C-108-8.2 | 1 LS | AS-BUILT DRAWINGS | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LS | | |
| D-701-5.1 | 418 LF | 12-INCH STORM SEWER, HDPE | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LF | | |

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 INVITATION TO BID 21-01
 AIRPORT HANGAR 6 AND 7 EXPANSION/DEVELOPMENT

BID FORM

| BASE BID - HANGARS #6 & #7 EXPANSION | | | | |
|---|-----------------|--|--------------------------|--------------|
| ITEM NUMBER | NUMBER OF UNITS | DESCRIPTION AND UNIT PRICE IN WORDS | UNIT PRICE IN NUMBERS | TOTAL AMOUNT |
| D-705-5.1 | 230 LF | UNDERDRAIN SYSTEM, COMPLETE, INCLUDING PERFORATED PIPE, FITTINGS, | \$ | \$ |
| | | | | |
| | | DOLLARS PER LF | | |
| | | | | |
| D-751-5.1 | 4 EA | 12-INCH YARD DRAIN INLET OR MANHOLE | \$ | \$ |
| | | | | |
| | | DOLLARS PER EA | | |
| | | | | |
| D-751-5.2 | 1 EA | FDOT TYPE C INLET WITH OIL SKIMMER (POND CONTROL STR.) | \$ | \$ |
| | | | | |
| | | DOLLARS PER EA | | |
| | | | | |
| P-151-4.1 | 1 LS | CLEARING AND GRUBBING (MISCELLANEOUS DEMOLITION) | \$ | \$ |
| | | | | |
| | | DOLLARS PER LS | | |
| | | | | |
| P-152-4.1 | 1,000 CY | UNCLASSIFIED EXCAVATION | \$ | \$ |
| | | | | |
| | | DOLLARS PER CY | | |
| | | | | |
| P-152-4.2 | 500 CY | EMBANKMENT IN PLACE | \$ | \$ |
| | | | | |
| | | DOLLARS PER CY | | |
| | | | | |

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CITY OF FERNANDINA BEACH
 INVITATION TO BID 21-01
 AIRPORT HANGAR 6 AND 7 EXPANSION/DEVELOPMENT

BID FORM

| BASE BID - HANGARS #6 & #7 EXPANSION | | | | |
|---|-----------------|--|--------------------------|--------------|
| ITEM NUMBER | NUMBER OF UNITS | DESCRIPTION AND UNIT PRICE IN WORDS | UNIT PRICE IN NUMBERS | TOTAL AMOUNT |
| P-160-8.1 | 900 SY | SUBGRADE STABILIZATION | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER SY | | |
| P-200-5.1 | 900 SY | 6-INCH ROCK BASE COURSE | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER SY | | |
| P-409-4.1 | 110 TON | FDOT SP-12.5 BITUMINOUS SURFACE COURSE | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER TON | | |
| P-602-5.1 | 270 GAL | BITUMINOUS PRIME COAT | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER GAL | | |
| T-904-5.1 | 2,100 SY | SODDING | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER SY | | |
| T-905-5.1 | 2,100 SY | 3-INCH TOPSOILING | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER SY | | |

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CITY OF FERNANDINA BEACH
 INVITATION TO BID 21-01
 AIRPORT HANGAR 6 AND 7 EXPANSION/DEVELOPMENT

BID FORM

| BASE BID - HANGARS #6 & #7 EXPANSION | | | | |
|---|-----------------|---|--------------------------|--------------|
| ITEM NUMBER | NUMBER OF UNITS | DESCRIPTION AND UNIT PRICE IN WORDS | UNIT PRICE IN NUMBERS | TOTAL AMOUNT |
| B-01 | 1 LS | 3-UNIT BOX HANGAR BUILDING, COMPLETE (HANGAR #7 EXTENSION) | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LS | | |
| B-02 | 1 LS | 3-UNIT T-HANGAR BUILDING WITH STORAGE AND TOILET ROOM, COMPLETE (HANGAR #6 EXTENSION) | \$ | \$ |
| | | | | |
| | | | | |
| | | DOLLARS PER LS | | |
| | | BASE BID TOTAL | \$ | \$ |
| | | | | |
| | | | | |
| | | | | |

THIS FORM MUST BE INCLUDED WITH BID SUBMITTAL

CITY OF FERNANDINA BEACH
 INVITATION TO BID 21-01
 AIRPORT HANGAR 6 AND 7 EXPANSION/DEVELOPMENT

BID FORM

| <i>BID ADDITIVE "A" - HANGARS #6 & #7 EXPANSION</i> | | | | |
|--|-----------------|---|---------------------------------|--------------|
| ITEM NUMBER | NUMBER OF UNITS | DESCRIPTION AND UNIT PRICE IN WORDS | UNIT PRICE IN NUMBERS | TOTAL AMOUNT |
| P-620-5.1 | 600 SF | RUNWAY AND TAXIWAY PAVEMENT MARKING (FULL APPLICATION RATE) | \$ | \$ |
| | | | | |
| | | DOLLARS PER SF | | |
| | | | | |
| P-620-5.2 | 900 SF | BLACK OUTLINE OF RUNWAY AND TAXIWAY PAVEMENT MARKING | \$ | \$ |
| | | | | |
| | | DOLLARS PER SF | | |
| | | | | |
| | | BID ADDITIVE "A" TOTAL | \$ | \$ |
| | | | | |
| | | | | |
| | | | | |

THIS FORM MUST BE INCLUDED WITH BID SUBMITTAL

CITY OF FERNANDINA BEACH
 INVITATION TO BID 21-01
 AIRPORT HANGAR 6 AND 7 EXPANSION/DEVELOPMENT

BID FORM

| BID ALTERNATE "1" - HANGARS #6 & #7 EXPANSION | | | | |
|--|-----------------|---|--------------------------|--------------|
| ITEM NUMBER | NUMBER OF UNITS | DESCRIPTION AND UNIT PRICE IN WORDS | UNIT PRICE IN NUMBERS | TOTAL AMOUNT |
| | | PROVIDE THE PRICE INCREASE OR DECREASE | | |
| SITE | 1 LS | COMPARED TO THE BASE BID FOR ALL SITE WORK REQUIRED TO ACCOMMODATE THE DIFFERENT BUILDING LAYOUT INCLUDED WITH BID ALTERNATE "1" (REFER TO TECHNICAL SPECIFICATION SECTION 13 34 19 - METAL BUILDING SYSTEMS 1.02(E)(1) BID ALTERNATES) | \$ | \$ |
| | | | | |
| | | DOLLARS PER LS | | |
| | | | | |
| A-100A/ A-200A | 1 LS | PROVIDE THE PRICE INCREASE OR DECREASE COMPARED TO THE BASE BID FOR BID ALTERNATE "1" 3-UNIT T-HANGAR BUILDING WITH SLIDING HANGAR DOOR SYSTEM, STORAGE AND TOILET ROOM, COMPLETE (REFER TO TECHNICAL SPECIFICATION SECTION 13 34 19 - METAL BUILDINGSYSTEMS 1.02(E)(1) BID ALTERNATES) | \$ | \$ |
| | | | | |
| | | DOLLARS PER LS | | |
| | | | | |
| | | BID ALTERNATE "1" TOTAL | \$ | \$ |
| | | | | |
| | | | | |
| | | | | |

THIS FORM MUST BE INCLUDED WITH BID SUBMITTAL

FLORIDA'S PUBLIC RECORDS LAW

The City is a public agency subject to Chapter 119, Florida Statutes. The Contractor shall comply with Florida's public records law. Specifically, the Contractor shall:

1. Keep and maintain public records required by the public agency to perform the service.
2. Upon request from the public agency's custodian of public records, provide the public agency with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in this chapter or as otherwise provided by law.
3. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if the contractor does not transfer the records to the public agency.
4. Upon completion of the contract, transfer, at no cost, to the public agency all public records in possession of the contractor or keep and maintain public records required by the public agency to perform the service. If the contractor transfers all public records to the public agency upon completion of the contract, the contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the contractor keeps and maintains public records upon completion of the contract, the contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the public agency, upon request from the public agency's custodian of public records, in a format that is compatible with the information technology systems of the public agency.
5. Redacted Copies of Confidential Information - If the contractor considers any portion of any documents, data, or records submitted to the city to be confidential, proprietary, trade secret or otherwise not subject to disclosure pursuant to Chapter 119, Florida Statutes, the Florida Constitution or other authority, the contractor must simultaneously provide the city with a separate redacted copy of the information it claims as Confidential and briefly describe in writing the grounds for claiming exemption from the public records law, including the specific statutory citation for such exemption. This redacted copy shall contain the Agreement name and number and shall be clearly titled "Confidential." The redacted copy should only redact those portions of material that the contractor claims is confidential, proprietary, trade secret or otherwise not subject to disclosure.
6. Request for Redacted Information - In the event of a public records or other disclosure request pursuant to Chapter 119, Florida Statutes, the Florida Constitution or other authority, to which documents that are marked as "Confidential" are responsive, the city will provide contractor-redacted copies to the requestor. If a requestor asserts a right to the Confidential Information, the city will notify the contractor such an assertion has been made. It is contractor's responsibility to assert that the information in question is exempt from disclosure under Chapter 119 or other applicable law. If the city becomes subject to a demand for discovery or disclosure of the Confidential Information of contractor under legal process, the Client shall give the contractor prompt notice of the demand prior to releasing the information labeled "Confidential" (unless otherwise prohibited by applicable law). The contractor shall be responsible for defending its determination that the redacted portions of its response are confidential, proprietary, trade secret, or otherwise not subject to disclosure.
7. Indemnification - The contractor shall protect, defend, and indemnify the city for any and all claims arising from or relating to contractors' determination that the redacted portions of its response are confidential, proprietary, trade secret, or otherwise not subject to disclosure. If the contractor fails to submit a redacted copy of information it claims is Confidential, the City is authorized to produce the entire documents, data, or records submitted to the City in answer to a public records request or other lawful request for these records.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, AT (904) 310-3115, OR cbest@fbfl.org, OFFICE OF THE CITY CLERK, 204 ASH STREET, FERNANDINA BEACH, FL 3203

FAA ADVISORY CIRCULAR 150/5370-2G

GENERAL PROVISIONS

General Contract Provisions

Section 10 Definition of Terms

When the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be defined as follows:

| Paragraph Number | Term | Definition |
|-------------------------|--|---|
| 10-01 | AASHTO | The American Association of State Highway and Transportation Officials. |
| 10-02 | Access Road | The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public roadway. |
| 10-03 | Advertisement | A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished. |
| 10-04 | Airport | Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; airport buildings and facilities located in any of these areas, and a heliport. |
| 10-05 | Airport Improvement Program (AIP) | A grant-in-aid program, administered by the Federal Aviation Administration (FAA). |
| 10-06 | Air Operations Area (AOA) | The term air operations area (AOA) shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron. |
| 10-07 | Apron | Area where aircraft are parked, unloaded or loaded, fueled and/or serviced. |
| 10-08 | ASTM International (ASTM) | Formerly known as the American Society for Testing and Materials (ASTM). |

| Paragraph Number | Term | Definition |
|-------------------------|--|--|
| 10-09 | Award | The Owner's notice to the successful bidder of the acceptance of the submitted bid. |
| 10-10 | Bidder | Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated. |
| 10-11 | Building Area | An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon. |
| 10-12 | Calendar Day | Every day shown on the calendar. |
| 10-13 | Certificate of Analysis (COA) | The COA is the manufacturer's Certificate of Compliance (COC) including all applicable test results required by the specifications. |
| 10-14 | Certificate of Compliance (COC) | The manufacturer's certification stating that materials or assemblies furnished fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer's authorized representative. |
| 10-15 | Change Order | A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for work within the scope of the contract and necessary to complete the project. |
| 10-16 | Contract | <p>A written agreement between the Owner and the Contractor that establishes the obligations of the parties including but not limited to performance of work, furnishing of labor, equipment and materials and the basis of payment.</p> <p>The awarded contract includes but may not be limited to: Advertisement, Contract form, Proposal, Performance bond, payment bond, General provisions, certifications and representations, Technical Specifications, Plans, Supplemental Provisions, standards incorporated by reference and issued addenda.</p> |
| 10-17 | Contract Item (Pay Item) | A specific unit of work for which a price is provided in the contract. |
| 10-18 | Contract Time | The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of |

| Paragraph Number | Term | Definition |
|-------------------------|--|--|
| | | calendar or working days, the contract shall be completed by that date. |
| 10-19 | Contractor | The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work. |
| 10-20 | Contractors Quality Control (QC) Facilities | The Contractor's QC facilities in accordance with the Contractor Quality Control Program (CQCP). |
| 10-21 | Contractor Quality Control Program (CQCP) | Details the methods and procedures that will be taken to assure that all materials and completed construction required by the contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. |
| 10-22 | Control Strip | A demonstration by the Contractor that the materials, equipment, and construction processes results in a product meeting the requirements of the specification. |
| 10-23 | Construction Safety and Phasing Plan (CSPP) | The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications. |
| 10-24 | Drainage System | The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area. |
| 10-25 | Engineer | The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering, inspection, and/or observation of the contract work and acting directly or through an authorized representative. |
| 10-26 | Equipment | All machinery, together with the necessary supplies for upkeep and maintenance; and all tools and apparatus necessary for the proper construction and acceptable completion of the work. |
| 10-27 | Extra Work | An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Owner's Engineer or Resident Project Representative (RPR) to be necessary to |

| Paragraph Number | Term | Definition |
|------------------|--------------------------------|---|
| | | complete the work within the intended scope of the contract as previously modified. |
| 10-28 | FAA | The Federal Aviation Administration. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative. |
| 10-29 | Federal Specifications | The federal specifications and standards, commercial item descriptions, and supplements, amendments, and indices prepared and issued by the General Services Administration. |
| 10-30 | Force Account | <p>a. Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis.</p> <p>b. Owner Force Account - Work performed for the project by the Owner's employees.</p> |
| 10-31 | Intention of Terms | <p>Whenever, in these specifications or on the plans, the words “directed,” “required,” “permitted,” “ordered,” “designated,” “prescribed,” or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer and/or Resident Project Representative (RPR) is intended; and similarly, the words “approved,” “acceptable,” “satisfactory,” or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer and/or RPR, subject in each case to the final determination of the Owner.</p> <p>Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.</p> |
| 10-32 | Lighting | A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface. |
| 10-33 | Major and Minor Contract Items | A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20% of the total amount of the award contract. All other items shall be considered minor contract items. |

| Paragraph Number | Term | Definition |
|-------------------------|--|---|
| 10-34 | Materials | Any substance specified for use in the construction of the contract work. |
| 10-35 | Modification of Standards (MOS) | Any deviation from standard specifications applicable to material and construction methods in accordance with FAA Order 5300.1. |
| 10-36 | Notice to Proceed (NTP) | A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins. |
| 10-37 | Owner | The term "Owner" shall mean the party of the first part or the contracting agency signatory to the contract. Where the term "Owner" is capitalized in this document, it shall mean airport Sponsor only. |
| 10-38 | Passenger Facility Charge (PFC) | Per 14 Code of Federal Regulations (CFR) Part 158 and 49 United States Code (USC) § 40117, a PFC is a charge imposed by a public agency on passengers enplaned at a commercial service airport it controls. |
| 10-39 | Pavement Structure | The combined surface course, base course(s), and subbase course(s), if any, considered as a single unit. |
| 10-40 | Payment bond | The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will pay in full all bills and accounts for materials and labor used in the construction of the work. |
| 10-41 | Performance bond | The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract. |
| 10-42 | Plans | The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications. Plans may also be referred to as 'contract drawings.' |
| 10-43 | Project | The agreed scope of work for accomplishing specific airport development with respect to a particular airport. |
| 10-44 | Proposal | The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work |

| Paragraph Number | Term | Definition |
|-------------------------|---|---|
| | | and furnish the necessary materials in accordance with the provisions of the plans and specifications. |
| 10-45 | Proposal guaranty | The security furnished with a proposal to guarantee that the bidder will enter into a contract if their own proposal is accepted by the Owner. |
| 10-46 | Quality Assurance (QA) | Owner's responsibility to assure that construction work completed complies with specifications for payment. |
| 10-47 | Quality Control (QC) | Contractor's responsibility to control material(s) and construction processes to complete construction in accordance with project specifications. |
| 10-48 | Quality Assurance (QA) Inspector | An authorized representative of the Engineer and/or Resident Project Representative (RPR) assigned to make all necessary inspections, observations, tests, and/or observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor. |
| 10-49 | Quality Assurance (QA) Laboratory | The official quality assurance testing laboratories of the Owner or such other laboratories as may be designated by the Engineer or RPR. May also be referred to as Engineer's, Owner's, or QA Laboratory. |
| 10-50 | Resident Project Representative (RPR) | The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for all necessary inspections, observations, tests, and/or observations of tests of the contract work performed or being performed, or of the materials furnished or being furnished by the Contractor, and acting directly or through an authorized representative. |
| 10-51 | Runway | The area on the airport prepared for the landing and takeoff of aircraft. |
| 10-52 | Runway Safety Area (RSA) | A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft. See the construction safety and phasing plan (CSPP) for limits of the RSA. |
| 10-53 | Safety Plan Compliance Document (SPCD) | Details how the Contractor will comply with the CSPP. |
| 10-54 | Specifications | A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the |

| Paragraph Number | Term | Definition |
|-------------------------|---|--|
| | | contract specifications by reference shall have the same force and effect as if included in the contract physically. |
| 10-55 | Sponsor | A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport. |
| 10-56 | Structures | Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein. |
| 10-57 | Subgrade | The soil that forms the pavement foundation. |
| 10-58 | Superintendent | The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the RPR, and who shall supervise and direct the construction. |
| 10-59 | Supplemental Agreement | A written agreement between the Contractor and the Owner that establishes the basis of payment and contract time adjustment, if any, for the work affected by the supplemental agreement. A supplemental agreement is required if: (1) in scope work would increase or decrease the total amount of the awarded contract by more than 25%; (2) in scope work would increase or decrease the total of any major contract item by more than 25%; (3) work that is not within the scope of the originally awarded contract; or (4) adding or deleting of a major contract item. |
| 10-60 | Surety | The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor. |
| 10-61 | Taxilane | A taxiway designed for low speed movement of aircraft between aircraft parking areas and terminal areas. |
| 10-62 | Taxiway | The portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas. |
| 10-63 | Taxiway/Taxilane Safety Area (TSA) | A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft. See |

| Paragraph Number | Term | Definition |
|-------------------------|----------------------------|---|
| | | the construction safety and phasing plan (CSPP) for limits of the TSA. |
| 10-64 | Work | The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications. |
| 10-65 | Working day | A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least six (6) hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days. |
| 10-66 | Owner Defined terms | None |

END OF SECTION 10 SECTION

20 PROPOSAL REQUIREMENTS AND CONDITIONS

20-02 Qualification of bidders. Each bidder shall submit evidence of competency and evidence of financial responsibility to perform the work to the Owner at the time of bid opening.

Evidence of competency, unless otherwise specified, shall consist of statements covering the bidder's past experience on similar work, and a list of equipment and a list of key personnel that would be available for the work.

Each bidder shall furnish the Owner satisfactory evidence of their financial responsibility. Evidence of financial responsibility, unless otherwise specified, shall consist of a confidential statement or report of the bidder's financial resources and liabilities as of the last calendar year or the bidder's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the bidder shall further certify whether their financial responsibility is approximately the same as stated or reported by the public accountant. If the bidder's financial responsibility has changed, the bidder shall qualify the public accountant's statement or report to reflect the bidder's true financial condition at the time such qualified statement or report is submitted to the Owner.

Unless otherwise specified, a bidder may submit evidence that they are prequalified with the State Highway Division and are on the current "bidder's list" of the state in which the proposed work is located. Evidence of State Highway Division prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports specified above.

20-03 Contents of proposal forms. The Owner's proposal forms state the location and description of the proposed construction; the place, date, and time of opening of the proposals; and the estimated quantities of the various items of work to be performed and materials to be furnished for which unit bid prices are asked. The proposal form states the time in which the work must be completed, and the amount of the proposal guaranty that must accompany the proposal. The Owner will accept only those Proposals properly executed on physical forms or electronic forms provided by the Owner. Bidder actions that may cause the Owner to deem a proposal irregular are given in paragraph 20-09 *Irregular proposals*. Mobilization is limited to 10 percent of the total project cost.

A prebid conference is required on this project to discuss as a minimum, the following items: material requirements; submittals; Quality Control/Quality Assurance requirements; the construction safety and phasing plan including airport access and staging areas; and unique airfield paving construction requirements. See bid advertisement for date, time and location of meeting.

20-04 Issuance of proposal forms. The Owner reserves the right to refuse to issue a proposal form to a prospective bidder if the bidder is in default for any of the following reasons:

- a. Failure to comply with any prequalification regulations of the Owner, if such regulations are cited, or otherwise included, in the proposal as a requirement for bidding.
- b. Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force with the Owner at the time the Owner issues the proposal to a prospective bidder.
- c. Documented record of Contractor default under previous contracts with the Owner.
- d. Documented record of unsatisfactory work on previous contracts with the Owner.

20-05 Interpretation of estimated proposal quantities. An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the

award of the contract. The Owner does not expressly, or by implication, agree that the actual quantities involved will correspond exactly therewith; nor shall the bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as provided in the Section 40, paragraph 40-02, Alteration of Work and Quantities, without in any way invalidating the unit bid prices.

20-06 Examination of plans, specifications, and site. The bidder is expected to carefully examine the site of the proposed work, the proposal, plans, specifications, and contract forms. Bidders shall satisfy themselves to the character, quality, and quantities of work to be performed, materials to be furnished, and to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the bidder has made such examination and is satisfied to the conditions to be encountered in performing the work and the requirements of the proposed contract, plans, and specifications.

Boring logs and other records of subsurface investigations and tests are available for inspection of bidders. It is understood and agreed that such subsurface information, whether included in the plans, specifications, or otherwise made available to the bidder, was obtained and is intended for the Owner's design and estimating purposes only. Such information has been made available for the convenience of all bidders. It is further understood and agreed that each bidder is solely responsible for all assumptions, deductions, or conclusions which the bidder may make or obtain from their own examination of the boring logs and other records of subsurface investigations and tests that are furnished by the Owner.

20-07 Preparation of proposal. The bidder shall submit their proposal on the forms furnished by the Owner. All blank spaces in the proposal forms, unless explicitly stated otherwise, must be correctly filled in where indicated for each and every item for which a quantity is given. The bidder shall state the price (written in ink or typed) both in words and numerals which they propose for each pay item furnished in the proposal. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.

The bidder shall correctly sign the proposal in ink. If the proposal is made by an individual, their name and post office address must be shown. If made by a partnership, the name and post office address of each member of the partnership must be shown. If made by a corporation, the person signing the proposal shall give the name of the state where the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of their authority to do so and that the signature is binding upon the firm or corporation.

20-08 Responsive and responsible bidder. A responsive bid conforms to all significant terms and conditions contained in the Owner's invitation for bid. It is the Owner's responsibility to decide if the exceptions taken by a bidder to the solicitation are material or not and the extent of deviation it is willing to accept.

A responsible bidder has the ability to perform successfully under the terms and conditions of a proposed procurement, as defined in 2 CFR § 200.318(h). This includes such matters as Contractor integrity, compliance with public policy, record of past performance, and financial and technical resources.

20-09 Irregular proposals. Proposals shall be considered irregular for the following reasons:

- a. If the proposal is on a form other than that furnished by the Owner, or if the Owner's form is altered, or if any part of the proposal form is detached.
- b. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.
- c. If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of authorized alternate pay items, for which the bidder is not required to furnish a unit price.

- d. If the proposal contains unit prices that are obviously unbalanced.
- e. If the proposal is not accompanied by the proposal guaranty specified by the Owner.
- f. If the applicable Disadvantaged Business Enterprise information is incomplete.

The Owner reserves the right to reject any irregular proposal and the right to waive technicalities if such waiver is in the best interest of the Owner and conforms to local laws and ordinances pertaining to the letting of construction contracts.

20-10 Bid guarantee. Each separate proposal shall be accompanied by a bid bond, certified check, or other specified acceptable collateral, in the amount specified in the proposal form. Such bond, check, or collateral, shall be made payable to the Owner.

2 CFR 200.325 provides that for contracts exceeding the Simplified Acquisition Threshold, the Owner should use local bonding policy and requirements provided that the FAA has made a determination that the Government's interest is adequately protected. If such a determination has not been made, the bid guarantee shall be equivalent to 5% of the bid price. It shall consist of a firm commitment such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of the bid, execute such contractual documents as may be required within the time specified.

20-11 Delivery of proposal. Each proposal submitted shall be placed in a sealed envelope plainly marked with the project number, location of airport, and name and business address of the bidder on the outside. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement or as modified by Addendum before the time specified for opening all bids. Proposals received after the bid opening time shall be returned to the bidder unopened.

20-12 Withdrawal or revision of proposals. A bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the bidder's request for withdrawal is received by the Owner in writing before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.

20-13 Public opening of proposals. Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.

20-14 Disqualification of bidders. A bidder shall be considered disqualified for any of the following reasons:

- a. Submitting more than one proposal from the same partnership, firm, or corporation under the same or different name.
- b. Evidence of collusion among bidders. Bidders participating in such collusion shall be disqualified as bidders for any future work of the Owner until any such participating bidder has been reinstated by the Owner as a qualified bidder.
- c. If the bidder is considered to be in "default" for any reason specified in paragraph 20-04, *Issuance of Proposal Forms*, of this section.

20-15 Discrepancies and Omissions. A Bidder who discovers discrepancies or omissions with the project bid documents shall immediately notify the Owner's Engineer of the matter. A bidder that has doubt as to the true meaning of a project requirement may submit to the Owner's Engineer a written request for interpretation no later than **10** days prior to bid opening.

Any interpretation of the project bid documents by the Owner's Engineer will be by written addendum issued by the Owner. The Owner will not consider any instructions, clarifications or interpretations of the bidding documents in any manner other than written addendum.

END OF SECTION 20

Section 30 Award and Execution of Contract

30-01 Consideration of proposals. After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit bid price written in words shall govern.

Until the award of a contract is made, the Owner reserves the right to reject a bidder's proposal for any of the following reasons:

a. If the proposal is irregular as specified in Section 20, paragraph 20-09, *Irregular Proposals*.

b. If the bidder is disqualified for any of the reasons specified Section 20, paragraph 20-14, *Disqualification of Bidders*.

In addition, until the award of a contract is made, the Owner reserves the right to reject any or all proposals, waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the Owner's best interests.

30-02 Award of contract. The award of a contract, if it is to be awarded, shall be made within **90** calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

If the Owner elects to proceed with an award of contract, the Owner will make award to the responsible bidder whose bid, conforming with all the material terms and conditions of the bid documents, is the lowest in price.

30-03 Cancellation of award. The Owner reserves the right to cancel the award without liability to the bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the Owner in accordance with paragraph 30-07 *Approval of Contract*.

30-04 Return of proposal guaranty. All proposal guaranties, except those of the two lowest bidders, will be returned immediately after the Owner has made a comparison of bids as specified in the paragraph 30-01, *Consideration of Proposals*. Proposal guaranties of the two lowest bidders will be retained by the Owner until such time as an award is made, at which time, the unsuccessful bidder's proposal guaranty will be returned. The successful bidder's proposal guaranty will be returned as soon as the Owner receives the contract bonds as specified in paragraph 30-05, *Requirements of Contract Bonds*.

30-05 Requirements of contract bonds. At the time of the execution of the contract, the successful bidder shall furnish the Owner a surety bond or bonds that have been fully executed by the bidder and the surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The surety and the form of the bond or bonds shall be acceptable to the Owner. Unless otherwise specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.

30-06 Execution of contract. The successful bidder shall sign (execute) the necessary agreements for entering into the contract and return the signed contract to the Owner, along with the fully executed surety bond or bonds specified in paragraph 30-05, *Requirements of Contract Bonds*, of this section, within **15** calendar days from the date mailed or otherwise delivered to the successful bidder.

30-07 Approval of contract. Upon receipt of the contract and contract bond or bonds that have been executed by the successful bidder, the Owner shall complete the execution of the contract in accordance with local laws or ordinances, and return the fully executed contract to the Contractor. Delivery of the

fully executed contract to the Contractor shall constitute the Owner's approval to be bound by the successful bidder's proposal and the terms of the contract.

30-08 Failure to execute contract. Failure of the successful bidder to execute the contract and furnish an acceptable surety bond or bonds within the period specified in paragraph 30-06, *Execution of Contract*, of this section shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidated damages to the Owner.

END OF SECTION 30

SECTION 40 SCOPE OF WORK

40-01 Intent of contract. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

40-02 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 Engineer or RPR 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%.

Work alterations and quantity variances that do not meet the definition of significant change in character of work shall not invalidate the contract nor release the surety. Contractor agrees to accept payment for such work alterations and quantity variances in accordance with Section 90, paragraph 90-03, *Compensation for Altered Quantities*.

Should the value of altered work or quantity variance meet the criteria for significant change in character of work, such altered work and quantity variance shall be covered by a supplemental agreement. Supplemental agreements shall also require consent of the Contractor's surety and separate performance and payment bonds. If the Owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the Owner reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

40-03 Omitted items. The Owner, the Owner's Engineer or the RPR may provide written notice to the Contractor to omit from the work any contract item that does not meet the definition of major contract item. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be non-performed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with Section 90, paragraph 90-04, *Payment for Omitted Items*.

40-04 Extra work. Should acceptable completion of the contract require the Contractor to perform an item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, Owner may issue a Change Order to cover the necessary extra work. Change orders for extra work shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the RPR's opinion, is necessary for completion of the extra work.

When determined by the RPR to be in the Owner's best interest, the RPR may order the Contractor to proceed with extra work as provided in Section 90, paragraph 90-05, *Payment for Extra Work*. Extra work that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original contract shall be covered by a supplemental agreement as defined in Section 10, paragraph 10-59, *Supplemental Agreement*.

If extra work is essential to maintaining the project critical path, RPR may order the Contractor to commence the extra work under a Time and Material contract method. Once sufficient detail is available

to establish the level of effort necessary for the extra work, the Owner shall initiate a change order or supplemental agreement to cover the extra work.

Any claim for payment of extra work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the Owner.

40-05 Maintenance of traffic. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration. The Contractor shall maintain traffic in the manner detailed in the Construction Safety and Phasing Plan (CSPP).

a. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas (AOAs) of the airport with respect to their own operations and the operations of all subcontractors as specified in Section 80, paragraph 80-04, *Limitation of Operations*. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in Section 70, paragraph 70-15, *Contractor's Responsibility for Utility Service and Facilities of Others*.

b. With respect to their own operations and the operations of all subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying personnel, equipment, vehicles, storage areas, and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, or maintenance vehicles at the airport in accordance with the construction safety and phasing plan (CSPP) and the safety plan compliance document (SPCD).

Refer to AC 150/5210-5, Painting, Marking and Lighting of Vehicles Used on an Airport and AC 150/5370-2, Operational Safety on Airports During Construction for applicable standards.

c. When the contract requires the maintenance of an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep the road, street, or highway open to all traffic and shall provide maintenance as may be required to accommodate traffic. The Contractor, at their expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel. The Contractor shall furnish, erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices (MUTCD) (<http://mutcd.fhwa.dot.gov/>), unless otherwise specified. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways.

40-06 Removal of existing structures. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Resident Project Representative (RPR) shall be notified prior to disturbing such structure. The disposition of existing structures so encountered shall be immediately determined by the RPR in accordance with the provisions of the contract.

Except as provided in Section 40, paragraph 40-07, *Rights in and Use of Materials Found in the Work*, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be used in the work as otherwise provided for in the contract and shall remain the property of the Owner when so used in the work.

40-07 Rights in and use of materials found in the work. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be embankment, the Contractor may at their own option either:

- a. Use such material in another contract item, providing such use is approved by the RPR and is in conformance with the contract specifications applicable to such use; or,
- b. Remove such material from the site, upon written approval of the RPR; or
- c. Use such material for the Contractor's own temporary construction on site; or,
- d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., the Contractor shall request the RPR's approval in advance of such use.

Should the RPR approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at their expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for use of such material used in the work or removed from the site.

Should the RPR approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of their own exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

40-08 Final cleanup. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The Contractor shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of the property Owner.

END OF SECTION 40

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Section 50 Control of Work

50-01 Authority of the Resident Project Representative (RPR). The RPR has final authority regarding the interpretation of project specification requirements. The RPR shall determine acceptability of the quality of materials furnished, method of performance of work performed, and the manner and rate of performance of the work. The RPR does not have the authority to accept work that does not conform to specification requirements.

50-02 Conformity with plans and specifications. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross-sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans, or specifications.

If the RPR finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications, but that the portion of the work affected will, in their opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, the RPR will advise the Owner of their determination that the affected work be accepted and remain in place. The RPR will document the determination and recommend to the Owner a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. Changes in the contract price must be covered by contract change order or supplemental agreement as applicable.

If the RPR finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the RPR's written orders.

The term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall not be construed as waiving the RPR's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's execution of the work, when, in the RPR's opinion, such compliance is essential to provide an acceptable finished portion of the work.

The term "reasonably close conformity" is also intended to provide the RPR with the authority, after consultation with the Sponsor and FAA, to use sound engineering judgment in their determinations to accept work that is not in strict conformity, but will provide a finished product equal to or better than that required by the requirements of the contract, plans and specifications.

The RPR will not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

50-03 Coordination of contract, plans, and specifications. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. If electronic files are provided and used on the project and there is a conflict between the electronic files and hard copy plans, the hard copy plans shall govern. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited testing standards occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the RPR for an interpretation and decision, and such decision shall be final.

The Contractor shall not take advantage of any apparent error or omission on the plans or specifications. In the event the Contractor discovers any apparent error or discrepancy, Contractor shall immediately notify the Owner or the designated representative in writing requesting their written interpretation and decision.

50-04 List of Special Provisions. See special provisions section for list of special provisions

50-05 Cooperation of Contractor. The Contractor shall be supplied with two (2) 11 x 17 hard copies of the plans and an electronic PDF of the plans and specifications. The Contractor shall have available on the construction site at all times one hardcopy each of the plans and specifications. Additional hard copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the RPR and their inspectors and with other Contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as their agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the RPR or their authorized representative.

50-06 Cooperation between Contractors. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with their own contract and shall protect and hold harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange their work and shall place and dispose of the materials being used to not interfere with the operations of the other Contractors within the limits of the same project. The Contractor shall join their work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

50-07 Construction layout and stakes. The Engineer/RPR shall establish necessary horizontal and vertical control. The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor. Contractor is responsible for preserving integrity of horizontal and vertical controls established by Engineer/RPR. In case of negligence on the part of the Contractor or their employees, resulting in the destruction of any horizontal and vertical control, the resulting costs will be deducted as a liquidated damage against the Contractor.

Prior to the start of construction, the Contractor will check all control points for horizontal and vertical accuracy and certify in writing to the RPR that the Contractor concurs with survey control established for the project. All lines, grades and measurements from control points necessary for the proper execution and control of the work on this project will be provided to the RPR. The Contractor is responsible to establish all layout required for the construction of the project.

Copies of survey notes will be provided to the RPR for each area of construction and for each placement of material as specified to allow the RPR to make periodic checks for conformance with plan grades, alignments and grade tolerances required by the applicable material specifications. Surveys will be

provided to the RPR prior to commencing work items that cover or disturb the survey staking. Survey(s) and notes shall be provided in hard copy and AutoCAD .dwg file format.

Laser, GPS, String line, or other automatic control shall be checked with temporary control as necessary. In the case of error, on the part of the Contractor, their surveyor, employees or subcontractors, resulting in established grades, alignment or grade tolerances that do not concur with those specified or shown on the plans, the Contractor is solely responsible for correction, removal, replacement and all associated costs at no additional cost to the Owner.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses. The cost shall be included in the price of the bid for the various items of the Contract.

50-08 Authority and duties of Quality Assurance (QA) inspectors. QA inspectors shall be authorized to inspect all work done and all material furnished. Such QA inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. QA inspectors are not authorized to revoke, alter, or waive any provision of the contract. QA inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

QA Inspectors are authorized to notify the Contractor or their representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the RPR for a decision.

50-09 Inspection of the work. All materials and each part or detail of the work shall be subject to inspection. The RPR shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the RPR requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense.

Provide advance written notice to the RPR of work the Contractor plans to perform each week and each day. Any work done or materials used without written notice and allowing opportunity for inspection by the RPR may be ordered removed and replaced at the Contractor's expense.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the Owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

50-10 Removal of unacceptable and unauthorized work. All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the RPR as provided in paragraph 50-02, *Conformity with Plans and Specifications*.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of Section 70, paragraph 70-14, *Contractor's Responsibility for Work*.

No removal work made under provision of this paragraph shall be done without lines and grades having been established by the RPR. Work done contrary to the instructions of the RPR, work done beyond the lines shown on the plans or as established by the RPR, except as herein specified, or any extra work done

without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the RPR made under the provisions of this subsection, the RPR will have authority to cause unacceptable work to be remedied or removed and replaced; and unauthorized work to be removed and recover the resulting costs as a liquidated damage against the Contractor.

50-11 Load restrictions. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor, at their own expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel.

50-12 Maintenance during construction. The Contractor shall maintain the work during construction and until the work is accepted. Maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various contract items, and the Contractor will not be paid an additional amount for such work.

50-13 Failure to maintain the work. Should the Contractor at any time fail to maintain the work as provided in paragraph 50-12, *Maintenance during Construction*, the RPR shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the RPR's notification, the Owner may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the Owner, shall be recovered as a liquidated damage against the Contractor.

50-14 Partial acceptance. If at any time during the execution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, the Contractor may request the RPR to make final inspection of that unit. If the RPR finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, the RPR may accept it as being complete, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract.

50-15 Final acceptance. Upon due notice from the Contractor of presumptive completion of the entire project, the RPR and Owner will make an inspection. If all construction provided for and contemplated by the contract is found to be complete in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The RPR shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the RPR will notify the Contractor and the Contractor shall correct the unsatisfactory work. Upon correction of the

work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the RPR will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

50-16 Claims for adjustment and disputes. If for any reason the Contractor deems that additional compensation is due for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, the Contractor shall notify the RPR in writing of their intention to claim such additional compensation before the Contractor begins the work on which the Contractor bases the claim. If such notification is not given or the RPR is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the RPR has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit a written claim to the RPR who will present it to the Owner for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor's right to dispute final payment based on differences in measurements or computations.

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Section 60 Control of Materials

60-01 Source of supply and quality requirements. The materials used in the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish documentation to the RPR as to the origin, composition, and manufacture of all materials to be used in the work. Documentation shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the RPR's option, materials may be approved at the source of supply before delivery. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

The Contractor shall furnish airport lighting equipment that meets the requirements of the specifications; and is listed in AC 150/5345-53, *Airport Lighting Equipment Certification Program and Addendum*, that is in effect on the date of advertisement.

60-02 Samples, tests, and cited specifications. All materials used in the work shall be inspected, tested, and approved by the RPR before incorporation in the work unless otherwise designated. Any work in which untested materials are used without approval or written permission of the RPR shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the RPR, shall be removed at the Contractor's expense.

Unless otherwise designated, quality assurance tests will be made by and at the expense of the Owner in accordance with the cited standard methods of ASTM, American Association of State Highway and Transportation Officials (AASHTO), federal specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids.

The testing organizations performing on-site quality assurance field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel. Unless otherwise designated, samples for quality assurance will be taken by a qualified representative of the RPR. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at their request after review and approval of the RPR.

A copy of all Contractor QC test data shall be provided to the RPR daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the RPR showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

The Contractor shall employ a Quality Control (QC) testing organization to perform all Contractor required QC tests in accordance with Item C-100 Contractor Quality Control Program (CQCP).

60-03 Certification of compliance/analysis (COC/COA). The RPR may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's COC stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified. The COA is the manufacturer's COC and includes all applicable test results.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the RPR.

When a material or assembly is specified by “brand name or equal” and the Contractor elects to furnish the specified “or equal,” the Contractor shall be required to furnish the manufacturer’s certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

- a. Conformance to the specified performance, testing, quality or dimensional requirements; and,
- b. Suitability of the material or assembly for the use intended in the contract work.

The RPR shall be the sole judge as to whether the proposed “or equal” is suitable for use in the work.

The RPR reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 Plant inspection. The RPR or their authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the RPR conduct plant inspections, the following conditions shall exist:

- a. The RPR shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.
- b. The RPR shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.
- c. If required by the RPR, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Place office or working space in a convenient location with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The RPR shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

60-05 Engineer/ Resident Project Representative (RPR) field office. An Engineer/RPR field office is not required.

60-06 Storage of materials. Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the RPR. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans and/or CSPP, the storage of materials and the location of the Contractor’s plant and parked equipment or vehicles shall be as directed by the RPR. Private property shall not be used for storage purposes without written permission of the Owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the RPR a copy of the property Owner’s permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at their expense, except as otherwise agreed to (in writing) by the Owner or lessee of the property.

60-07 Unacceptable materials. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the RPR.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the RPR has approved its use in the work.

60-08 Owner furnished materials. The Contractor shall furnish all materials required to complete the work, except those specified, if any, to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

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Section 70 Legal Regulations and Responsibility to Public

70-01 Laws to be observed. The Contractor shall keep fully informed of all federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all their officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's employees.

70-02 Permits, licenses, and taxes. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful execution of the work.

70-03 Patented devices, materials, and processes. If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the Patentee or Owner. The Contractor and the surety shall indemnify and hold harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the execution or after the completion of the work.

70-04 Restoration of surfaces disturbed by others. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) must be shown on the plans and is indicated as follows: N/A

Except as listed above, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the RPR.

Should the Owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such Owners by arranging and performing the work in this contract to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the RPR, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

70-05 Federal Participation. The United States Government has agreed to reimburse the Owner for some portion of the contract costs. The contract work is subject to the inspection and approval of duly authorized representatives of the FAA Administrator. No requirement of this contract shall be construed as making the United States a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

70-06 Sanitary, health, and safety provisions. The Contractor's worksite and facilities shall comply with applicable federal, state, and local requirements for health, safety and sanitary provisions.

70-07 Public convenience and safety. The Contractor shall control their operations and those of their subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to their own operations and those of their own subcontractors and all suppliers in accordance with Section 40, paragraph 40-05, *Maintenance of Traffic*, and shall limit such operations for the convenience and safety of the traveling public as specified in Section 80, paragraph 80-04, *Limitation of Operations*.

The Contractor shall remove or control debris and rubbish resulting from its work operations at frequent intervals, and upon the order of the RPR. If the RPR determines the existence of Contractor debris in the work site represents a hazard to airport operations and the Contractor is unable to respond in a prompt and reasonable manner, the RPR reserves the right to assign the task of debris removal to a third party and recover the resulting costs as a liquidated damage against the Contractor.

70-08 Construction Safety and Phasing Plan (CSPP). The Contractor shall complete the work in accordance with the approved Construction Safety and Phasing Plan (CSPP) developed in accordance with AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP is included in the project plans.

70-09 Use of explosives. The use of explosives is not permitted on this project.

70-10 Protection and restoration of property and landscape. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer/RPR has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the execution of the work, resulting from any act, omission, neglect, or misconduct in manner or method of executing the work, or at any time due to defective work or materials, and said responsibility shall not be released until the project has been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore, at their expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner.

70-11 Responsibility for damage claims. The Contractor shall indemnify and hold harmless the Engineer/RPR and the Owner and their officers, agents, and employees from all suits, actions, or claims, of any character, brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act," or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of their own contract considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, their own surety may be held until such suits, actions, or claims for injuries or damages shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he or she is adequately protected by public liability and property damage insurance.

70-12 Third party beneficiary clause. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create for the public or any member thereof, a third-party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

70-13 Opening sections of the work to traffic. If it is necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such “phasing” of the work must be specified below and indicated on the approved Construction Safety and Phasing Plan (CSPP) and the project plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified.

Upon completion of any portion of work listed above, such portion shall be accepted by the Owner in accordance with Section 50, paragraph 50-14, *Partial Acceptance*.

No portion of the work may be opened by the Contractor until directed by the Owner in writing. Should it become necessary to open a portion of the work to traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the RPR, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at their expense.

The Contractor shall make their own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the contract work.

The Contractor must conform to safety standards contained AC 150/5370-2 and the approved CSPP.

Contractor shall refer to the plans, specifications, and the approved CSPP to identify barricade requirements, temporary and/or permanent markings, airfield lighting, guidance signs and other safety requirements prior to opening up sections of work to traffic.

70-14 Contractor’s responsibility for work. Until the RPR’s final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with Section 50, paragraph 50-14, *Partial Acceptance*, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at their own expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding, and sodding furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

70-15 Contractor’s responsibility for utility service and facilities of others. As provided in paragraph 70-04, *Restoration of Surfaces Disturbed by Others*, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the Owner to construct, reconstruct or maintain such utility services or facilities

during the progress of the work. In addition, the Contractor shall control their operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and/or in the contract documents.

Dale L. Martin, City Manager dmartin@fbfl.org (904) 310-3100

Nathan Coyle, Airport Manager ncoyle@fbfl.org (904) 310-3436

It is understood and agreed that the Owner does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of the responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the Owners of all utility services or other facilities of their plan of operations. Such notification shall be in writing addressed to "The Person to Contact" as provided in this paragraph and paragraph 70-04, *Restoration of Surfaces Disturbed By Others*. A copy of each notification shall be given to the RPR.

In addition to the general written notification provided, it shall be the responsibility of the Contractor to keep such individual Owners advised of changes in their plan of operations that would affect such Owners.

Prior to beginning the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such Owner of their plan of operation. If, in the Contractor's opinion, the Owner's assistance is needed to locate the utility service or facility or the presence of a representative of the Owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner's "Person to Contact" no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the RPR.

The Contractor's failure to give the two days' notice shall be cause for the Owner to suspend the Contractor's operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use hand excavation methods within 3 feet (1 m) of such outside limits at such points as may be required to ensure protection from damage due to the Contractor's operations.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, the Contractor shall immediately notify the proper authority and the RPR and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the RPR continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to their operations whether due to negligence or accident. The Owner reserves the right to deduct such costs from any monies due or which may become due the Contractor, or their own surety.

70-16 Furnishing rights-of-way. The Owner will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

70-17 Personal liability of public officials. In carrying out any of the contract provisions or in exercising any power or authority granted by this contract, there shall be no liability upon the Engineer, RPR, their

authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

70-18 No waiver of legal rights. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or stopped from recovering from the Contractor or their surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill their obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Owner's rights under any warranty or guaranty.

70-19 Environmental protection. The Contractor shall comply with all federal, state, and local laws and regulations controlling pollution of the environment. The Contractor shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, asphalts, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

70-20 Archaeological and historical findings. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during their operations, any building, part of a building, structure, or object that is incongruous with its surroundings, the Contractor shall immediately cease operations in that location and notify the RPR. The RPR will immediately investigate the Contractor's finding and the Owner will direct the Contractor to either resume operations or to suspend operations as directed.

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract change order or supplemental agreement as provided in Section 40, paragraph 40-04, *Extra Work*, and Section 90, paragraph 90-05, *Payment for Extra Work*. If appropriate, the contract change order or supplemental agreement shall include an extension of contract time in accordance with Section 80, paragraph 80-07, *Determination and Extension of Contract Time*.

70-21 Insurance Requirements. The insurance requirements for commercial general and umbrella liability; commercial auto and umbrella liability; worker's compensation; property; and/or other types of coverage required by the project are included in the "Up-Front" contract documents.

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Section 80 Execution and Progress

80-01 Subletting of contract. The Owner will not recognize any subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Resident Project Representative (RPR).

The Contractor shall perform, with his organization, an amount of work equal to at least 35 percent of the total contract cost.

Should the Contractor elect to assign their contract, said assignment shall be concurred in by the surety, shall be presented for the consideration and approval of the Owner, and shall be consummated only on the written approval of the Owner.

The Contractor shall provide copies of all subcontracts to the RPR 14 days prior to being utilized on the project. As a minimum, the information shall include the following:

- Subcontractor's legal company name.
- Subcontractor's legal company address, including County name.
- Principal contact person's name, telephone and fax number.
- Complete narrative description, and dollar value of the work to be performed by the subcontractor.
- Copies of required insurance certificates in accordance with the specifications.
- Minority/ non-minority status.

80-02 Notice to proceed (NTP). The Owners notice to proceed will state the date on which contract time commences. The Contractor is expected to commence project operations within 7 days of the NTP date. The Contractor shall notify the RPR at least 24 hours in advance of the time contract operations begins. The Contractor shall not commence any actual operations prior to the date on which the notice to proceed is issued by the Owner.

80-03 Execution and progress. Unless otherwise specified, the Contractor shall submit their coordinated construction schedule showing all work activities for the RPR's review and acceptance at least 10 days prior to the start of work. The Contractor's progress schedule, once accepted by the RPR, will represent the Contractor's baseline plan to accomplish the project in accordance with the terms and conditions of the Contract. The RPR will compare actual Contractor progress against the baseline schedule to determine that status of the Contractor's performance. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the time set forth in the proposal.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the RPR's request, submit a revised schedule for completion of the work within the contract time and modify their operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the execution of the work be discontinued for any reason, the Contractor shall notify the RPR at least 24 hours in advance of resuming operations.

The Contractor shall not commence any actual construction prior to the date on which the NTP is issued by the Owner.

The project schedule shall be prepared as a network diagram in Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), or other format, or as otherwise specified. It shall include information on the sequence of work activities, milestone dates, and activity duration. The schedule shall show all work items identified in the project proposal for each work area and shall include the project start date and end date.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

80-04 Limitation of operations. The Contractor shall control their operations and the operations of their subcontractors and all suppliers to provide for the free and unobstructed movement of aircraft in the air operations areas (AOA) of the airport.

When the work requires the Contractor to conduct their operations within an AOA of the airport, the work shall be coordinated with airport operations (through the RPR) at least [48 hours] prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the RPR and until the necessary temporary marking, signage and associated lighting is in place as provided in Section 70, paragraph 70-08, *Construction Safety and Phasing Plan (CSPP)*.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA), the Contractor shall maintain constant communications as specified; immediately obey all instructions to vacate the AOA; and immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AOA until satisfactory conditions are provided. The areas of the AOA identified in the Construction Safety Phasing Plan (CSPP) and as listed below, cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows:

1. All runways – No access allowed.
2. All taxiways – No access allowed.

See consultation phasing plan for limits of work.

The Contractor shall be required to conform to safety standards contained in AC 150/5370-2, Operational Safety on Airports During Construction and the approved CSPP.

80-04.1 Operational safety on airport during construction. All Contractors' operations shall be conducted in accordance with the approved project Construction Safety and Phasing Plan (CSPP) and the Safety Plan Compliance Document (SPCD) and the provisions set forth within the current version of AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a SPCD that details how it proposes to comply with the requirements presented within the CSPP.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks to assure compliance with the safety plan measures.

The Contractor is responsible to the Owner for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made aware of the requirements of the CSPP and SPCD and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved CSPP and SPCD unless approved in writing by the Owner. The necessary coordination actions to review Contractor proposed modifications to an approved CSPP or approved SPCD can require a significant amount of time.

80-05 Character of workers, methods, and equipment. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the contract, plans, and specifications.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

Any person employed by the Contractor or by any subcontractor who violates any operational regulations or operational safety requirements and, in the opinion of the RPR, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the RPR, be removed immediately by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the work without approval of the RPR.

Should the Contractor fail to remove such person or persons or fail to furnish suitable and sufficient personnel for the proper execution of the work, the RPR may suspend the work by written notice until compliance with such orders.

All equipment that is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the work shall not cause injury to previously completed work, adjacent property, or existing airport facilities due to its use.

When the methods and equipment to be used by the Contractor in accomplishing the work are not prescribed in the contract, the Contractor is free to use any methods or equipment that will accomplish the work in conformity with the requirements of the contract, plans, and specifications.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless otherwise authorized by the RPR. If the Contractor desires to use a method or type of equipment other than specified in the contract, the Contractor may request authority from the RPR to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the RPR determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality, or take such other corrective action as the RPR may direct. No change will be made in basis of payment for the contract items involved nor in contract time as a result of authorizing a change in methods or equipment under this paragraph.

80-06 Temporary suspension of the work. The Owner shall have the authority to suspend the work wholly, or in part, for such period or periods the Owner may deem necessary, due to unsuitable weather, or other conditions considered unfavorable for the execution of the work, or for such time necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract.

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the

effective date of the written order to suspend work to the effective date of the written order to resume the work. Claims for such compensation shall be filed with the RPR within the time period stated in the RPR's order to resume work. The Contractor shall submit with their own claim information substantiating the amount shown on the claim. The RPR will forward the Contractor's claim to the Owner for consideration in accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather or for any other delay provided for in the contract, plans, or specifications.

If it becomes necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. The Contractor shall take every precaution to prevent damage or deterioration of the work performed and provide for normal drainage of the work. The Contractor shall erect temporary structures where necessary to provide for traffic on, to, or from the airport.

80-07 Determination and extension of contract time. The 270 calendar days shall be stated in the proposal and contract and shall be known as the Contract Time.

If the contract time requires extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

Contract time based on calendar days. Contract Time based on calendar days shall consist of the number of calendar days stated in the contract counting from the effective date of the Notice to Proceed and including all Saturdays, Sundays, holidays, and non-work days. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.

At the time of final payment, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in the contract time shall not consider either cost of work or the extension of contract time that has been covered by a change order or supplemental agreement. Charges against the contract time will cease as of the date of final acceptance.

80-08 Failure to complete on time. For each calendar day or working day, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in paragraph 80-07, *Determination and Extension of Contract Time*) the sum specified in the contract and proposal as liquidated damages (LD) will be deducted from any money due or to become due the Contractor or their own surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in their contract.

| Phase | Liquidated Damages Cost | Allowed Construction Time |
|-------|-------------------------|---------------------------|
| 1 | \$500/ Calendar Day | 270 Calendar Days |

The maximum construction time allowed will be the sum of the time allowed for individual schedules but not more than 270 calendar days. Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a waiver on the part of the Owner of any of its rights under the contract.

80-09 Default and termination of contract. The Contractor shall be considered in default of their contract and such default will be considered as cause for the Owner to terminate the contract for any of the following reasons, if the Contractor:

- a. Fails to begin the work under the contract within the time specified in the Notice to Proceed, or

- b.** Fails to perform the work or fails to provide sufficient workers, equipment and/or materials to assure completion of work in accordance with the terms of the contract, or
- c.** Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or
- d.** Discontinues the execution of the work, or
- e.** Fails to resume work which has been discontinued within a reasonable time after notice to do so, or
- f.** Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or
- g.** Allows any final judgment to stand against the Contractor unsatisfied for a period of 10 days, or
- h.** Makes an assignment for the benefit of creditors, or
- i.** For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Owner consider the Contractor in default of the contract for any reason above, the Owner shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the contract.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the RPR of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the execution of the work out of the hands of the Contractor. The Owner may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the RPR will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the Owner the amount of such excess.

80-10 Termination for national emergencies. The Owner shall terminate the contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to the execution of war or in the interest of national defense.

When the contract, or any portion thereof, is terminated before completion of all items of work in the contract, payment will be made for the actual number of units or items of work completed at the contract price or as mutually agreed for items of work partially completed or not started. No claims or loss of anticipated profits shall be considered.

Reimbursement for organization of the work, and other overhead expenses, (when not otherwise included in the contract) and moving equipment and materials to and from the job will be considered, the intent being that an equitable settlement will be made with the Contractor.

Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor at actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the RPR.

Termination of the contract or a portion thereof shall neither relieve the Contractor of their responsibilities for the completed work nor shall it relieve their surety of its obligation for and concerning any just claim arising out of the work performed.

80-11 Work area, storage area and sequence of operations. The Contractor shall obtain approval from the RPR prior to beginning any work in all areas of the airport. No operating runway, taxiway, or air operations area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate work in accordance with the approved CSPP and SPCD.

END OF SECTION 80

Section 90 Measurement and Payment

90-01 Measurement of quantities. All work completed under the contract will be measured by the RPR, or their authorized representatives, using United States Customary Units of Measurement.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet (0.8 square meters) or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the RPR.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

The term “lump sum” when used as an item of payment will mean complete payment for the work described in the contract. When a complete structure or structural unit (in effect, “lump sum” work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

When requested by the Contractor and approved by the RPR in writing, material specified to be measured by the cubic yard (cubic meter) may be weighed, and such weights will be converted to cubic yards (cubic meters) for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the RPR and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Measurement and Payment Terms

| Term | Description |
|---|---|
| Excavation and Embankment Volume | In computing volumes of excavation, the average end area method will be used unless otherwise specified. |
| Measurement and Proportion by Weight | The term “ton” will mean the short ton consisting of 2,000 pounds (907 kg) avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, independently certified scales by competent, qualified personnel at locations designated by the RPR. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as the RPR directs, and each truck shall bear a plainly legible identification mark. |
| Measurement by Volume | Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable for the materials hauled, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles shall be loaded to at least their water level |

| Term | Description |
|----------------------------|--|
| | capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery. |
| Asphalt Material | Asphalt materials will be measured by the gallon (liter) or ton (kg). When measured by volume, such volumes will be measured at 60°F (16°C) or will be corrected to the volume at 60°F (16°C) using ASTM D1250 for asphalts. Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when asphalt material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work. When asphalt materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, will be used for computing quantities. |
| Cement | Cement will be measured by the ton (kg) or hundredweight (km). |
| Structure | Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions. |
| Timber | Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece. |
| Plates and Sheets | The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inch. |
| Miscellaneous Items | When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted. |
| Scales | <p>Scales must be tested for accuracy and serviced before use. Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.</p> <p>Scales shall be accurate within 0.5% of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the RPR before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed 0.1% of the nominal rated capacity of the scale, but not less than one pound (454 grams). The use of spring balances will not be permitted.</p> <p>In the event inspection reveals the scales have been “overweighing” (indicating more than correct weight) they will be immediately adjusted. All materials</p> |

| Term | Description |
|-------------------------|--|
| | <p>received subsequent to the last previous correct weighting-accuracy test will be reduced by the percentage of error in excess of 0.5%.</p> <p>In the event inspection reveals the scales have been under-weighting (indicating less than correct weight), they shall be immediately adjusted. No additional payment to the Contractor will be allowed for materials previously weighed and recorded.</p> <p>Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the RPR can safely and conveniently view them.</p> <p>Scale installations shall have available ten standard 50-pound (2.3 km) weights for testing the weighing equipment or suitable weights and devices for other approved equipment.</p> <p>All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.</p> |
| Rental Equipment | <p>Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered in connection with extra work will be measured as agreed in the change order or supplemental agreement authorizing such work as provided in paragraph 90-05 <i>Payment for Extra Work</i>.</p> |
| Pay Quantities | <p>When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the RPR. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.</p> |

90-02 Scope of payment. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the execution thereof, subject to the provisions of Section 70, paragraph 70-18, *No Waiver of Legal Rights*.

When the “basis of payment” subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the contract, plans, or specifications.

90-03 Compensation for altered quantities. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in Section 40, paragraph 40-02, *Alteration of Work and Quantities*, will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or

indirectly from their own unbalanced allocation of overhead and profit among the contract items, or from any other cause.

90-04 Payment for omitted items. As specified in Section 40, paragraph 40-03, *Omitted Items*, the RPR shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the Owner.

Should the RPR omit or order nonperformance of a contract item or portion of such item from the work, the Contractor shall accept payment in full at the contract prices for any work actually completed and acceptable prior to the RPR's order to omit or non-perform such contract item.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the RPR's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the RPR's order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

90-05 Payment for extra work. Extra work, performed in accordance with Section 40, paragraph 40-04, *Extra Work*, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work.

90-06 Partial payments. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, prepared by the RPR, of the value of the work performed and materials complete and in place, in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with paragraph 90-07, *Payment for Materials on Hand*. No partial payment will be made when the amount due to the Contractor since the last estimate amounts to less than five hundred dollars.

Option 3: The Owner may hold retainage from prime Contractors and provide for prompt and regular incremental acceptances of portions of the prime contract, pay retainage to prime Contractors based on these acceptances, and require a contract clause obligating the prime Contractor to pay all retainage owed to the subcontractor for satisfactory completion of the accepted work within 30 days after the Owner's payment to the prime Contractor. If Option 3 is selected, the percent withheld may range from 0% to 10% but in no case may it exceed 10%. When establishing a suitable retainage value that protects the Owner's interests, give consideration that the performance and payment bonds also provide similar protection of Owner interests. Owner may elect to incrementally release retainage if owner is satisfied its interest with completion of the project are protected in an adequate manner. If Option 3 is selected, insert the following clause and specify a suitable value where indicated:

From the total of the amount determined to be payable on a partial payment, **10%** percent of such total amount will be deducted and retained by the Owner for protection of the Owner's interests. Unless otherwise instructed by the Owner, the amount retained by the Owner will be in effect until the final payment is made except as follows:

- (1) Contractor may request release of retainage on work that has been partially accepted by the Owner in accordance with Section 50-03. Contractor must provide a certified invoice to the RPR that supports the value of retainage held by the Owner for partially accepted work.

(2) In lieu of retainage, the Contractor may exercise at its option the establishment of an escrow account per paragraph 90-08.

The Contractor is required to pay all subcontractors for satisfactory performance of their contracts no later than 30 days after the Contractor has received a partial payment. Contractor must provide the Owner evidence of prompt and full payment of retainage held by the prime Contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed. A subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the Owner. When the Owner has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.

When at least 95% of the work has been completed to the satisfaction of the RPR, the RPR shall, at the Owner's discretion and with the consent of the surety, prepare estimates of both the contract value and the cost of the remaining work to be done. The Owner may retain an amount not less than twice the contract value or estimated cost, whichever is greater, of the work remaining to be done. The remainder, less all previous payments and deductions, will then be certified for payment to the Contractor.

It is understood and agreed that the Contractor shall not be entitled to demand or receive partial payment based on quantities of work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the RPR to be a part of the final quantity for the item of work in question.

No partial payment shall bind the Owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in paragraph 90-09, *Acceptance and Final Payment*.

The Contractor shall deliver to the Owner a complete release of all claims for labor and material arising out of this contract before the final payment is made. If any subcontractor or supplier fails to furnish such a release in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any potential lien or other such claim. The bond or collateral shall include all costs, expenses, and attorney fees the Owner may be compelled to pay in discharging any such lien or claim.

90-07 Payment for materials on hand. Partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract, plans, and specifications and are delivered to acceptable sites on the airport property or at other sites in the vicinity that are acceptable to the Owner. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

a. The material has been stored or stockpiled in a manner acceptable to the RPR at or on an approved site.

b. The Contractor has furnished the RPR with acceptable evidence of the quantity and quality of such stored or stockpiled materials.

c. The Contractor has furnished the RPR with satisfactory evidence that the material and transportation costs have been paid.

d. The Contractor has furnished the Owner legal title (free of liens or encumbrances of any kind) to the material stored or stockpiled.

e. The Contractor has furnished the Owner evidence that the material stored or stockpiled is insured against loss by damage to or disappearance of such materials at any time prior to use in the work.

It is understood and agreed that the transfer of title and the Owner's payment for such stored or stockpiled materials shall in no way relieve the Contractor of their responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications.

In no case will the amount of partial payments for materials on hand exceed the contract price for such materials or the contract price for the contract item in which the material is intended to be used.

No partial payment will be made for stored or stockpiled living or perishable plant materials.

The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this paragraph.

90-08 Payment of withheld funds. At the Contractor's option, if an Owner withholds retainage in accordance with the methods described in paragraph 90-06 *Partial Payments*, the Contractor may request that the Owner deposit the retainage into an escrow account. The Owner's deposit of retainage into an escrow account is subject to the following conditions:

a. The Contractor shall bear all expenses of establishing and maintaining an escrow account and escrow agreement acceptable to the Owner.

b. The Contractor shall deposit to and maintain in such escrow only those securities or bank certificates of deposit as are acceptable to the Owner and having a value not less than the retainage that would otherwise be withheld from partial payment.

c. The Contractor shall enter into an escrow agreement satisfactory to the Owner.

d. The Contractor shall obtain the written consent of the surety to such agreement.

90-09 Acceptance and final payment. When the contract work has been accepted in accordance with the requirements of Section 50, paragraph 50-15, *Final Acceptance*, the RPR will prepare the final estimate of the items of work actually performed. The Contractor shall approve the RPR's final estimate or advise the RPR of the Contractor's objections to the final estimate which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement. The Contractor and the RPR shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the RPR's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may approve the RPR's estimate under protest of the quantities in dispute, and such disputed quantities shall be considered by the Owner as a claim in accordance with Section 50, paragraph 50-16, *Claims for Adjustment and Disputes*.

After the Contractor has approved, or approved under protest, the RPR's final estimate, and after the RPR's receipt of the project closeout documentation required in paragraph 90-11, *Contractor Final Project Documentation*, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of Section 50, paragraph 50-16, *Claims for Adjustments and Disputes*, or under the provisions of this paragraph, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

90-10 Construction warranty.

a. In addition to any other warranties in this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material,

workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

b. This warranty shall continue for a period of one year from the date of final acceptance of the work, except as noted. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the Owner takes possession. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work.

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Owner real or personal property, when that damage is the result of the Contractor's failure to conform to contract requirements; or any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Owner will notify the Contractor, in writing, within seven (7) days after the discovery of any failure, defect, or damage.

f. If the Contractor fails to remedy any failure, defect, or damage within 14 days after receipt of notice, the Owner shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

g. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice; (2) Require all warranties to be executed, in writing, for the benefit of the Owner, as directed by the Owner, and (3) Enforce all warranties for the benefit of the Owner.

h. This warranty shall not limit the Owner's rights with respect to latent defects, gross mistakes, or fraud.

90-11 Contractor Final Project Documentation. Approval of final payment to the Contractor is contingent upon completion and submittal of the items listed below. The final payment will not be approved until the RPR approves the Contractor's final submittal. The Contractor shall:

a. Provide two (2) copies of all manufacturers warranties specified for materials, equipment, and installations.

b. Provide weekly payroll records (not previously received) from the general Contractor and all subcontractors.

c. Complete final cleanup in accordance with Section 40, paragraph 40-08, *Final Cleanup*.

d. Complete all punch list items identified during the Final Inspection.

e. Provide complete release of all claims for labor and material arising out of the Contract.

f. Provide a certified statement signed by the subcontractors, indicating actual amounts paid to the Disadvantaged Business Enterprise (DBE) subcontractors and/or suppliers associated with the project.

g. When applicable per state requirements, return copies of sales tax completion forms.

h. Manufacturer's certifications for all items incorporated in the work.

i. All required record drawings, as-built drawings or as-constructed drawings.

j. Project Operation and Maintenance (O&M) Manual(s).

k. Security for Construction Warranty.

l. Equipment commissioning documentation submitted, if required.

END OF SECTION 90

TECHNICAL SPECIFICATIONS

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-901 shall 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 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. 10% of 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 / General Conditions – 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 requirements of the notes and details in the Plans. Barricades supplied to the Owner (if required 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 powered light, or equal.

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. (NOT USED)

106-2.3-1.1 L-893, Raised-Lighted "X" Runway Closure Markers. 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 activity, 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 Maintenance & 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

DESCRIPTION

108-1.1 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.

MATERIALS

108-2.1 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 always be the Contractor's responsibility to maintain these stakes in their proper location and position.

Record drawing deliverables shall meet the requirements of the Sections 108-4.1 and 108-4.2 as applicable to the project.

CONSTRUCTION DETAILS

108-3.1 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.

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 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.

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.

AS-BUILT DRAWINGS

108-4.1. 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.

108-4.2. 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.

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.

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) 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.

METHOD OF MEASUREMENT

108-7.1 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.

BASIS OF PAYMENT

108-8.1 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-108-8.1 - PROJECT SURVEY, STAKEOUT - per lump sum

Item C-108-8.2 – AS-BUILT DRAWINGS - per lump sum

END ITEM C-108

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. When burning of material is permitted, it shall be burned under the constant overseeing of a watchman to assure the surrounding vegetation and other adjacent property is not jeopardized. Burning shall be done in accordance with all applicable Federal, state and local laws, ordinances, and regulations. The Contractor shall notify the agency having jurisdiction and obtain all approvals in writing before starting any burning operations. 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 and Grubbing (Miscellaneous Demolition) - 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 m³) 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 $\pm 2\%$ 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 subplot. 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 recompact 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 $\pm 2\%$ 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 recompact.

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 recompact.

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

Item P-152-4.2 - Embankment In Place - per cubic yard

TESTING REQUIREMENTS

ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))

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/ft³ (2700 kN-m/m³))

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 403.0 | |
| LBR 352.5 | |
| 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 P-160-6.1 - 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 requirements), 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 – 6-Inch Rock Base Course – per square yard

END OF ITEM P-200

ITEM P-409 SUPERPAVE ASPHALT CONCRETE

DESCRIPTION

409-1.1 GENERAL. This work shall consist of constructing Superpave asphalt concrete pavement courses 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.

MATERIALS, MIX DESIGN, EQUIPMENT, CONSTRUCTION METHODS, QUALITY CONTROL & MATERIAL ACCEPTANCE

409-2.1 Materials, mix design, equipment, construction methods, quality control and material acceptance shall conform to the requirements included in the above referenced specification sections and within the Plans. The Superpave Asphalt mix shall be **Type SP-12.5, Fine Mix, Traffic Level B**, unless otherwise approved by the Engineer.

METHOD OF MEASUREMENT

409-3.1 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.

BASIS OF PAYMENT

409-4.1 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 - FDOT SP-12.5 Bituminous Surface Course – per ton

END OF ITEM P-409

ITEM P-602: BITUMINOUS PRIME COAT

1.0 DESCRIPTION

1.1 This item shall consist of an application of bituminous material on the prepared base course in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

2.0 MATERIALS

2.1 Bituminous Material. The bituminous material shall be an emulsified asphalt indicated in ASTM D3628 as a bituminous application for prime coat appropriate to local conditions or as designated by the Engineer.

3.0 CONSTRUCTION METHODS

3.1 Weather Limitations. The prime coat shall be applied only when the existing surface is dry; the atmospheric temperature is 50°F (10°C) or above, and the temperature has not been below 35°F (2°C) for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the Engineer.

3.2 Equipment. The equipment shall include a self-powered pressure bituminous material distributor and equipment for heating bituminous material.

Provide a distributor with pneumatic tires of such size and number that the load produced on the base surface does not exceed 65.0 psi (4.5 kg/sq cm) of tire width to prevent rutting, shoving or otherwise damaging the base, surface or other layers in the pavement structure. Design and equip the distributor to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard (0.23 to 9.05 L/square meter), with a pressure range of 25 to 75 psi (172.4 to 517.1 kPa) and with an allowable variation from the specified rate of not more than $\pm 5\%$, and at variable widths. Include with the distributor equipment a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. Equip the distributor to circulate and agitate the bituminous material during the heating process. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper. The Contractor shall remove blotting sand prior to asphalt concrete lay down operations at no additional expense to the Owner.

A power broom and power blower suitable for cleaning the surfaces to which the bituminous coat is to be applied shall be provided.

3.3 Application of Bituminous Material. Immediately before applying the prime coat, the full width of the surface to be primed shall be swept with a power broom to remove all loose dirt and other objectionable material.

The bituminous material shall be uniformly applied with a bituminous distributor at the rate of 0.15 to 0.30 gallons per square yard (0.68 to 1.36 liters per square meter) depending on the base course surface texture. The type of bituminous material and application rate shall be approved by the Engineer prior to application.

Following application of the bituminous material and prior to application of the succeeding layer of pavement, allow the bituminous coat to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread enough sand to effectively blot up and cure excess bituminous material. Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

3.4 Trial Applications. Before providing the complete bituminous coat, the Contractor shall apply three lengths of at least 100 feet (30 m) for the full width of the distributor bar to evaluate the amount of bituminous material that can be satisfactorily applied with the equipment. Apply three different trial application rates of bituminous materials within the application range specified in paragraph 602-3.3. Other trial applications will be made using various amounts of material as deemed necessary by the Engineer.

3.5 Bituminous Material Contractor's Responsibility. The Contractor shall provide a statement of source and character of the proposed bituminous material which must be submitted to and approved by the Engineer before any shipment of bituminous materials to the project. The Contractor shall furnish vendor's certified test reports for each carload, or equivalent, of bituminous material shipped to the project. The test reports shall be provided to and approved by the Engineer before the bituminous material is applied. If the bituminous material does not meet the specifications, it shall be replaced at the Contractor's expense. Furnishing the vendor's certified test report for the bituminous material shall not be interpreted as basis for final acceptance.

3.6 Freight and Weigh Bills. The Contractor shall submit waybills and delivery tickets during the progress of the work. Before the final estimate is allowed, file with the Engineer certified waybills and certified delivery tickets for all bituminous materials used in the construction of the pavement covered by the contract. Do not remove bituminous material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

4.0 METHOD OF MEASUREMENT

4.1 The bituminous material for prime coat shall be measured by the gallon (liter). Volume shall be corrected to the volume at 60°F (16°C) in accordance with ASTM D1250. The bituminous material paid for will be the measured quantities used in the accepted work, provided that the measured quantities are not 10% over the specified application rate. Any amount of bituminous material more than 10% over the specified application rate for each application will be deducted from the measured quantities, except for irregular areas where hand spraying of the bituminous material is necessary. Water added to emulsified asphalt will not be measured for payment.

5.0 BASIS OF PAYMENT

5.1 Payment shall be made at the contract unit price per gallon (liter) for bituminous prime coat. This price shall be full compensation for furnishing all materials and for all preparation, delivering, and applying the materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item P-602-5.1 - Bituminous Prime Coat - per gallon.

TESTING REQUIREMENTS

ASTM D1250 Standard Guide for Use of the Petroleum Measurement Tables

MATERIAL REQUIREMENTS

ASTM D977 Standard Specification for Emulsified Asphalt

ASTM D2028 Standard Specification for Cutback Asphalt (Rapid-Curing Type)

ASTM D2397 Standard Specification for Cationic Emulsified Asphalt

ASTM D3628 Standard Practice for Selection and Use of Emulsified Asphalts

END OF ITEM P-602

ITEM P-610: STRUCTURAL PORTLAND CEMENT CONCRETE

DESCRIPTION

610-1.1 This item shall consist of plain and/or reinforced structural portland cement concrete, prepared and constructed in accordance with these specifications, at the locations and of the form and dimensions shown on the plans.

MATERIALS

610-2.1 GENERAL. The Contractor shall submit cement concrete mixture and materials data documentation and certifications to the Engineer and receive written approval for use prior to implementing any concrete mix design or incorporating the material into the work. The same requirement shall apply for materials other than cement concrete covered under this Item.

Only approved materials, conforming to the requirements of these specifications, shall be used in the work. They may be subjected to inspection and tests at any time during the progress of their preparation or use. The source of supply of each of the materials shall be approved by the Engineer before delivery or use is started. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be stored and handled to insure the preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed therein.

In no case shall the use of pit run or naturally mixed aggregates be permitted. Naturally mixed aggregate shall be screened and washed, and all fine and coarse aggregates shall be stored separately and kept clean. The mixing of different kinds of aggregates from different sources in one storage pile or alternating batches of different aggregates will not be permitted.

a. Reactivity. Aggregates shall be tested for deleterious reactivity with alkalis in the cement, which may cause excessive expansion of the concrete. Separate tests of coarse and fine aggregate shall be made in accordance with ASTM C 1260. If the expansion of coarse or fine aggregate test specimens, tested in accordance with ASTM C 1260, does not exceed 0.10 % at 28 days (30 days from casting), the coarse or fine aggregates shall be accepted.

If the expansion of any aggregate, coarse or fine, at 28 days is greater than 0.10%, tests of combined materials shall be made in accordance with ASTM C 1567 using the aggregates, cementitious materials, and/or specific reactivity reducing chemicals in the proportions proposed for the mixture design. If the expansion of the proposed combined materials test specimens, tested in accordance with ASTM C 1567, does not exceed 0.10 % at 28 days, the proposed combined materials will be accepted. If the expansion of the proposed combined materials test specimens is greater than 0.10% at 28 days, the aggregates will not be accepted unless adjustments to the combined materials mixture can reduce the expansion to less than 0.10 % at 28 days, or new aggregates shall be evaluated and tested.

610-2.2 COARSE AGGREGATE. The coarse aggregate for concrete shall meet the requirements of ASTM C 33. Crushed stone aggregate shall have a durability factor, as determined by ASTM C 666, greater than or equal to 95. The Engineer may consider and reserve final approval of other State classification procedures addressing aggregate durability.

Coarse aggregate shall be well graded from coarse to fine and shall meet one of the gradations shown in Table 1, using ASTM C 136.

610-2.3 FINE AGGREGATE. The fine aggregate for concrete shall meet the requirements of ASTM C 33.

The fine aggregate shall be well graded from fine to coarse and shall meet the requirements of Table 2 when tested in accordance with ASTM C 136:

TABLE 1. GRADATION FOR COARSE AGGREGATE

| Sieve Designation (square openings) | Percentage by Weight Passing Sieves | | | | | | | |
|-------------------------------------|-------------------------------------|--------|----|------|------|--------|-------|-----------|
| | 2" | 1-1/2" | 1" | 3/4" | 1/2" | 3/8" | No.4 | |
| No. 4 to 3/4 in. (4.75 19.0 mm) | | | | | | | | |
| 100 | | | | | | | | |
| 90-100 | | | | | | | | |
| 20-55 | | | | | | | | |
| 0-10 | | | | | | | | |
| No. 4 to 1 in. (4.75 25.0 mm) | | | | | 100 | 90-100 | 25-60 | 0-10 |
| No. 4 to 1 1/2 in. (4.75 38.1 mm) | | | | | 100 | 95-100 | 35-70 | 10-30 0-5 |

TABLE 2. GRADATION FOR FINE AGGREGATE

| Sieve Designation (square openings) Passing Sieves | Percentage by Weight |
|--|----------------------|
| 3/8 inch (9.5 mm) | |
| No. 4 (4.75 mm) | |
| No. 16 (1.18 mm) | |
| No. 30 (0.60 mm) | |
| No. 50 (0.30 mm) | |
| No. 100 (0.15 mm) | |
| 100 | |
| 95-100 | |
| 45-80 | |
| 25-55 | |
| 10-30 | |
| 2-10 | |

Blending will be permitted, if necessary, in order to meet the gradation requirements for fine aggregate. Fine aggregate deficient in the percentage of material passing the No. 50 mesh sieve may be accepted, provided that such deficiency does not exceed 5% and is remedied by the addition of pozzolanic or cementitious materials other than portland cement, as specified in 610 2.6 on admixtures, in sufficient quantity to produce the required workability as approved by the Engineer.

610-2.4 CEMENT. Cement shall conform to the requirements of ASTM C 150 Type I or II, unless otherwise specified in the Contract/Plans or requested by the Engineer.

The Contractor shall furnish vendors' certified test reports for each carload, or equivalent, of cement shipped to the project. The report shall be delivered to the Engineer before permission to use the cement is granted. All such test reports shall be subject to verification by testing sample materials received for use on the project.

610-2.5 WATER. The water used in concrete shall be free from sewage, oil, acid, strong alkalis, vegetable matter, and clay and loam. If the water is of questionable quality, it shall be tested in accordance with AASHTO T 26.

610-2.6 ADMIXTURES. The use of any material added to the concrete mix shall be approved by the Engineer. Before approval of any material, the Contractor shall be required to submit the results of complete physical and chemical analyses made by an acceptable testing laboratory. Subsequent tests shall be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

Pozzolanic admixtures shall be fly ash or raw or calcined natural pozzolons meeting the requirements of ASTM C 618.

Air entraining admixtures shall meet the requirements of ASTM C 260. Air entraining admixtures shall be added at the mixer in the amount necessary to produce the specified air content.

Water reducing, set controlling admixtures shall meet the requirements of ASTM C 494, Type A, water reducing or Type D, water reducing and retarding. Water reducing admixtures shall be added at the mixer separately from air entraining admixtures in accordance with the manufacturer's printed instructions.

610-2.7 PREMOLDED JOINT MATERIAL. Premolded joint material for expansion joints shall meet the requirements of either ASTM D 1751 or ASTM D 1752 as applicable to Contract requirements, as shown in the Plans, or as requested by the Engineer.

610 2.8 JOINT FILLER. The filler for joints shall meet the requirements of Item P 605, unless otherwise specified in the proposal.

610-2.9 STEEL REINFORCEMENT. Reinforcing shall consist of that which is shown in the Plans or otherwise required by the Contract and conforming to the requirements of the below table.

| | |
|------------------------------|---------------------|
| Welded Steel Wire Fabric | ASTM A 185 |
| Welded Deformed Steel Fabric | ASTM A 497 |
| Bar Mats | ASTM A 184 or A 704 |

610 2.10 COVER MATERIALS FOR CURING. Curing materials shall conform to one of the following specifications:

| | |
|---|--------------------|
| Waterproof paper for curing concrete | ASTM C 171 |
| Polyethylene Sheeting for Curing Concrete | ASTM C 171 |
| Liquid Membrane-Forming Compounds for Curing Concrete | ASTM C 309, Type 2 |

CONSTRUCTION METHODS

610-3.1 GENERAL. The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified herein. All machinery

and equipment owned or controlled by the Contractor, which he proposes to use on the work, shall be of sufficient size to meet the requirements of the work, and shall be such as to produce satisfactory work; all work shall be subject to the inspection and approval of the Engineer.

610-3.2 CONCRETE COMPOSITION. The concrete shall develop a compressive strength of 4000 psi in 28 days as determined by test cylinders made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The concrete shall contain not less than 470 pounds of cement per cubic yard (280 kg per cubic meter). The concrete shall contain 5 percent of entrained air, plus or minus 1 percent, as determined by ASTM C 231 and shall have a slump of not more than 4 inches (10 cm) as determined by ASTM C 143.

610 3.3 ACCEPTANCE SAMPLING AND TESTING. Concrete for each structure will be accepted on the basis of the compressive strength specified in paragraph 3.2. The concrete shall be sampled in accordance with ASTM C 172. Compressive strength specimens shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39.

Concrete cylindrical test specimens shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The Contractor shall cure and store the test specimens under such conditions as directed. The Engineer will make the actual tests on the specimens at no expense to the Contractor.

Frequency of testing shall be agreed upon at least seven days prior to incorporating the concrete into the work. The Contractor shall notify the Engineer of the upcoming work if an acceptance sampling and testing plan is not already in place. Acceptance sampling and testing shall be coordinated with Quality Control sampling and testing.

610 3.3.1 QUALITY CONTROL SAMPLING AND TESTING. The Contractor shall sample and test the concrete in accordance with an approved Quality Control Plan meeting the requirements of General Provision 100. All costs associated with Quality Control sampling and testing shall be borne by the Contractor.

610-3.4 PROPORTIONING AND MEASURING DEVICES. When package cement is used, the quantity for each batch shall be equal to one or more whole sacks of cement. The aggregates shall be measured separately by weight. If aggregates are delivered to the mixer in batch trucks, the exact amount for each mixer charge shall be contained in each batch compartment. Weighing boxes or hoppers shall be approved by the Engineer and shall provide means of regulating the flow of aggregates into the batch box so that the required and exact weight of aggregates can be readily obtained.

610-3.5 CONSISTENCY. The consistency of the concrete shall be checked by the slump test specified in ASTM C 143.

610-3.6 MIXING. Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C 94.

610-3.7 MIXING CONDITIONS. The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F (4°C) without permission of the Engineer. If permission is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F (10°C) nor more than 100°F (38°C). The Contractor shall be held responsible for any defective work, resulting

from freezing or injury in any manner during placing and curing, and shall replace such work at his/her expense.

Retempering of concrete by adding water or any other material shall not be permitted.

The delivery of concrete to the job shall be in such a manner that batches of concrete will be deposited at uninterrupted intervals.

610-3.8 FORMS. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the Engineer. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as designed on the plans. The forms shall be true to line and grade and shall be mortar tight and sufficiently rigid to prevent displacement and sagging between supports. The Contractor shall bear responsibility for their adequacy. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes.

The internal ties shall be arranged so that, when the forms are removed, no metal will show in the concrete surface or discolor the surface when exposed to weathering. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied shortly before the concrete is placed. Forms shall be constructed so that they can be removed without injuring the concrete or concrete surface. The forms shall not be removed before the expiration of at least 30 hours from vertical faces, walls, slender columns, and similar structures; forms supported by falsework under slabs, beams, girders, arches, and similar construction shall not be removed until tests indicate that at least 60% of the design strength of the concrete has developed.

610-3.9 PLACING REINFORCEMENT. All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concreting. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

610-3.10 EMBEDDED ITEMS. Before placing concrete, any items that are to be embedded shall be firmly and securely fastened in place as indicated. All such items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The embedding of wood shall be avoided. The concrete shall be spaded and consolidated around and against embedded items.

610-3.11 PLACING CONCRETE. All concrete shall be placed during daylight, unless otherwise approved. The concrete shall not be placed until the depth and character of foundation, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved. Concrete shall be placed as soon as practical after mixing and in no case later than 1 hour after water has been added to the mix. The method and manner of placing shall be such to avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. Dropping the concrete a distance of more than 5 feet (1.5 m), or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated soil.

The concrete shall be compacted with suitable mechanical vibrators operating within the concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate compaction. Vibrators shall be manipulated so as to work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish compaction but shall not be prolonged to the point where segregation occurs. Concrete deposited under water shall be carefully placed in a compact mass in its

final position by means of a tremie, a closed bottom dump bucket, or other approved method and shall not be disturbed after being deposited.

610-3.12 CONSTRUCTION JOINTS. When the placing of concrete is suspended, necessary provisions shall be made for joining future work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, reinforcing bars or other devices as may be prescribed. The work shall be arranged so that a section begun on any day shall be finished during daylight of the same day. Before depositing new concrete on or against concrete that has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste or grout.

610-3.13 EXPANSION JOINTS. Expansion joints shall be constructed at such points and of such dimensions as may be indicated on the drawings. The premolded filler shall be cut to the same shape as that of the surfaces being joined. The filler shall be fixed firmly against the surface of the concrete already in place in such manner that it will not be displaced when concrete is deposited against it.

610-3.14 DEFECTIVE WORK. Any defective work discovered after the forms have been removed shall be immediately removed and replaced. If any dimensions are deficient, or if the surface of the concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be repaired satisfactorily, the entire section shall be removed and replaced at the expense of the Contractor.

610-3.15 SURFACE FINISH. All exposed concrete surfaces shall be true, smooth, and free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck off with a straightedge and floated. Mortar finishing shall not be permitted, nor shall dry cement or sand cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

When directed, the surface finish of exposed concrete shall be a rubbed finish. If forms can be removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed with a wooden float until all irregularities are removed. If the concrete has hardened before being rubbed, a carborundum stone shall be used to finish the surface. When approved, the finishing can be done with a rubbing machine.

610-3.16 CURING AND PROTECTION. All concrete shall be properly cured and protected by the Contractor. The work shall be protected from the elements, flowing water, and from defacement of any nature during the building operations. The concrete shall be cured as soon as it has sufficiently hardened by covering with an approved material. Water absorptive coverings shall be thoroughly saturated when placed and kept saturated for a period of at least 3 days. All curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to currents of air. Where wooden forms are used, they shall be kept wet at all times until removed to prevent the opening of joints and drying out of the concrete. Traffic shall not be allowed on concrete surfaces for 7 days after the concrete has been placed.

610-3.17 DRAINS OR DUCTS. Drainage pipes, conduits, and ducts that are to be encased in concrete shall be installed by the Contractor before the concrete is placed. The pipe shall be held rigidly so that it will not be displaced or moved during the placing of the concrete.

610-3.18 COLD WEATHER PROTECTION. When concrete is placed at temperatures below 40°F (4°C), the Contractor shall provide satisfactory methods and means to protect the mix from injury by freezing. The aggregates, or water, or both, shall be heated in order to place the concrete at temperatures between 50°F and 100°F (10°C and 38°C).

Calcium chloride may be incorporated in the mixing water when directed by the Engineer. Not more than 2 pounds (908 grams) of Type 1 nor more than 1.6 pounds (726 grams) of Type 2 shall be added per bag of cement. After the concrete has been placed, the Contractor shall provide sufficient protection such as cover, canvas, framework, heating apparatus, etc., to enclose and protect the structure and maintain the temperature of the mix at not less than 50°F (10°C) until at least 60% of the designed strength has been attained.

610-3.19 FILLING JOINTS. All joints that require filling shall be thoroughly cleaned, and any excess mortar or concrete shall be cut out with proper tools. Joint filling shall not be started until after final curing and shall be done only when the concrete is completely dry. The cleaning and filling shall be carefully done with proper equipment and in a manner to obtain a neat looking joint free from excess filler.

METHOD OF MEASUREMENT

610-4.1 No measurement will be made for direct payment of structural concrete, as the cost of furnishing and installing shall be considered incidental to the work covered under other Pay Items. Portland cement concrete shall be measured by the number of cubic yards (cubic meters) of concrete complete in place and accepted. In computing the yardage of concrete for payment, the dimensions used shall be those shown on the plans or ordered by the Engineer. No measurements or other allowances shall be made for forms, falsework, cofferdams, pumping, bracing, expansion joints, or finishing of the concrete. No deductions in yardage shall be made for the volumes of reinforcing steel or embedded items.

610-4.2 Reinforcing steel shall be measured by the calculated theoretical number of pounds (kg) placed, as shown on the plans, complete in place and accepted. The unit weight used for deformed bars shall be the weight of plain square or round bars of equal nominal size. If so indicated on the plans, the poundage to be paid for shall include the weight of metal pipes and drains, metal conduits and ducts, or similar materials indicated and included.

BASIS OF PAYMENT

610-5.1 Payment shall be made at the contract unit price per cubic yard (cubic meter) for structural portland cement concrete and per pound (kg) for reinforcing steel. These prices shall be full compensation for furnishing all materials and for all preparation, delivery and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item. No Payment will be made separately or directly for this item on any part of the work, unless otherwise listed in the various pay items. All structural concrete will be considered a necessary and incidental part of the work and its cost shall be considered by the Contractor and included in the contract price for the pay items of work involved.

Payment will be made under:

Item P 610 5.1 Structural Portland Cement Concrete – per cubic yard (cubic meter)

Item P 610 5.1 Steel Reinforcement – per pound (kg)

TESTING REQUIREMENTS

ASTM C 31 Making and Curing Test Specimens in the Field

- ASTM C 39 Compressive Strength of Cylindrical Concrete Specimens
- ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates
- ASTM C 138 Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- ASTM C 143 Slump of Hydraulic Cement Concrete
- ASTM C 231 Air Content of Freshly Mixed Concrete by the Pressure Method
- ASTM C 666 Resistance of Concrete to Rapid Freezing and Thawing
- ASTM C 1077 Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
- ASTM C 1260 Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

MATERIAL REQUIREMENTS

- ASTM A 184 Specification for Fabricated Deformed Steel Bar or Rod Mats for Concrete Reinforcement
- ASTM A 185 Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
- ASTM A 497 Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
- ASTM A 615 Deformed and Plain Billet Steel Bars for Concrete Reinforcement
- ASTM A 704 Welded Steel Plain Bars or Rod Mats for Concrete Reinforcement
- ASTM C 33 Concrete Aggregates
- ASTM C 94 Ready Mixed Concrete
- ASTM C 150 Portland Cement
- ASTM C 171 Sheet Materials for Curing Concrete
- ASTM C 172 Sampling Freshly Mixed Concrete
- ASTM C 260 Air Entraining Admixtures for Concrete
- ASTM C 309 Liquid Membrane Forming Compounds for Curing Concrete
- ASTM C 494 Chemical Admixtures for Concrete
- ASTM C 595 Blended Hydraulic Cements
- ASTM C 618 Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete

ASTM D 1751 Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

ASTM D 1752 Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

AASHTO T 26 Quality of Water to be Used in Concrete

END OF ITEM P-610

ITEM P-620: RUNWAY AND TAXIWAY PAINTING

DESCRIPTION

620-1.1 This item shall consist of the painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer.

MATERIALS

620-2.1 MATERIALS ACCEPTANCE. Material data documentation and certifications shall be submitted to the Engineer and approved in writing prior to delivering materials to the site for installation. The Contractor shall furnish manufacturer's certified test reports for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. The reports can be used for material acceptance or the Engineer may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers for inspection by the Engineer. Material shall not be loaded into the equipment until inspected by the Engineer.

620-2.2 PAINT. Paint shall be Waterborne in accordance with the requirements of paragraph 620-2.2.a. Paint, as required by the Contract, shall be furnished in White – 37925, Yellow – 33538 or 33655, Black – 37038, and Red – 31136, in accordance with Federal Standard No. 595.

a. WATERBORNE. Paint shall meet the requirements of Federal Specification TT-P-1952E, Type III. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis. The acrylic resin shall be 100% cross linking acrylic as evidenced by infrared peaks at wavelengths 1568, 1624, and 1672 cm-1 with intensities equal to those produced by an acrylic resin known to be 100% cross linking.

b. EPOXY. Paint shall be a two component, minimum 99 percent solids type system conforming to the following:

(1) **Pigments.** Component A. Percent by weight.

(a) White: Titanium Dioxide, ASTM D 476, type II shall be 18 percent minimum (16.5 percent minimum at 100 percent purity).

(b) Yellow and Colors: Titanium Dioxide, ASTM D 476, type II shall be 14 to 17 percent. Organic yellow, other colors, and tinting as required to meet color standard.

(2) **Epoxy Content.** Component A. The weight per epoxy equivalent, when tested in accordance with ASTM D 1652 shall be the manufacturer's target plus or minus 50.

(3) **Amine Number.** Component B. When tested in accordance with ASTM D 2074 shall be the manufacturer's target plus or minus 50.

(4) **Prohibited Materials.** The manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, halogenated solvents, nor any carcinogen as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.

(5) Daylight Directional Reflectance.

(a) White: The daylight directional reflectance of the white paint shall not be less than 75 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN, Method 6121.

(b) Yellow: The daylight directional reflectance of the yellow paint shall not be less than 38 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN. The x and y values shall be consistent with the Federal Hegman yellow color standard chart for traffic yellow standard 33538, or shall be consistent with the tolerance listed below:

x .462 x .470 x .479 x .501
y .438 y .455 y .428 y .452

(6) Accelerated Weathering.

(a) Sample Preparation. Apply the paint at a wet film thickness of 0.013 inch (0.33 mm) to four 3 by 6 inch (8 by 15 cm) aluminum panels prepared as described in Federal Test Method Standard No. 141D/GEN, Method 2013. Air dry the sample 48 hours under standard conditions.

(b) Testing Conditions. Test in accordance with ASTM G 15453 using both Ultra Violet (UV-B) Light and condensate exposure, 72 hours total, alternating 4 hour UV exposure at 60 degree C, and 4 hours condensate exposure at 40 degrees

(c) Evaluation. Remove the samples and condition for 24 hours under standard conditions. Determine the directional reflectance and color match using the procedures in paragraph 620-2.2b(5) above. Evaluate for conformance with the color requirements.

(7) Volatile Organic Content. Determine the volatile organic content in accordance with 40 CFR Part 60 Appendix A, Method 24.

(8) Dry Opacity. Use Procedure B, Method B of Method 4121 of Federal Test Method Standard No. 141D/GEN. The wet film thickness shall be 0.015 inch (0.12 mm). The minimum opacity for white and colors shall be 0.92.

(9) Abrasion Resistance. Subject the panels prepared in paragraph 620-2.2b(6) to the abrasion test in accordance with ASTM D 968, Method A, except that the inside diameter of the metal guide tube shall be from 0.747 to 0.750 inch (18.97 to 19.05 mm). Five liters of unused sand shall be used for each test panel. The test shall be run on two test panels. [Note: five liters of sand weighs 17.5 lb. (7.94 kg).] Both baked and weathered paint films shall require not less than 150 liters of sand for the removal of the paint films.
(10) Hardness, Shore. Hardness shall be at least 80 when tested in accordance with ASTM D 2240.

c. METHACRYLATE. Paint shall be a two component, minimum 99 percent solids-type system conforming to the following:

(1) Pigments. Component A. Percent by weight.

(a) White:

Titanium Dioxide, ASTM D 476, type II shall be 6 percent minimum.
Methacrylate resin shall be 18 percent minimum.

(b) Yellow and Colors:

Titanium Dioxide, ASTM D 476, type II shall be 6 percent minimum.
Organic yellow, other colors, and tinting as required to meet color standard.
Methacrylate resin shall be 18 percent minimum.

(2) Prohibited Materials. The manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, halogenated solvents, nor any carcinogen as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.

(3) Daylight Directional Reflectance:

(a) White: The daylight directional reflectance of the white paint shall not be less than 75 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN, Method 6121.

(b) Yellow: The daylight directional reflectance of the yellow paint shall not be less than 45 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN. The x and y values shall be consistent with the Federal Hegman yellow color standard chart for traffic yellow standard 33538, or shall be consistent with the tolerance listed below:

| | | | |
|--------|--------|--------|--------|
| x .462 | x .470 | x .479 | x .501 |
| y .438 | y .455 | y .428 | y .452 |

(4) Accelerated Weathering.

(a) Sample Preparation. Apply the paint at a wet film thickness of 0.013 inch (0.33 mm) to four 3 by 6 inch (8 by 15 cm) aluminum panels prepared as described in Method 2013 of Federal Test Method Standard No. 141D/GEN. Air dry the sample 48 hours under standard conditions.

(b) Testing Conditions. Test in accordance with ASTM G 53 154 using both Ultra Violet (UV-B) Light and condensate exposure, 72 hours total, alternating 4 hour UV exposure at 60 degree C, and 4 hours condensate exposure at 40 degrees.

(c) Evaluation. Remove the samples and condition for 24 hours under standard conditions. Determine the directional reflectance and color match using the procedures in paragraph 620-2.2c(3) above. Evaluate for conformance with the color requirements.

(5) Volatile Organic Content. Determine the volatile organic content in accordance with 40 CFR Part 60 Appendix A, Method 24.

(6) Dry Opacity. Use Procedure B, Method B of Method 4121 of Federal Test Method Standard No. 141D/GEN. The wet film thickness shall be 0.015 inch (0.12 mm). The minimum opacity for white and colors shall be 0.92.

(7) Abrasion Resistance. Subject the panels prepared in paragraph 620-2.2c(4) to the abrasion test in accordance with ASTM D 968, Method A, except that the inside diameter of the metal guide tube shall be from 0.747 to 0.750 inch (18.97 to 19.05 mm). Five liters of unused sand shall be used for each test panel. The test shall be run on two test panels. [Note: 5 liters of sand weighs 17.5 lb. (7.94 kg).] Both baked and weathered paint films shall require not less than 150 liters of sand for the removal of the paint films.

(8) Hardness, Shore. Hardness shall be at least 80 when tested in accordance with ASTM D 2240.

d. SOLVENT-BASE. Paint shall meet the requirements of Federal Specification [A-A-2886A Type I or Type II].

e. PREFORMED THERMOPLASTIC AIRPORT PAVEMENT MARKINGS. Markings must be composed of ester modified resins in conjunction with aggregates, pigments, and binders that have been factory produced as a finished product. The material must be impervious to degradation by aviation fuels, motor fuels, and lubricants.

(1) The markings must be able to be applied in temperatures down to 35°F without any special storage, preheating, or treatment of the material before application.

(2) Graded Glass Beads.

(a) The material must contain a minimum of thirty percent (30%) intermixed graded glass beads by weight. The intermixed beads shall conform to [Federal Specification. TT B 1325D, Type I, gradation A] [Federal Specification. TT B 1325D, Type IV].

(b) The material must have factory applied coated surface beads in addition to the intermixed beads at a rate of 1 lb. (\pm 10%) per 10 sq. ft. These factory applied coated surface beads shall have a minimum of 90% true spheres, minimum refractive index of 1.50, and meet the following gradation.

| Size Gradation | Retained, % |
|----------------|----------------------|
| Passing, % | |
| US Mesh | μm |
| 12 1700 | 0 - 2% 98 - 100% |
| 14 1400 | 0 - 3.5% 96.5 - 100% |
| 16 1180 | 2 - 25% 75 - 98% |
| 18 1000 | 28 - 63% 37 - 72% |
| 20 850 | 63 - 72% 28 - 37% |
| 30 600 | 67 - 77% 23 - 33% |
| 50 300 | 89 - 95% 5 - 11% |
| 80 200 | 97 - 100% 0 - 3% |

(3) Heating Indicators. The top surface of the material (same side as the factory applied surface beads) shall have regularly spaced indents. These indents shall act as a visual cue during application that the material has reached a molten state so satisfactory adhesion and proper bead embedment has been achieved and a post-application visual cue that the installation procedures have been followed.

(4) Pigments. Percent by weight.

(a) White:

Titanium Dioxide, ASTM D 476, type II shall be 10 percent minimum.

(b) Yellow and Colors:

Titanium Dioxide, ASTM D 476, type II shall be 1 percent minimum.
Organic yellow, other colors, and tinting as required to meet color standard.

(5) Prohibited Materials. The manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, halogenated solvents, nor any carcinogen as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.

(6) Daylight Directional Reflectance.

(a) White: The daylight directional reflectance of the white paint shall not be less than 75 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN, Method 6121.

(b) Yellow: The daylight directional reflectance of the yellow paint shall not be less than 45 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN. The x and y values shall be consistent with the Federal Hegman yellow color standard chart for traffic yellow standard 33538, or shall be consistent with the tolerance listed below:

| | | | |
|--------|--------|--------|--------|
| x .462 | x .470 | x .479 | x .501 |
| y .438 | y .455 | y .428 | y .452 |

(7) Skid Resistance. The surface, with properly applied and embedded surface beads, must provide a minimum resistance value of 45 BPN when tested according to ASTM E303.

(8) Thickness. The material must be supplied at a nominal thickness of 65 mils (1.7 mm).

(9) Environmental Resistance. The material must be resistant to deterioration due to exposure to sunlight, water, salt, or adverse weather conditions and impervious to aviation fuels, gasoline, and oil.

(10) Retroreflectivity. The material, when applied in accordance with manufacturer's guidelines, must demonstrate a uniform level of nighttime retroreflection when tested in accordance to ASTM E1710.

(11) Packaging. A protective film around the box must be applied in order to protect the material from rain or premature aging.

(12) Manufacturing Control and ISO Certification. The manufacturer must be ISO 9001:2000 certified and provide proof of current certification. The scope of the certification shall include manufacture of reflective markings.

a. The markings must be a resilient thermoplastic product with uniformly distributed glass beads throughout the entire cross-sectional area. The markings must be resistant to the detrimental effects of aviation fuels, motor fuels and lubricants, hydraulic fluids, de-icers, anti-icers, protective coatings, etc. Lines, legends, and symbols must be capable of being affixed to bituminous and/or Portland cement concrete pavements by the use of a large radiant heater. Colors shall be available as required.

b. The markings must be capable of conforming to pavement contours, breaks, and faults through the action of airport traffic at normal pavement temperatures. The markings must be capable of fully conforming to grooved pavements, including pavement grooving per FAA AC 150/5320-12, current version. The markings shall have resealing characteristics, such that it is capable of fusing with itself and previously applied thermoplastics when heated with a heat source per manufacturer's recommendation.

c. Multicolored markings must consist of interconnected individual pieces of preformed thermoplastic pavement marking material, which through a variety of colors and patterns, make up the desired design. The individual pieces in each large marking segment (typically more than 20 ft. long) must be factory assembled with a compatible material and interconnected so that in the field it is not necessary to assemble the individual pieces within a marking segment. Obtaining multicolored effect by overlaying materials of different colors is not acceptable due to resulting inconsistent marking thickness and inconsistent application temperature in the marking/substrate interface.

e. The marking material must set up rapidly, permitting the access route to be re-opened to traffic a maximum of 15 minutes after application.

f. The marking material shall have an integral color throughout the thickness of the marking material.

620-2.3 REFLECTIVE MEDIA. Glass beads shall meet the requirements for Federal Specification. TT B 1325D, Type III, gradation A. Initial readings should yield at least 600 mcd/m²/lux on white markings and at least 300 mcd/m²/lux on yellow markings at installation. Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

620-2.4 HERBICIDE. Herbicide used for removal of grass in weeds in existing pavement to be painted, shall be of the type which is compatible with and non-damaging to bituminous asphalt pavement. The Contractor shall submit material data documentation to the Engineer and receive written approval prior to incorporating it into the work.

CONSTRUCTION METHODS

620 3.1 WEATHER LIMITATIONS. The painting shall be performed only when the surface is dry and when the surface temperature is at least 45°F (7°C) and rising and the pavement surface temperature is at least 5°F (2.7°C) above the dew point. Markings shall not be applied when the pavement temperature is greater than 130°F (55°C). Markings shall not be applied when the wind speed exceeds 10 knots unless windscreens are used to shroud the material guns.

620-3.2 EQUIPMENT. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray type or airless-type marking machine suitable for application of traffic paint and able to paint a 3-ft wide marking. It shall produce an even and uniform film thickness at the required coverage and shall apply markings of uniform cross-sections and clear cut edges without running or spattering and without over spray.

620-3.3 PREPARATION OF SURFACE. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material that would reduce the bond between the paint and the pavement; In the instance that grass and/or weeds are present an herbicide shall be applied to the affected areas with sufficient time ahead of the painting operation to allow complete removal. The area to be painted shall be cleaned by waterblasting, shotblasting, grinding or sandblasting as required to remove all dirt, laitance, and loose materials without damage to the pavement surface. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the Engineer. Paint shall not be applied to Portland cement concrete pavement until the areas to be painted are clean of curing material. Sandblasting or high-pressure water shall be used to remove curing materials.

At least 24 hours prior to remarking existing markings the existing markings must be removed such that 90% of the existing markings are removed with low (3,500-10,000 psi) waterblaster. After waterblasting, the surface shall be cleaned of all residue or debris either with sweeping or blowing with compressed air or both.

Prior to the initial application of markings, the Contractor shall certify in writing that the surface has been prepared in accordance with the paint manufacturer's requirements, that the application equipment is appropriate for the type of marking paint and that environmental conditions are appropriate for the material being applied. This certification along with a copy of the paint manufacturer's surface preparation and application requirements must be submitted and approved by the Engineer prior to the initial application of markings.

620 3.4 LAYOUT OF MARKINGS. The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans.

620-3.5 APPLICATION. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. All proposed markings shall be outlined with a 6" black border as described in the Plans. Paint shall not be applied until the layout and condition of the surface has been approved by the Engineer. The edges of the markings shall not vary from a straight line more than 1/2 inch (12 mm) in 50 feet (15 m) and marking dimensions and spacings shall be within the following tolerances:

Dimension and Spacing Tolerance

36 inches (910 mm) or less ±1/2 inch (12 mm)
greater than 36 inches to 6 feet (910 mm to 1.85 m) ± 1 inch (25 mm)
greater than 6 feet to 60 feet (1.85 m to 18.3 m) ± 2 inches (51 mm)
greater than 60 feet (18.3 m) ± 3 inches (76 mm)

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate(s) shown in Table 1. The addition of thinner will not be permitted. A period of time as recommended by the paint manufacturer shall elapse between placement of a

bituminous surface course or seal coat and application of the paint. The Contractor shall submit documentation from the paint manufacturer addressing the recommended minimum time period.

TABLE 1. APPLICATION RATES FOR PAINT AND GLASS BEADS

| Paint Type | Paint |
|----------------------------------|---|
| | Square feet per gallon, ft ² /gal. (Square meters per liter, m ² /l) |
| Glass Beads, Type I, Gradation A | Pounds per gallon of paint—lb./gal. (Kilograms per liter of paint—kg/l) |
| Glass Beads, Type III | Pounds per gallon of paint—lb./gal. (Kilograms per liter of paint—kg/l) |
| Glass Beads, Type IV | Pounds per gallon of paint—lb./gal. (Kilograms per liter of paint—kg/l) |
| Waterborne | |
| | 115 ft ² /gal. maximum (2.8 m ² /l) |
| | 7 lb./gal. minimum (0.85 kg/l) |
| | 10 lb./gal. minimum (1.2 kg/l) |
| | 8 lb./gal. minimum (1.0 kg/l) |

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads (manually applying glass beads by hand shall not be permitted). Glass beads shall be applied at the rate(s) shown in Table 1. Glass beads shall not be applied to black paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made.

All emptied containers shall be returned to the paint storage area for checking by the Engineer. The containers shall not be removed from the airport or destroyed until authorized by the Engineer.

620-3.6 Test strip. Prior to the full application of airfield markings, the Contractor shall produce a test strip in the presence of the engineer. The test strip shall include the application of a minimum of 5 gallons (4 liters) of paint and application of (35 lbs (15.9 kg) of Type I/50 lbs (22.7 kg) of Type II) glass beads. The test strip shall be used to establish thickness/darkness standard for all markings. The test strip shall

cover no more than the maximum area prescribed in Table 1 (e.g., for 5 gallons (19 liters) of waterborne paint shall cover no more than 575 square feet (53.4 m²).

The Contractor shall install temporary airfield markings at 50% of the specified application rates, two to three days after all pavement operations are complete. (No glass beads are required for temporary markings). The Contractor shall then allow the pavement to cure for a period of 30 days prior to the full application of the airfield markings.

620-3.6 APPLICATION--PREFORMED AIRPORT PAVEMENT MARKINGS.

a. Asphalt and Portland cement To ensure minimum single-pass application time and optimum bond in the marking/substrate interface, the materials must be applied using a variable speed self-propelled mobile heater with an effective heating width of no less than 16 feet (4.88 m) and a free span between supporting wheels of no less than 18 feet (5.49 m). The heater must emit thermal radiation to the marking material in such a manner that the difference in temperature of 2 inch (5.08 cm) wide linear segments in the direction of heater travel must be within 5 percent of the overall average temperature of the heated thermoplastic material as it exits the heater. The material must be able to be applied at ambient and pavement temperatures down to 35°F (2°C) without any preheating of the pavement to a specific temperature. The material must be able to be applied without the use of a thermometer. The pavement shall be clean, dry, and free of debris. A non-VOC sealer with a maximum applied viscosity of 250 centi-Poise (ASTM D 2393) must be applied to the pavement shortly before the markings are applied. The supplier must enclose application instructions with each box/package.

620-3.7 PROTECTION AND CLEANUP. After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose or unadhered reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

METHOD OF MEASUREMENT

620-3.8 The quantity of runway and taxiway markings to be paid for shall be the number of square feet of painting performed in accordance with the Plans and specifications and accepted by the Engineer.

- a. Runway & Taxiway Painting. Measurement shall include all paint except for the 6" black outline and shall be as described above in 620-3.8.
- b. Black Outline Runway & Taxiway Painting. Measurement shall include the 6" black outline only and shall be as described above in 620-3.8.

BASIS OF PAYMENT

620-5.1 Payment shall be made at the respective contract price per square foot for runway and taxiway painting, and [price per pound (kilogram)] [lump sum price] [price per square foot (square meter)] [lump sum price] for preformed markings] for reflective media. 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 620 5.1 Runway and Taxiway Pavement Marking (Full Application Rate) - per square foot
- Item P-620-5.2 Black Outline of Runway and Taxiway Pavement Marking - per square foot

TESTING REQUIREMENTS

- ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates
- ASTM C 146 Chemical Analysis of Glass Sand
- ASTM C 371 Wire-Cloth Sieve Analysis of Nonplastic Ceramic Powders
- ASTM D 92 Test Method for Flash and Fire Points by Cleveland Open Cup
- ASTM D 711 No-Pick-Up Time of Traffic Paint
- ASTM D 968 Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
- ASTM D 1213-54 (1975) Test Method for Crushing Resistance of Glass Spheres
- ASTM D 1652 Test Method for Epoxy Content of Epoxy Resins
- ASTM D 2074 Test Method for Total Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
- ASTM D 2240 Test Method for Rubber Products-Durometer Hardness
- ASTM G 15453 Operating Light and Water-Exposure Apparatus (Fluorescent Light Apparatus UV-Condensation Type) for Exposure of Nonmetallic Materials.
- Federal Test Method Standard No. 141D/GEN Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing

MATERIAL REQUIREMENTS

- ASTM D 476 Specifications for Dry Pigmentary Titanium Dioxide Pigments Products
- Code of Federal Regulations 40 CFR Part 60, Appendix A – Definition of Traverse Point Number and Location
- Code of Federal Regulations 29 CFR Part 1910.1200 – Hazard Communications
- FED SPEC TT-B-1325D Beads (Glass Spheres) Retroreflective
- AASHTO M 247 Glass Beads Used in Traffic Paints

FED SPEC TT-P-1952E Paint, Traffic and Airfield Marking, Waterborne

Commercial Item

Description (CID) A-A-2886B Paint, Traffic, Solvent Based

FED STD 595 Colors used in Government Procurement

END OF ITEM P-620

Item D-701 Pipe for Storm Drains and Culverts

DESCRIPTION

701-1.1 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.

MATERIALS

701-2.1 Materials shall meet the requirements shown on the plans and specified below. Underground piping and components used in drainage systems for terminal and aircraft fueling ramp drainage shall be noncombustible and inert to fuel in accordance with National Fire Protection Association (NFPA) 415.

701-2.2 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:

AASTO M294 Standard Specification for 12 to 60 in. Diameter Corrugated Polyethylene (PE) Pipe

701-2.3 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.

701-2.4 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 precast 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.

701-2.5 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.

701-2.6 Joint fillers. Poured filler for joints shall conform to the requirements of ASTM D6690.

701-2.7 Plastic gaskets. Plastic gaskets shall conform to the requirements of ASTM C990.

701-2.8. 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.

701-2.9 Precast box culverts. Manufactured in accordance with and conforming to ASTM C1433.

701-2.10 Precast concrete pipe. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or American Concrete Pipe Association QCast Plant Certification program.

CONSTRUCTION METHODS

701-3.1 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 12 inches (300 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.

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 should be filled with granular material to form a uniform 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 RPR 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.

701-3.2 Bedding. The bedding surface for the pipe shall provide a foundation of uniform density to support the pipe throughout its entire length.

a. Rigid pipe. The pipe bedding shall be constructed uniformly for the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 in when the bedding thickness is less than 6 inches, and 1-1/2 in when the bedding thickness is greater than 6 inches. Bedding shall be loosely placed uncompacted material under the middle third of the pipe prior to placement of the 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:

Flexible Pipe Bedding

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. Other pipe materials. For PVC, polyethylene, polypropylene, or fiberglass 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.

701-3.3 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.

701-3.4 Joining pipe. Joints shall be made with (1) cement mortar, (2) cement grout, (3) rubber gaskets, (4) plastic gaskets, (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. Pipe sections at joints shall be fully seated and the inner surfaces flush and even. Concrete pipe joints shall be sealed with rubber gaskets meeting ASTM C443 when leak resistant joints are required. Concrete pipe joints shall be sealed with butyl mastic meeting ASTM C990 or mortar when soil tight joints are required. 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, or Polypropylene pipe. Joints for PVC, Polyethylene, or Polypropylene pipe shall conform to the requirements of ASTM D3212 when leak resistant 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.

d. Fiberglass pipe. Joints and fittings shall be as detailed on the plans and in accordance with the manufacturers recommendations. Joints shall meet the requirements of ASTM D4161 for flexible elastomeric seals. Enter manufacturers joint installation requirements.

701-3.5 Embedment and Overfill. Pipes shall be inspected before any fill material 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.

701-3.5-1 Embedment Material Requirements

a. Concrete Pipe. Embedment material and compaction requirements shall be in accordance with the applicable Type of Standard Installation (Types 1, 2, 3, or 4) per ASTM C1479. If a concrete cradle or CLSM embedment material is used, it shall conform to the plan details.

b. Plastic and fiberglass Pipe. Embedment material shall meet the requirements of ASTM D3282, A-1, A-2-4, A-2-5, or A-3. Embedment material shall be free of organic material, stones larger than 1.5 inches in the greatest dimension, or frozen lumps. Embedment material shall extend to 12 inches above the top of the pipe.

c. Metal Pipe. Embedment material shall be granular as specified in the contract document and specifications, and shall be free of organic material, rock fragments larger than 1.5 inches in the greatest dimension and frozen lumps. As a minimum, backfill materials shall meet the requirements of ASTM D3282, A-1, A-2, or A-3. Embedment material shall extend to 12 inches above the top of the pipe.

701-3.5-2 Placement of Embedment Material

The embedment material 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 embedment 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 embedment material 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. All embedment material shall be compacted to a density required under Item P-152.

Concrete cradles and flowable fills, such as controlled low strength material (CLSM) or controlled density fill (CDF), may be used for embedment provided adequate flotation resistance can be achieved by restraints, weighing, or placement technique.

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.

701-3.6 Overfill

Pipes shall be inspected before any overfill is in place. Any pipes found to be out of alignment, unduly settled, or damaged shall be removed and relaid or replaced at the Contractor's expense. Evaluation of any damage to RCP shall be evaluated based on AASHTO R73.

Overfill material shall be placed and compacted in layers as required to achieve compaction to at least 95 percent standard proctor per ASTM D1557. The soil shall contain no debris, organic matter, frozen material, or stones with a diameter greater than one half the thickness of the compacted layers being placed.

701-3.7 Inspection Requirements

An initial post installation inspection shall be performed by the RPR no sooner than 30 days after completion of installation and final backfill. Clean or flush all lines prior to inspection.

Use a camera with lighting suitable to allow a clear picture of the entire periphery of the pipe interior. Center the camera in the pipe both vertically and horizontally and be able to pan and tilt to a 90 degree angle with the axis of the pipe rotating 360 degrees. Use equipment to move the camera through the pipe that will not obstruct the camera's view or interfere with proper documentation of the pipe's condition. The video image shall be clear, focused, and relatively free from roll, static, or other image distortion qualities that would prevent the reviewer from evaluating the condition of the pipe.

For pipe sizes larger than 48 inches, a walk-through visual inspection shall be performed.

Incorporate specific inspection requirements for the various types of pipes beneath the general inspection requirements.

Reinforced concrete pipe shall be inspected, evaluated, and reported on in accordance with ASTM C1840, "Standard Practice for Inspection and Acceptance of Installed Reinforced Concrete Culvert, Storm Drain, and Storm Sewer Pipe." Any issues reported shall include still photo and video documentation. The zoom ratio shall be provided for all still or video images that document any issues of concern by the inspection firm.

Flexible pipes shall be inspected for rips, tears, joint separations, soil migration, cracks, localized buckling, settlement, alignment, and deflection. Determine whether the allowable deflection has been exceeded by use of a laser profiler for internal pipe diameters of 48 inches or less, or direct measurement for internal pipe diameters greater than 48 inches. Laser profile equipment shall utilize low barrel distortion video equipment. Deflection of installed pipe shall not exceed the limits provided in the table below, as a percentage of the average inside diameter of the pipe.

Maximum Allowable Pipe Deflection

Type of Pipe Maximum Allowable Deflection (%)

Corrugated Metal Pipe 5

Concrete Lined CMP 3

Thermoplastic Pipe 5

Fiberglass 5

If deflection readings in excess of the allowable deflection are obtained, remove the pipe with excessive deflection and replace with new pipe. Isolated areas may exceed allowable by 2.5% with concurrence of RPR. Repair or replace any pipe with cracks exhibiting displacement across the crack, bulges, creases, tears, spalls, or delaminations. The report for flexible pipe shall include as a minimum, the deflection results and final post installation inspection report. The inspection report shall include: a copy of all video taken, pipe location identification, equipment used for inspection, inspector name, deviation from design line and grade, and inspector's notes.

METHOD OF MEASUREMENT

701-4.1 The length of pipe shall be measured in linear feet (m) of pipe in place, completed, and accepted. 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 [identify each class, types and size of pipe] shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipe being measured.

BASIS OF PAYMENT

701-5.0 These prices shall fully compensate the Contractor for furnishing all materials and for all preparation, excavation, and installation of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made at the contract unit price per linear foot (meter) for:

Item 701-5.1 - 12-Inch Storm Sewer, HDPE – 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.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M167 Standard Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches

AASHTO M190 Standard Specification for Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches

AASHTO M196 Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains

AASHTO M219 Standard Specification for Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches

AASHTO M243 Standard Specification for Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches

AASHTO M252 Standard Specification for Corrugated Polyethylene Drainage Pipe

AASHTO M294 Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter

AASHTO M304 Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter

AASHTO MP20 Standard Specification for Steel Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 900-mm (12- to 36-in.) Diameter

ASTM International (ASTM)

ASTM A760 Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains

ASTM A761 Standard Specification for Corrugated Steel Structural Plate, Zinc Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches

ASTM A762 Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains

ASTM A849 Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe

ASTM B745 Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains

ASTM C14 Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe

ASTM C76 Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

ASTM C94 Standard Specification for Ready Mixed Concrete

ASTM C144 Standard Specification for Aggregate for Masonry Mortar

ASTM C150 Standard Specification for Portland Cement

- ASTM C443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
- ASTM C506 Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
- ASTM C507 Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
- ASTM C655 Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe
- ASTM C990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
- ASTM C1433 Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
- ASTM D1056 Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber
- ASTM D3034 Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- ASTM D3212 Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- ASTM D3262 Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Sewer Pipe
- ASTM D3282 Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
- ASTM D4161 Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals
- ASTM D6690 Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
- ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- ASTM F667 Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings
- ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter
- ASTM F794 Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
- ASTM F894 Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
- ASTM F949 Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
- ASTM F2435 Standard Specification for Steel Reinforced Polyethylene (PE) Corrugated Pipe

ASTM F2562 Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage

ASTM F2736 Standard Specification for 6 to 30 in. (152 to 762 mm) Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe

ASTM F2764 Standard Specification for 30 to 60 in. (750 to 1500 mm) Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications

ASTM F2881 Standard Specification for 12 to 60 in. (300 to 1500 mm) Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications

National Fire Protection Association (NFPA)

NFPA 415 Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways

END ITEM D-701

Item D-705 Pipe Underdrains for Airports

DESCRIPTION

705-1.1 This item shall consist of the construction of pipe drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

705-2.1 General. Materials shall meet the requirements shown on the plans and specified below.

Pipe shall have a smooth interior and annular exterior corrugations meeting AASHTO M252, Type S or SP, ADS N-12 or approved equal.

705-2.2 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

705-2.3 Joint mortar. Pipe joint mortar shall consist of one part by volume of 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.

705-2.4 Elastomeric seals. Elastomeric seals shall conform to the requirements of ASTM F477.

705-2.5 Porous backfill. Porous backfill shall be free of clay, humus, or other objectionable matter, and shall conform to Size No. 57 coarse aggregate gradation.

Table 1. Gradation of Porous Backfill

| Sieve Designation (square openings) | Percentage by Weight Passing Sieves |
|-------------------------------------|-------------------------------------|
| | Porous Material No. * |
| 1-1/2 inch | 100 |
| 1 inch | 95 to 100 |
| 1/2 inch | 25 to 60 |
| No. 4 (4.75 mm) | 0-10 |
| No. 8 (2.36 mm) | 0-5 |
| No. 16 (1.18 mm) | - |
| No. 50 (300 µm) | - |
| No. 100 (150 µm) | - |

705-2.6 Granular material. Granular material used for backfilling shall conform to the requirements of ASTM D2321 for Class IA, IB, or II materials.

705-2.7 Filter fabric. The filter fabric shall conform to the requirements of AASHTO M288 Class 2 or equivalent.

Table 2. Fabric Properties

| Fabric Property | Test Method | Test Requirement |
|--|-----------------------------------|-------------------------|
| Grab Tensile Strength, lbs | ASTM D4632 | 125 min |
| Grab Tensile Elongation % | ASTM D4632 | 50 min |
| Burst Strength, psi | ASTM D3785 | 125 min |
| Trapezoid Tear Strength, lbs | ASTM D4533 | 55 min |
| Puncture Strength, lbs | ASTM D4833 | 40 min |
| Abrasion, lbs | ASTM D4886 | 15 max loss |
| Equivalent Opening Size | ASTM D4751 | 70-100 |
| Permittivity sec⁻¹ | ASTM D4491 | 0.80 |
| Accelerated Weathering (UV Stability) (Strength Retained - %) | ASTM D4355 *(500 hrs exposure) | 70 |

705-2.8 Controlled low-strength material (CLSM). CLSM is not used

CONSTRUCTION METHODS

705-3.1 Equipment. All equipment required for the construction of pipe underdrains shall be on the project, in good working condition, and approved by the RPR before construction is permitted to start.

705-3.2 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 shall not be less than the external diameter of the pipe plus 6 inches (150 mm) on each side of the pipe. The trench walls shall be approximately vertical.

Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the foundation grade for a depth of at least 4 inches (100 mm). 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 RPR shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

Excavated material not required or acceptable for backfill shall be disposed of by the Contractor as directed by the RPR. The excavation shall not be carried below the required depth; if this occurs, the trench shall be backfilled at the Contractor's expense with material approved by the RPR and compacted to the density of the surrounding material.

The pipe bedding shall be constructed uniformly over the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 inch when the bedding thickness is less than 6 inches, and

1-1/2 inch when the bedding thickness is greater than 6 inches. Bedding shall be loosely placed, uncompacted material under the middle third of the pipe prior to placement of the pipe.

The Contractor shall do trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to federal, state and local laws. Unless otherwise provided, the bracing, sheathing, or shoring shall be removed by the Contractor after the backfill has reached at least 12 inches (300 mm) over the top of the pipe. The sheathing or shoring shall be pulled as the granular backfill is placed and compacted to avoid any unfilled spaces between the trench wall and the backfill material. The cost of bracing, sheathing, or shoring, and the removal of same, shall be included in the unit price bid per foot (meter) for the pipe.

705-3.3 Laying and installing pipe.

a. Concrete pipe. The laying of the pipe in the finished trench shall be started at the lowest point and proceed upgrade. When bell and spigot pipe is used, the bells shall be laid upgrade. If tongue and groove pipe is used, the groove end shall be laid upgrade. Holes in perforated pipe shall be placed down, unless otherwise shown on the plans. The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform. Pipe shall not be laid on frozen ground.

Pipe which is not true in alignment, or which shows any settlement after laying, shall be taken up and re-laid by the Contractor at no additional expense. Making adjustments in grade by exerting force on the barrel of the pipe with excavating equipment, by lifting and dropping the pipe, or by lifting the pipe and packing bedding material under it shall be prohibited. If the installed pipe section is not to grade, the pipe section shall be completely removed, the grade corrected, and the pipe rejoined.”

b. Metal pipe. The metal pipe shall be laid with the separate sections joined firmly together with bands, with outside laps of circumferential joints pointing upgrade, and with longitudinal laps on the sides. Any metal in the pipe or bands that is not protected thoroughly by galvanizing shall be coated with a suitable asphaltum paint.

During installation, the asphalt-protected pipe shall be handled without damaging the asphalt coating. Any breaks in the bitumen or treatment of the pipe shall be refilled with the type and kind of bitumen used in coating the pipe originally.

c. PVC, fiberglass, or polyethylene pipe. PVC or polyethylene pipe shall be installed in accordance with the requirements of ASTM D2321. Perforations shall meet the requirements of AASHTO M252 or AASHTO M294 Class 2, unless otherwise indicated on the plans. The pipe shall be laid accurately to line and grade. Fiberglass per ASTM D3839 Standard Guide for Underground Installation of "Fiberglass" (Glass-Fiber Reinforced Thermosetting-Resin) Pipe.

d. All types of pipe. The upgrade end of pipelines, not terminating in a structure, shall be plugged or capped as approved by the RPR.

Unless otherwise shown on the plans, a 4-inch (100 mm) bed of granular backfill material shall be spread in the bottom of the trench throughout the entire length under all perforated pipe underdrains.

Pipe outlets for the underdrains shall be constructed when required or shown on the plans. The pipe shall be laid with tight-fitting joints. Porous backfill is not required around or over pipe outlets for underdrains. All connections to other drainage pipes or structures shall be made as required and in a satisfactory manner. If connections are not made to other pipes or structures, the outlets shall be protected and constructed as shown on the plans.

e. Filter fabric. The filter fabric shall be installed in accordance with the manufacturer's recommendations, or in accordance with the AASHTO M288 Appendix, unless otherwise shown on the plans.

705-3.4 Mortar. The mortar shall be of the desired consistency for caulking and filling the joints of the pipe and for making connections to other pipes or to structures. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted.

705-3.5 Joints in concrete pipe. When open or partly open joints are required or specified, they shall be constructed as indicated on the plans. The pipe shall be laid with the ends fitted together as designed. If bell and spigot pipe is used, mortar shall be placed along the inside bottom quarter of the bell to center the following section of pipe.

The open or partly open joints shall be surrounded with granular material meeting requirements of porous backfill No. 2 in Table 1 or as indicated on the plans. This backfill shall be placed so its thickness will be not less than 3 inches (75 mm) nor more than 6 inches (150 mm), unless otherwise shown on the plans.

When the original material excavated from the trench is impervious, commercial concrete sand or granular material meeting requirements of porous backfill No. 1 shall surround porous backfill No. 2 (Table 1), as shown on the plans or as directed by the RPR.

When the original material excavated from the trench is pervious and suitable, it may be used as backfill in lieu of porous backfill No. 1, when indicated on the plans or as directed by the RPR.

705-3.6 Embedment and Backfill

a. Earth. All trenches and excavations shall be backfilled soon after the pipes are installed, unless additional protection of the pipe is directed. The embedment material shall be select material from excavation or borrow and shall be approved by the RPR. The select material shall be placed on each side of the pipe out to a distance of the nominal pipe diameter and one foot (30 cm) over the top of the pipe and shall be readily compacted. It shall not contain stones 3 inches (75 mm) or larger in size, frozen lumps, chunks of highly plastic clay, or any other material that is objectionable to the RPR. The material shall be moistened or dried, as required to aid compaction. Placement of the embedment material shall not cause displacement of the pipe. Thorough compaction under the haunches and along the sides to the top of the pipe shall be obtained.

The embedment material shall be placed in loose layers not exceeding 6 inches (150 mm) in depth under and around the pipe. Backfill material over the pipe shall be placed in lifts not exceeding 8 inches (200 mm). Successive layers shall be added and thoroughly compacted by hand and pneumatic tampers, approved by the RPR, until the trench is completely filled and brought to the planned elevation. Embedment and backfilling shall be done to avoid damaging top or side of the pipe.

In embankments and other unpaved areas, the backfill shall be compacted per Item P-152 to the density required for embankments in unpaved areas. Under paved areas, the subgrade and any backfill shall be compacted per Item P-152 to the density required for embankments for paved areas.

b. Granular backfill. When granular backfill is required, placement in the trench and about the pipe shall be as shown on the plans. The granular backfill shall not contain an excessive amount of foreign matter, nor shall soil from the sides of the trench or from the soil excavated from the trench be allowed to filter into the granular backfill. When required by the RPR, a template shall be used to properly place and separate the two sizes of backfill. The backfill shall be placed in loose layers not exceeding 6 inches (150 mm) in depth. The granular backfill shall be compacted by hand and pneumatic tampers to the requirements as given for embankment. Backfilling shall be done to avoid damaging top or side pressure on the pipe. The granular backfill shall extend to the elevation of the trench or as shown on the plans.

When perforated pipe is specified, granular backfill material shall be placed along the full length of the pipe. The position of the granular material shall be as shown on the plans. If the original material excavated from the trench is pervious and suitable, it shall be used in lieu of porous backfill No. 1.

If porous backfill is placed in paved or adjacent to paved areas before grading or subgrade operations is completed, the backfill material shall be placed immediately after laying the pipe. The depth of the granular backfill shall be not less than 12 inches (300 mm), measured from the top of the underdrain. During subsequent construction operations, a minimum depth of 12 inches (300 mm) of backfill shall be maintained over the underdrains. When the underdrains are to be completed, any unsuitable material shall be removed exposing the porous backfill. Porous backfill containing objectionable material shall be removed and replaced with suitable material. The cost of removing and replacing any unsuitable material shall be at the Contractor's expense.

If a granular subbase blanket course is used which extends several feet beyond the edge of paving to the outside edge of the underdrain trench, the granular backfill material over the underdrains shall be placed in the trench up to an elevation of 2 inches (50 mm) above the bottom surface of the granular subbase blanket course. Immediately prior to the placing of the granular subbase blanket course, the Contractor shall blade this excess trench backfill from the top of the trench onto the adjacent subgrade where it can be incorporated into the granular subbase blanket course. Any unsuitable material that remains over the underdrain trench shall be removed and replaced. The subbase material shall be placed to provide clean contact between the subbase material and the underdrain granular backfill material for the full width of the underdrain trench.

c. Controlled low-strength material (CLSM). CLSM is not used.

705-3.7 Flexible Pipe Ring Deflection. Not used

705-3.8 Connections. When the plans call for connections to existing or proposed pipe or structures, these connections shall be watertight and made to obtain a smooth uniform flow line throughout the drainage system.

705-3.9 Cleaning and restoration of site. After the backfill is completed, the Contractor shall dispose of all surplus material, soil, and rubbish from the site. Surplus soil may be deposited in embankments, shoulders, or as directed by the RPR. Except for paved areas of the airport, the Contractor shall restore all disturbed areas to their original condition.

METHOD OF MEASUREMENT

705-4.1 The length of pipe shall be the number of linear feet (meters) of pipe underdrains in place, completed, and approved; 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 sizes shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipeline being measured. Measurement for other component of the underdrain system (porous backfill, filter fabric and cleanout) shall not be measured directly and are incidental to underdrain pipe installation.

BASIS OF PAYMENT

705-5.4 Pipe underdrains, Complete. Pipe underdrains, complete (including porous backfill, filter fabric and cleanouts) shall be made at the contract unit price per linear foot.

These prices shall be full compensation for furnishing all materials and for all preparation, excavation, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item D-705-5.1 - Underdrain System, Complete, including perforated pipe, fittings, gravel, filter fabric and cleanouts - 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.

ASTM International (ASTM)

AASHTO M252 Standard Specification for Corrugated Polyethylene Drainage Pipe

END OF ITEM D-705

Item D-751 Manholes, Catch Basins, Inlets and Inspection Holes

DESCRIPTION

751-1.1 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 RPR.

MATERIALS

751-2.1 Brick. The brick shall conform to the requirements of ASTM C32, Grade MS.

751-2.2 Mortar. Mortar shall consist of one part Portland cement and two parts sand. The cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

751-2.3 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.

751-2.4 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. Gaskets shall conform to the requirements of ASTM C443.

751-2.5 Corrugated metal. Corrugated metal shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M36.

751-2.6 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.

751-2.7 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 asphalt paint, when directed.

751-2.8 Precast inlet structures. Manufactured in accordance with and conforming to ASTM C913.

CONSTRUCTION METHODS

751-3.1 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 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. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximately only; and the RPR 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 RPR. 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 disturbed 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 RPR. No concrete or reinforcing steel shall be placed until the RPR has approved the depth of the excavation and the character of the foundation material.

751-3.2 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 re-laid 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.

751-3.3 Concrete structures. Concrete structures which are to be cast-in-place within the project boundaries 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 RPR 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.

751-3.4 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. 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: (1) be smoothed to a uniform surface on both interior and exterior of the structure or (2) utilize a rubber gasket per ASTM C443. 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 or metal encapsulated steps that are embedded or built into the side walls shall be aligned and placed in accordance to ASTM C478. When a metal ladder replaces the steps, it shall be securely fastened into position.

751-3.5 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.

751-3.6 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.

751-3.7 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 RPR, 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 RPR. 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.

751-3.8 Installation of steps. The steps shall be installed as indicated on the plans or as directed by the RPR. 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 meet the requirements of ASTM C478. The steps 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 RPR.

751-3.9 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 RPR.

b. Backfill shall not be placed against any structure until approved by the RPR. 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.

751-3.10 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 RPR. 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.

METHOD OF MEASUREMENT

751-4.1 Manholes, catch basins, inlets, and inspection holes shall be measured by the unit.

BASIS OF PAYMENT

751-5.1 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-Inch Yard Drain Inlet or Manhole - per each

Item D-751-5.2 - FDOT Type C Inlet with Oil Skimmer (Pond Control Structure) – per each

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.

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 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 C443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

ASTM C478 Standard Specification for Precast Reinforced Concrete Manhole Sections

ASTM C913 Standard Specification for Precast Concrete Water and Wastewater Structures.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M36 Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains

END OF ITEM D-751

ITEM T-901: SEEDING

DESCRIPTION

901-1.1 This item shall consist of soil preparation, seeding the areas shown on the plans or as directed by the RPR in accordance with these specifications.

MATERIALS

901-2.1 Seed. The species and application rates of grass, legume, and cover-crop seed furnished shall be those stipulated herein. Seed shall conform to the requirements of Federal Specification JJJ-S-181, Federal Specification, Seeds, Agricultural.

Seed shall be furnished separately or in mixtures in standard containers labeled in conformance with the Agricultural Marketing Service (AMS) Seed Act and applicable state seed laws with the seed name, lot number, net weight, percentages of purity and of germination and hard seed, and percentage of maximum weed seed content clearly marked for each kind of seed. The Contractor shall furnish the RPR duplicate signed copies of a statement by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within six (6) months of date of delivery. This statement shall include: name and address of laboratory, date of test, lot number for each kind of seed, and the results of tests as to name, percentages of purity and of germination, and percentage of weed content for each kind of seed furnished, and, in case of a mixture, the proportions of each kind of seed. Wet, moldy, or otherwise damaged seed will be rejected.

901-2.2 Lime. Not required.

901-2.3 Fertilizer. Not required.

901-2.4 Soil for repairs. The soil for fill and topsoiling of areas to be repaired shall be at least of equal quality to that which exists in areas adjacent to the area to be repaired. The soil shall be relatively free from large stones, roots, stumps, or other materials that will interfere with subsequent sowing of seed, compacting, and establishing turf, and shall be approved by the RPR before being placed.

CONSTRUCTION METHODS

901-3.1 Advance preparation and cleanup. After grading of areas has been completed and before applying fertilizer and ground limestone, areas to be seeded shall be raked or otherwise cleared of stones larger than 2 inches (50 mm) in any diameter, sticks, stumps, and other debris that might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes has occurred after the completion of grading and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage include filling gullies, smoothing irregularities, and repairing other incidental damage.

An area to be seeded shall be considered a satisfactory seedbed without additional treatment if it has recently been thoroughly loosened and worked to a depth of not less than 5 inches (125 mm) as a result of grading operations and, if immediately prior to seeding, the top 3 inches (75 mm) of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and if shaped to the required grade.

When the area to be seeded is sparsely sodded, weedy, barren and unworked, or packed and hard, any grass and weeds shall first be cut or otherwise satisfactorily disposed of, and the soil then scarified or otherwise loosened to a depth not less than 5 inches (125 mm). Clods shall be broken and the top 3 inches (75 mm) of soil shall be worked into a satisfactory seedbed by discing, or by use of cultipackers, rollers, drags, harrows, or other appropriate means.

901-3.2 Dry application method.

a. Liming. Not required.

b. Fertilizing. Not required.

c. Seeding. Grass seed shall be sown at the rate specified in paragraph 901-2.1 immediately after fertilizing. The fertilizer and seed shall be raked within the depth range stated in the special provisions. Seeds of legumes, either alone or in mixtures, shall be inoculated before mixing or sowing, in accordance with the instructions of the manufacturer of the inoculant. When seeding is required at other than the seasons shown on the plans or in the special provisions, a cover crop shall be sown by the same methods required for grass and legume seeding.

d. Rolling. After the seed has been properly covered, the seedbed shall be immediately compacted by means of an approved lawn roller, weighing 40 to 65 pounds per foot (60 to 97 kg per meter) of width for clay soil (or any soil having a tendency to pack), and weighing 150 to 200 pounds per foot (223 to 298 kg per meter) of width for sandy or light soils.

901-3.3 Wet application method.

a. General. The Contractor may elect to apply seed and fertilizer (and lime, if required) by spraying them on the previously prepared seedbed in the form of an aqueous mixture and by using the methods and equipment described herein. The rates of application shall be as specified in the special provisions.

b. Spraying equipment. The spraying equipment shall have a container or water tank equipped with a liquid level gauge calibrated to read in increments not larger than 50 gallons (190 liters) over the entire range of the tank capacity, mounted so as to be visible to the nozzle operator. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

The unit shall also be equipped with a pressure pump capable of delivering 100 gallons (380 liters) per minute at a pressure of 100 lb / sq inches (690 kPa). The pump shall be mounted in a line that will recirculate the mixture through the tank whenever it is not being sprayed from the nozzle. All pump passages and pipe lines shall be capable of providing clearance for 5/8 inch (16 mm) solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. There shall be an indicating pressure gauge connected and mounted immediately at the back of the nozzle.

The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture delivered to the nozzle. At least three different types of nozzles shall be supplied so that mixtures may be properly sprayed over distance varying from 20 to 100 feet (6 to 30 m). One shall be a close-range ribbon nozzle, one a medium-range ribbon nozzle, and one a long-range jet nozzle. For ease of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings.

In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet (15 m) in length shall be provided to which the nozzles may be connected.

c. Mixtures. Lime, if required, shall be applied separately, in the quantity specified, prior to the fertilizing and seeding operations. Not more than 220 pounds (100 kg) of lime shall be added to and mixed with each 100 gallons (380 liters) of water. Seed and fertilizer shall be mixed together in the relative proportions specified, but not more than a total of 220 pounds (100 kg) of these combined solids shall be added to and mixed with each 100 gallons (380 liters) of water.

All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. The Contractor shall identify to the RPR all sources of water at least two (2) weeks prior to use. The RPR may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the RPR following such tests.

All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within two (2) hours from the time they were mixed or they shall be wasted and disposed of at approved locations.

d. Spraying. Lime, if required, shall be sprayed only upon previously prepared seedbeds. After the applied lime mixture has dried, the lime shall be worked into the top 3 inches (75 mm), after which the seedbed shall again be properly graded and dressed to a smooth finish.

Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which the lime, if required, shall already have been worked in. The mixtures shall be applied by means of a high-pressure spray that shall always be directed upward into the air so that the mixtures will fall to the ground like rain in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner as might produce erosion or runoff.

Particular care shall be exercised to ensure that the application is made uniformly and at the prescribed rate and to guard against misses and overlapped areas. Proper predetermined quantities of the mixture in accordance with specifications shall be used to cover specified sections of known area.

Checks on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets of paper or pans over the area at intervals and observing the quantity of material deposited thereon.

On surfaces that are to be mulched as indicated by the plans or designated by the RPR, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

901-3.4 Maintenance of seeded areas. The Contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the RPR. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeding as directed. The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

When either the dry or wet application method outlined above is used for work done out of season, it will be required that the Contractor establish a good stand of grass of uniform color and density to the satisfaction of the RPR. A grass stand shall be considered adequate when bare spots are one square foot (0.01 sq m) or less, randomly dispersed, and do not exceed 3% of the area seeded.

METHOD OF MEASUREMENT

901-4.1 No separate measurement for payment will be made under Item T-901. The specification is provided for reference.

BASIS OF PAYMENT

901-5.1 No separate payment will be made under Item T-901. The specification is provided for reference.

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.

ASTM International (ASTM)

ASTM C602 Standard Specification for Agricultural Liming Materials

Federal Specifications (FED SPEC)

FED SPEC JJJ-S-181, Federal Specification, Seeds, Agricultural

Advisory Circulars (AC)

AC 150/5200-33 Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-901

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 special provisions, 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 that stated in the special provisions. 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 special provisions. 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

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.

Topsoil will be measured per square yard installed and accepted for lawn areas.

5.0 BASIS OF PAYMENT

5.1 Payment will be made at the contract unit price per square yard 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.

Payment will be made under:

Item T 905 5.1 – 3-Inch Topsoiling - per square yard

Item T 905 5.2 Topsoiling (Furnished from Off the Site)—per cubic yard (cubic meter)

TESTING MATERIALS

ASTM C 117 Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by
Washing

END OF ITEM T-905

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 below or in the 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-Inch Concrete Sidewalk – Per Square Yard

END OF ITEM 522

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 washers 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 which 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 AASHTO 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 appurtenances 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 $\pm 1.0\%$ 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 of 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 carrier 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 carrier 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 Resident Project Representative.

9.2 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 Resident Project Representative.

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.

10.2 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.

Item 429-1 Sanitary Sewer, Complete, Including All Items/Appurtenances Exterior to Buildings – per lump sum

Item 429-2 Sanitary Sewer Alternate Forcemain Additional Costs – per lump sum

END OF SECTION 429

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 ductile 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/repared, 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, SDR 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, RESILIENT-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 at 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. Disinfection Tests:

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 1000 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) $L = SD P^{1/2}$

148,000

Formula No. 2: (PVC only)

$L = ND P^{1/2}$

7,400

Formula No. 3: (DIP only)

$L = SD P^{1/2}$

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 fail 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 is 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 if 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 Water Service, Complete, Including Backflow Preventers & All Other Items/Appurtenances Exterior to Buildings – per lump sum

END OF SECTION 428

SECTION 15400 – 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 improvisations 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, globe 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 1/4" 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 1/4 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 or 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 1-1/4" and larger shall be made with silver solder, for joints less than 1-1/4" 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 15400

SECTION 15600 – 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 phrase "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 1/4" 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 15600

A. SECTION 16100 – 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.

II. 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 | 1/4" |
| Distribution Panelboards | 1/4" |
| 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, 3Ø, 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 be 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 1/2" 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 $\frac{3}{4}$ " 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:

| | |
|---------------------|------------------------|
| <u>Manufacturer</u> | <u>208/120V, 3Ø 4W</u> |
| General Electric | Type AQ |
| Square-D | Type NQOD |
| Westinghouse | Pow-R-Line 2 |

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:

| <u>Manufacturer</u> | <u>Safety Switches</u> | <u>Motor Starters</u> |
|---------------------|------------------------|-----------------------|
| 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 $\frac{3}{4}$ ".
 2. No conduit shall be smaller than $\frac{1}{2}$ ".
 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 all 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 megohms 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 16100

SECTION 01 40 00 - QUALITY REQUIREMENTS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. Testing and inspection agencies and services.
- D. Contractor's design-related professional design services.
- E. Tolerances.
- F. Manufacturers' field services.
- G. Defect Assessment.

1.02 REFERENCE STANDARDS

- A. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation 2017.
- B. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction 2019.
- C. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2020.
- D. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing 2015.
- E. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components 2016.
- F. IAS AC89 - Accreditation Criteria for Testing Laboratories 2018.

1.03 DEFINITIONS

- A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.
- B. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. 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.
- C. 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.

1.04 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

- B. Base design on performance and/or design criteria indicated in individual specification sections.
 - 1. Submit a Request for Information to Architect if the criteria indicated are not sufficient to perform required design services.
- C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
 - 1. Design of Structural Components: Include development of shop drawings, and performing shop and site work, as described in Section 13 34 19 - Metal Building Systems.

1.05 SUBMITTALS

- A. 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 a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
 - 2. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.
- B. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor 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.
- C. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, 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.

1.06 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.07 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 numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.08 QUALITY ASSURANCE

- A. 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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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.

3.02 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, 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.

3.03 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

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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 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), International Building Code, Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements 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. ACI 318 - Building Code Requirements for Structural Concrete and Commentary 2014 (Errata 2018).
- B. AISC 360 - Specification for Structural Steel Buildings 2016.
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2020.
- E. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing 2015.
- F. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. ICC (IBC)-2018 - International Building Code 2018.

1.06 SUBMITTALS

- A. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
 - 1. Submit agency name, address, and telephone number, 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. Submit certification that Special Inspection Agency is acceptable to AHJ.
- B. Testing Agency Qualifications: Prior to the start of work, the Testing Agency is required to:
 - 1. 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. Submit certification that Testing Agency is acceptable to AHJ.
- C. Manufacturer's Qualification Statement: Manufacturer is required to submit documentation of manufacturing capability and quality control procedures. Include documentation of AHJ approval.
- D. Fabricator's Qualification Statement: Fabricator is required to submit documentation of fabrication facilities and methods as well as quality control procedures. Include documentation of AHJ approval.
- E. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to the AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of Special Inspector.
 - d. Date and time of special inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of special inspection.
 - h. Date of special inspection.
 - i. Results of special inspection.
 - j. Compliance with Contract Documents.
 - 2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.
- F. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.

- c. Name of Special Inspector.
 - d. Date and time of special inspection.
 - e. Identification of fabricated item and specification section.
 - f. Location in the Project.
 - g. Results of special inspection.
 - h. Verification of fabrication and quality control procedures.
 - i. Compliance with Contract Documents.
 - j. Compliance with referenced standard(s).
- G. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to Architect and one to AHJ.
- 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 or inspection.
 - h. Date of test or inspection.
 - i. Results of test or inspection.
 - j. Compliance with Contract Documents.
- H. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, 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.
- I. Manufacturer's Field Reports: Submit reports to Architect and AHJ.
- 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.
- J. Fabricator's Field Reports: Submit reports to Architect and AHJ.
- 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.

1.07 SPECIAL INSPECTION AGENCY

- A. Owner or Architect will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.
- B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.
- C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.08 TESTING AND INSPECTION AGENCIES

- A. Owner or Architect may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.
- B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.09 QUALITY ASSURANCE

- A. Special Inspection Agency Qualifications:
 - 1. Independent firm specializing in performing testing and inspections of the type specified in this section.
- B. Testing Agency Qualifications:
 - 1. Independent firm specializing in performing testing and inspections of the type specified in this section.
- C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL**

- A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
 - 1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
 - 2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.02 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

- A. Special Inspection Agency shall:
 - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified reference standards.
 - 3. Ascertain compliance of materials and products with requirements of Contract Documents.
 - 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
 - 5. Perform additional tests and inspections required by Architect.
 - 6. Submit reports of all tests or inspections specified.
- B. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- C. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.03 TESTING AGENCY DUTIES AND RESPONSIBILITIES

- A. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
 - 5. Perform additional tests and inspections required by Architect.
 - 6. Submit reports of all tests or inspections specified.
- B. Limits on Testing or Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the work.
- C. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.
- D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

3.04 CONTRACTOR DUTIES AND RESPONSIBILITIES

- A. Contractor Responsibilities, General:
 - 1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
 - 2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to work to be tested or inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
 - c. To facilitate tests or 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 or inspection services.
 - 5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

3.05 MANUFACTURERS' AND FABRICATORS' FIELD SERVICES

- A. When specified in individual specification sections, require material suppliers, assembly fabricators, or product manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, to test, adjust, and balance equipment and [] 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.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Concrete formwork.
- B. Floors and slabs on grade.
- C. Concrete foundations and anchor bolts for pre-engineered building.
- D. Concrete reinforcement.
- E. Joint devices associated with concrete work.
- F. 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.
- B. Section 31 31 16 - Termite Control: Field-applied termiticide and mildewcide for concrete surfaces.

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 C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2012.
- M. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- N. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2020.
- O. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2020.
- P. ASTM C150/C150M - Standard Specification for Portland Cement 2020.
- Q. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete 2016.
- R. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).

- S. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete 2017a.
- T. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019.
- U. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2019.
- V. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2017.
- W. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.
- X. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.
- Y. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers 2020.
- Z. ASTM E1155M - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers (Metric) 2014.
- AA. 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.
- BB. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs 2017.
- CC. COE CRD-C 513 - COE Specifications for Rubber Waterstops 1974.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- B. Mix Design: Submit proposed concrete mix design.
 - 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
- C. Test Reports: Submit report for each test or series of tests specified.
- D. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- E. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- F. Delegated-Design Submittal: For Concrete 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.

1.05 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.

1.06**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. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 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.
 - 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
- C. Lightweight Aggregate: ASTM C330/C330M.
- D. Fly Ash: ASTM C618, Class C or F.
- E. 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. Retarding Admixture: ASTM C494/C494M Type B.
- I. 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: 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, unless otherwise noted.

2.07 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
- B. Moisture-Retaining Sheet: ASTM C171.
 - 1. Polyethylene film, clear, minimum nominal thickness of 4 mil, 0.004 inch.
- C. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- C. Normal Weight Concrete:
 - 1. Footings and slab on grade, 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. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
 - d. Slump Limit: 4 inches, 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 - 2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
 - 3. Water-Cement Ratio: Maximum 50 percent by weight.
 - 4. Total Air Content: As noted on the Structural drawing S-000 Note 4.D.3. and in accordance with ASTM C173/C173M.
 - 5. 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. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions. Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.
- F. In locations where new concrete is doveled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- G. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. 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. Notify Architect not less than 24 hours prior to commencement of placement operations.
- D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- F. 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.
- G. 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. 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.
 - 2. Under Thick-Bed Tile: F(F) of 20; F(L) of 15, on-grade only.
 - 3. Under Carpeting: F(F) of 25; F(L) of 20, on-grade only.
 - 4. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, 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. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile and ceramic tile with full bed setting system.
 - 2. 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.
 - 3. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

- B. 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 three concrete test cylinders. Obtain test samples for every 100 cubic yards or less 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. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- B. 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.
- C. 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 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.

1.02 RELATED REQUIREMENTS

- A. Section 09 30 00 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- D. ASTM C1311 - Standard Specification for Solvent Release Sealants 2014.
- E. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.

1.04 SUBMITTALS

- A. 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. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
- B. 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.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. 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.

1.05 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 three years of documented experience.

1.06 WARRANTY

- A. Correct defective work within a five year period after Date of Substantial Completion.
- B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 - 1. Dow Chemical Company; [____]: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - 2. Hilti, Inc; [____]: www.us.hilti.com/#sle.
 - 3. QUIKRETE Companies; [____]: www.quikrete.com/#sle.
 - 4. Sherwin-Williams Company; [____]: www.sherwin-williams.com/#sle.
 - 5. Sika Corporation; [____]: www.usa-sika.com/#sle.
 - 6. Tremco Commercial Sealants & Waterproofing; [____]: www.tremcosealants.com/#sle.
- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
 - 1. Dow Chemical Company; [____]: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - 2. QUIKRETE Companies; [____]: www.quikrete.com/#sle.
 - 3. Sherwin-Williams Company; [____]: www.sherwin-williams.com/#sle.
 - 4. Sika Corporation; [____]: www.usa-sika.com/#sle.
 - 5. Tremco Commercial Sealants & Waterproofing; [____]: www.tremcosealants.com/#sle.

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. Other joints indicated below.
 - 2. Do not seal the following types of joints.
 - a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - c. Joints where installation of sealant is specified in another section.
- 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 Wet Areas: restrooms; fixtures in wet areas include plumbing fixtures and other similar items.

2.03 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: Plus and minus 50 percent, minimum.
 2. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 3. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 4. Color: Match adjacent finished surfaces.
 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 65 to 180 degrees F.
- B. 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.

2.04 SELF-LEVELING SEALANTS

- A. Type [] - 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.
- B. Type [] - Self-Leveling Polyurethane Sealant for Horizontal Expansion Joints: ASTM C920, Grade P, Uses T, M and O; multi-component; explicitly approved by manufacturer for horizontal expansion joints.
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Hardness Range: 30 to 35, Shore A, when tested in accordance with ASTM C661.
 3. Color: To be selected by Architect from manufacturer's standard range.
- C. Type [] - 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.

2.05 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.

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. 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.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. 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.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

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. Fire-rated hollow metal doors and frames.
- C. Thermally insulated hollow metal doors with frames.
- D. Hurricane resistant hollow metal doors and frames.
- E. Accessories, including louvers.

1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2011.
- E. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2020.
- H. 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.
- I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014.
- J. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames 2016.
- K. FBC TAS 201 - Impact Test Procedures; Testing Application Standard 1994.
- L. FBC TAS 202 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure; Testing Application Standard 1994.
- M. FBC TAS 203 - Criteria for Testing Products Subject To Cyclic Wind Pressure Loading; Testing Application Standard 1994.
- N. FLA (PAD) - Florida Building Code Online - Product Approval Directory Current Edition.
- O. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- P. ITS (DIR) - Directory of Listed Products current edition.
- Q. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.
- R. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.
- S. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2007.

- T. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.
- U. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2019.
- V. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2017.
- W. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2013.
- X. UL (DIR) - Online Certifications Directory Current Edition.
- Y. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.

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 inch by 2 inch 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. 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. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 3. Steelcraft, an Allegion brand: www.allegion.com/#sle.
- B. Hurricane Resistant Hollow Metal Doors and Frames:
 - 1. Republic Doors, an Allegion brand; [____]: www.republicdoor.com/#sle.

2.02 DESIGN CRITERIA

- A. Requirements for Hollow Metal Doors and Frames:

1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to 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. 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.
 7. 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. Fire-Rated Doors:
1. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 2. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - a. Attach fire rating label to each fire rated unit.
 3. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
 4. Door Thickness: 1-3/4 inch, nominal.
 5. Door Face Sheets: Flush.
 6. Door Finish: Factory finished.
- C. Type Exterior , Hurricane Resistant Doors: Provide fire-rated door construction as indicated for door Type [] , Fire-Rated Doors, and the following hurricane resistant door requirements.
1. Comply with Florida Building Code (FBC) test protocols for High Velocity Hurricane Zone (HVHZ) FBC TAS 201, FBC TAS 202 and FBC TAS 203.
 2. Design and size door and frame components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M.
 - a. Design Wind Loads: Comply with requirements of applicable code.
 - b. Wind-Borne Debris Resistance: Door and frame components shall have FLA (PAD) approval for Large and Small Missile impact and pressure cycling at design wind loads.
 3. 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 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
4. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 5. Door Thickness: 1-3/4 inch, nominal.
 6. Door Face Sheets: Flush.
 7. Door Finish: Factory finished.

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: Knock-down type.
 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvanized) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
 2. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
 3. Weatherstripping: Integral, recessed into frame edge.
- D. Door Frames, Fire-Rated: Knock-down type.
 1. Fire Rating: Same as door, labeled.
 2. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

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. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.

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. 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 33 23 - OVERHEAD COILING DOORS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Continuous corrugated rolling steel sheet doors.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
- B. FBC TAS 201 - Impact Test Procedures; Testing Application Standard 1994.
- C. FBC TAS 202 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure; Testing Application Standard 1994.
- D. FBC TAS 203 - Criteria for Testing Products Subject To Cyclic Wind Pressure Loading; Testing Application Standard 1994.
- E. ITS (DIR) - Directory of Listed Products current edition.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

- A. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.05 SUBMITTALS

- A. Product Data: Provide general construction and component connections and details.
- B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- C. Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Operation and Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.
- H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

- C. Store materials in a dry, warm, ventilated weathertight location.
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.08 PROJECT 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.

1.09 COORDINATION

- A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

- A. Provide two year manufacturer limited warranty.
- B. Provide three year manufacturer limited warranty for door and operating systems warranty of all parts and components of the system, except the counterbalance spring and finish, to be free from defects in material and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Overhead Rolling Sheet Doors:
 - 1. Clopay Building Products: www.clopaydoor.com/#sle.
 - 2. Cornell Iron Works, Inc: www.cornelliron.com/#sle.
 - 3. Wayne-Dalton, a Division of Overhead Door Corporation; Model 790: www.wayne-dalton.com/#sle.
 - 4. ASTA AMERICA by Janus International; Model 203IM: www.astaamerica.com

2.02 CONTINUOUS CORRUGATED ROLLING STEEL SHEET DOORS

- A. Continuous Corrugated Rolling Steel Sheet Doors: Model 203IM Impact Rated Windlock Commercial Sheet Doors as manufactured by ASTA AMERICA. (Basis of Design)
 - 1. Hurricane Resistance Requirements:
 - a. Large Missile/Small Missile impact per Florida Building Code protocol (TAS-201), Florida Building Code HVHZ (TAS-201) and ASTM E1886/1996 Test Requirements
 - b. Cycle Loads Test per Florida Building Code protocol (TAS-203), Florida Building Code HVHZ (TAS-203) and ASTM E 1886/1996 Test Requirements.
 - c. Uniform Static Load Test – per Florida Building Code protocol (TAS-202), Florida Building Code HVHZ (Tas-202) and ASTM E 330.
 - d. Structural Performance: Doors shall be designed to withstand aa Ultimate Wind Speed (3 second gusts): 130 mph / Exposure Category: "D" in the closed position. Design and size of the components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with Florida Building Code to a design pressure to meet design criteria of building. Provide doors capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - e. Basic Wind Speed: As 130 miles per hour at 33 feet above grade. Determine wind loads and resulting design pressures applicable to Project according to the following, based on mean roof heights above grade as indicated on Drawings.

- f. Ultimate Design Wind Speeds: ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure."
 - g. Wind borne debris region requirements are applicable.
 - h. Refer to Structural Drawings for additional design criteria and requirements.
2. Manual Operation:
 - a. Manual push up.
 3. Curtain:
 - a. Sheet: 26 gauge ASTM A653-G60 galvanized Grade 80 full hard steel roll formed in continuous corrugation.
 - b. Side Stripping: Wear strip attached to curtain edges.
 - c. Bottom Bar: 2" x 2" x 3/16" galvanized steel angle fastened to aluminum retainer with an EPDM astragal bottom weather seal. The bottom bar assembly extends the full width of the opening.
 - d. Windlocks: 10 gauge galvanized 110 degree clips, riveted to door curtain edge. The windlock clips are located on every rise of each corrugation of the curtain, and spaced every 3-1/2", excluding the seam connections.
 4. Sheet Finish:
 - a. Curtain sections shall receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on epoxy prime paint, and 0.6 mils thick baked-on polyester top coat.
 - b. Top Coat Color: As selected by the Owner/Architect from the manufacturer's standard colors.
 - c. Guides, angles, bottom bar stops, headplates and rings galvanized. Aluminum bottom bar clear anodized.
 5. Windload Certified: Design to satisfy windload of 35 psf (kPa), based on 14 foot (4877 mm) wide test door with certification up to 20 feet (6096 mm) wide with less windload rating.
 6. Drum Assembly:
 - a. Drum: 26 gauge 12 inch (305 mm) diameter galvanized steel spiral torque tube attached to 16 gauge galvanized drums with ball bearings, supported by 11 gauge 1-5/16 inch (32 mm) O.D. steel tube.
 - b. Springs: Oil tempered, grease packed helical torsion type with 12,500 cycles and an overload factor of 25 percent. Mounted on 1-5/16 inch (32 mm) O. D. hot rolled steel tubing, 13 gauge steel tubing for doors up to 10 feet, otherwise 11 gauge up to 16 feet (4877 mm) wide; doors greater than 16 foot (4877 mm) side shall be 1-5/16 inch (32 mm) schedule 80 black pipe.
 7. Support Brackets: 3/16 inch (5 mm) thick structural steel angles and 1/4 inch (6 mm) thick steel diagonal brace welded in a triangular form to support ends of drum assembly.
 8. Guides: Roll formed 12 gauge galvanized steel channels with toggle locked 12 gauge windlock inserts, 3-1/2 inches (89 mm) deep per side.
 9. Heavy Duty Guide Clip: Roll-formed 12-gauge galvanized steel angle. The angle leg on the guide side is 1-3/4" x 2" and the angle leg on the wall side is 2" x 1-3/4". The heavy duty guide clip is secured to the guide with welds. A continuous weld located across the top of the clip and spot welds on eachside. The heavy duty guide clip spacing is a specified on the approved drawings.

10. Guide Insert: The guide insert is roll-formed 12-gauge galvanized steel. The guide insert is continuous from the bottom to the top of the door with an opening for the slide bolt lock to pass at the bottom of the guide. The guide insert is secured to the guide with a 1/2" Tog-L-Lok, spaced every 3".
11. Wall Construction: The doors must be mounted to the following types of wall construction:
 - a. Steel, minimum 3/16" thick, A36
12. Locking:
 - a. Optional Dual Exterior 8 gauge galvanized steel slide bolts attached to the bottom bar suitable for padlocks. (padlocks by others)
13. Weatherseals:
 - a. Top draft stop; EPDM weatherseal riveted to curtain and seals against header. Field installed.
 - b. Weatherseals: Side draft seal, aluminum retainer with brush seal. Field installed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.
- B. Verify clearance for operator and jamb width prior to fabrication of doors.
- C. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- D. Do not begin installation until openings have been properly prepared.
- E. 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 units in accordance with manufacturer's instructions.
- B. Install doors plumb, true, and square in a rigid manner.
- C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- E. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 92 00.
- G. Install enclosure and perimeter trim.
- H. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.04 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch.
- C. Maximum Variation From Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet straight edge.

3.05 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Adjust operating assemblies for smooth and noiseless operation.

3.06 CLEANING

- A. Clean installed components using non-abrasive materials and methods recommended by manufacturer.
- B. Remove labels and visible markings.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

3.07 PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION

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SECTION 08 36 21 - HANGAR, OVERHEAD, POWER DOOR SYSTEM**PART 1 GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SCOPE OF WORK

- A. This Section includes Hangar, overhead, electrically operated, Power Door System.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Hangar overhead power door system by Higher Power Hydraulic Doors or Approved equal as follows:
 - 1. Door size as shown on drawings.
 - 2. Door consists of door jambs, cam units, truss, push blocks, bearing assembly and other components per manufactures instructional manual.
 - 3. Includes hydraulic cylinders, electric hydraulic power unit, electrical controls, hydraulic lines, hydraulic hoses and weather seals. All steel is prime painted with the manufacturer's standard structural primer.
 - 4. Includes framed openings for man door in each hangar door per drawings.
 - 5. Work by others includes preparation of the building to receive the hangar door, field wiring, field finish paint, metal sheeting and insulation.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Provide one piece upward swinging door systems that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:
 - 1. Thermal Movements: Provide one piece upward swinging door that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
 - b. Operating Temperature Range: Provide hydraulic operators capable of operating between minus 30 deg F and plus 140 deg F
 - c. Structural Performance: Doors shall be designed to withstand a wind load of 130 mph / Exposure "D" in the closed position. Design and size of the components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with Florida Building Code to a design pressure to meet design criteria of building. Provide doors capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1) Ultimate Wind Speed (3 second gusts): As 130 miles per hour at 33 feet above grade. Determine wind loads and resulting design pressures applicable to Project according to the following, based on mean roof heights above grade as

indicated on Drawings:

- 2) Wind Loads: ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure."
- d. Door Operator Performance: Provide door operators that will open and close doors and maintain them in fully closed or open position when subjected to the design wind pressures for Project.

1.04 SUBMITTALS

- A. Product Data: Design and submittal drawings/calculations indicating compliance with the specified code required design loads shall be approved by the Engineer/Architect prior to hangar door fabrication. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the doors.
- B. Shop Drawings: Submit complete shop drawings and erection details to the Engineer/Architect for review. Include plans, elevations, sections, details, hardware mounting heights, and attachments to other Work.
 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 2. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.
 3. Show methods of erection, door layout, sections and details, anticipated loads, flashing, sealants, interfaces with all materials not supplied and proposed identification of component parts and their finishes.
 4. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes where applicable.
 5. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
 6. Maintenance Data: For door operators and control systems to include in maintenance manuals specified in Division 1. Operation and maintenance manual shall be furnished to the Owner, include instructions on how to perform safety tests, and the name, address, and telephone number of nearest authorized service representative.
 7. Provide calculations prepared by a Florida Licensed Structural Engineer to verify that door and assembly meet requirements of the Florida Building Code. Provide advance copy of documentation of doors to facilitate the building permit process.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is an authorized representative of the canopy tip-up door manufacturer for both installation and maintenance of units required for this Project.
 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
 2. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing

- engineering services of the kind indicated.
3. Manufacturer Qualifications: A firm experienced in manufacturing systems similar to those indicated for this Project and with a record of successful in-service performance.
 4. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
 5. Source Limitations: Obtain one piece upward swinging doors through one source from a single manufacturer.
 6. Product Options: Drawings indicate size, profiles, and dimensional requirements of hangar doors and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
 - a. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
 7. Welding Standards: Comply with AWS D1.1, "Structural Welding Code-Steel"; and AWS D1.3, "Structural Welding Code - Sheet Steel"
 8. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify door openings by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Store delivered materials and equipment in dry locations with adequate ventilation, free from dust and water, so as to permit access for inspection and handling.
- B. Handle materials carefully to prevent damage.

1.08 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of the door system that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 1. Excessive air leakage.
 2. Faulty operation of operators and hardware.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Warranty Period: Door manufacturer shall provide a written standard limited warranty for material and workmanship. Six (6) year warranty on all materials and workmanship with installation performed by an approved Higher Power installer from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Higher Power Hydraulic Doors. (Basis of Design)
 - 2. Schweiss.
 - 3. PowerLift Doors.
- B. Manufacturer has a minimum of five years experience in manufacturing hydraulic doors of this nature. Door assemblies specified in this section shall be produced in a factory environment and with the highest level of quality control.

2.02 MATERIALS

- A. Steel : Provide steel components that comply with section 2.4
- B. Main door structure: A36 minimum steel as required by design loads.
- C. Door Jamb Columns: I-Beam as required by manufacturer design loads.
- D. Welding Rods and Bare Electrodes: AWS A5.10
- E. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of door system.
- F. All weather seals shall be retained with full length steel binding strips attached with rust resistant fasteners.
- G. Exterior and interior sheeting, insulation and finish paint shall match balance of the buildings.
- H. Hydraulic Cylinder: Two (2) hydraulic cylinders that exceed the anticipated door loads complete with safety components to prevent the door from falling if a hydraulic failure occurs.

2.03 ONE PIECE UPWARD SWINGING DOOR

- A. General: Provide manufacturer's standard one piece upward swinging door system, complete with doors, transom framing, operators, controls, activation devices, safety devices, and accessories as indicated. Comply with the following:
 - 1. Configuration: upward swinging door
 - 2. Activation Devices: Activate doors by the following equipment:
 - a. "Dead man" control switch: Operator must hold down switch for one complete open and close cycle

2.04 COMPONENTS

- A. Framing Members: Fabricate from extruded steel.
 - 1. Main Members: Minimum 11 gauge and 3/16" square and rectangular tubing
 - 2. Door Perimeter Framework: 1/4" thick square and rectangular tubing
 - 3. Brackets and Reinforcements: Manufacturer's standard; compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.
 - 4. Hinges: manufacturer's standard
 - 5. Fasteners and Accessories: Manufacturer's standard corrosion resistant, nonstaining, nonbleeding; compatible with adjacent materials.
 - a. Reinforcement: Reinforce members as required to retain fastener threads.

- b. Exposed Fasteners: Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

2.05 ELECTRIC HYDRAULIC DOOR OPERATOR

- A. General: manufacturer's standard for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Comply with the following:
 - 1. Electrical wiring: Furnished completely, factory installed wired motor, wired for 208V single phase. With 5HP-pump, valving, and reservoir all in a self contained unit
 - 2. Connections: Provide connections for power and control wiring.
 - 3. Provide 40 Amp circuit breaker.
 - 4. On/Off Feature: Provide on/off/hold-open switch to control power to operator.

2.06 ACTIVATION AND SAFETY DEVICES

- A. Restrictors: Hydraulic cylinders to have restrictors that will cause the door, in case of failure, to settle closed no less than 1 to 1 ½ minutes.
- B. Activation Device: The activation device shall be of a manual control type, allowing the door to stop regardless of position once the device is released

2.07 HARDWARE

- A. Heavy-Duty Hardware: Provide units as indicated in size, number, and type recommended by manufacturer doors required. Finish exposed parts to match door finish, unless otherwise indicated.
- B. Compression Weather Stripping: Manufacturer's standard replaceable, compressible gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287. Include bumper-type gaskets at door stops

2.08 ELECTRIC CONTROLS

- A. Electric components placed next to the door opening in a location to meet the requirements of N.E.C. section 513. NEMA type 1: "open-close-stop" push button control wired for 24 volts standard. Wired to require constant pressure for door to raise and lower.
- B. All electrical wiring from the electric motor operator internal to the push button control shall be factory wired.

2.09 FABRICATION

- A. General: Fabricate one-piece upward swinging door system components to designs, sizes, and thicknesses specified and to comply with indicated standards.
- B. Prefabrication: Provide doors as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
 - 1. Do not drill and tap for surface-mounted hardware items until time of installation at Project site.
 - 2. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metalwork in manner that prevents damage to exposed finish surfaces. For hardware, perform these operations before applying finishes.
 - 3. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

4. Prepare components to receive concealed fasteners and anchor and connection devices.
5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
6. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
7. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
8. Hardware: Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operation and for delivery to and installation at Project site.
9. Framing: Fabricate tubular and channel frame assemblies in configuration indicated, with welded or mechanical joints according to manufacturer's standards. Provide subframes and reinforcement of types indicated or, if not indicated, as needed for a complete system to support required loads.
 - a. Exterior Framing: Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior. Provide anchorage and alignment brackets for concealed support of assembly from the building structure. Allow for thermal expansion of exterior units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions before starting work.
- B. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- C. Verify that electrical power is available and of the correct characteristics.
- D. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of door.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating door installation.

3.03 INSTALLATION

- A. General: Install door unit assembly in accordance with manufacturer's written installation instructions, unless more stringent requirements are indicated. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Installation shall meet all requirements of building code and applied loads.
- B. Anchor assembly to floor and building framing without distortion or stress.
- C. Fit and align door assembly including hardware.
- D. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by

manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

- E. Door Operators: Install door operator system, including control wiring, as follows:
 - 1. Refer to Division 16 Sections for connection to electrical power distribution system.
 - 2. Activation and Safety Devices: Install control devices and wiring, including connections to door operators.
 - 3. Coordinate installation of electrical service. Complete power and control wiring from electrical controls to building mains power.
 - 4. Install perimeter trim, closures and weather stripping.

3.04 ADJUSTING

- A. Inspection of the doors and complete operating test will be made by the installer in the presence of the general contractor and 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 door during construction until the building is turned over to the owner and final inspection is made.
- B. Adjust door operators, controls, and hardware for smooth and safe operation and for weather tight closure.
- C. Readjust door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic. Lubricate hardware, operating equipment, and other moving parts.

3.05 CLEANING AND PROTECTION

- A. Clean surfaces and repaint abraded or damaged primed surfaces to match factory-applied finish.
- B. Provide final protection and maintain conditions, including limiting construction traffic, that ensure doors are without damage or deterioration at time of Substantial Completion.

3.06 DEMONSTRATION

- A. Engage manufacturer's representative to train Owner's maintenance personnel to adjust, operate, and maintain doors and operators.

END OF SECTION 08 36 21

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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. Metal stud wall framing.
- C. Gypsum wallboard.
- D. Joint treatment and accessories.

1.02 SUBMITTALS

- A. Shop Drawings: Indicate special details associated with fireproofing.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

PART 2 PRODUCTS**2.01 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
 - 1. Fire Rated Partitions: As indicated on drawings.
 - 2. Fire Rated Structural Column Framing: As indicated on drawings.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com/#sle.
 - 2. Jaimes Industries: www.jaimesind.com/#sle.
 - 3. Marino; [____]: www.marinoware.com/#sle.
 - 4. SCAFCO Corporation: www.scafco.com/#sle.
- 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. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

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.
- 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, unless otherwise indicated.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold resistant board is required at all locations.

3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
4. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch, unless otherwise noted.
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
5. Long Edges: Tapered.

2.04 ACCESSORIES

- A. 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.
- B. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 2. Ready-mixed vinyl-based joint compound.
- C. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- D. 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 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Studs: Space studs as indicated.
 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 2. 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. Furring for Fire Ratings: Install as required for fire resistance ratings indicated.
- D. Blocking: Install mechanically fastened steel channel blocking for support of:
 1. Framed openings.
 2. Plumbing fixtures.
 3. Toilet accessories.
 4. Wall mounted door hardware.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

- C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- 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 follows:
 - 1. Not more than 30 feet apart on walls 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 and as indicated.

3.05 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. 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.
- C. 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.

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

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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. Ceramic accessories.
- D. Ceramic trim.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
- B. Section 09 21 16 - Gypsum Board Assemblies: Tile backer board.

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. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Tile: 2 percent of each size, color, and surface finish combination.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.05 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS**2.01 TILE**

- A. Manufacturers:
 - 1. American Olean Corporation: www.americanolean.com/#sle.
 - 2. Dal-Tile Corporation: www.daltile.com/#sle.
 - 3. Tectura Designs, a division of Wausau Tile Inc; [____]: www.tecturadesigns.com/#sle.
- B. Porcelain Tile, Type [____]: ANSI A137.1 standard grade.
 - 1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
 - 2. Size: 6 by 6 inch As indicated on drawings, nominal.
 - 3. Thickness: 5/16 inch.
 - 4. Edges: Square.
 - 5. Surface Finish: Non-slip.
 - 6. Color(s): To be selected by Architect from manufacturer's standard range.

7. Trim Units: Matching bullnose and cove base shapes in sizes coordinated with field tile.

2.02 TRIM AND ACCESSORIES

- A. Ceramic Trim: Matching bullnose and cove base ceramic shapes in sizes coordinated with field tile.
 1. Applications:
 - a. Open Edges: Bullnose.
 - b. Inside Corners: Jointed.
 - c. Floor to Wall Joints: Cove base.
 2. Manufacturers: Same as for tile.

2.03 SETTING MATERIALS

- A. Manufacturers:
 1. Bostik Inc; [____]: www.bostik-us.com/#sle.
 2. LATICRETE International, Inc: www.laticrete.com/sle.
 3. ProSpec, an Oldcastle brand: www.prospec.com.
 4. TEC, an H.B. Fuller Construction Products Brand; [____]: www.tecspecialty.com/#sle.
- B. 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.
 3. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.
- C. Organic Adhesive: ANSI A136.1, thinset mastic type.
 1. Use Type I in areas subject to prolonged moisture exposure.

2.04 GROUTS

- A. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
 1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
 2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
 3. Color(s): As selected by Architect from manufacturer's full line.
 4. Products:
 - a. LATICRETE International, Inc: www.laticrete.com/#sle.
 - b. ProSpec, an Oldcastle brand: www.prospec.com.
 - c. TEC, an H.B. Fuller Construction Products Brand: www.tecspecialty.com/#sle.

2.05 MAINTENANCE MATERIALS

- A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
 1. Applications: Between tile and plumbing fixtures.

2. Color(s): As selected by Architect from manufacturer's full line.
3. Products:
 - a. LATICRETE International, Inc; LATICRETE LATASIL: www.laticrete.com/#sle.

2.06 ACCESSORY MATERIALS

- A. Underlayment at Floors: Specifically designed for bonding to thin-set setting mortar; not primarily a waterproofing material and having the following characteristics:
 1. Crack Resistance: No failure at 1/16 inch gap, minimum; comply with ANSI A118.12.
 2. Water Resistance: Comply with ANSI A118.10, bonded waterproofing.
 3. Uncoupling Function: Allow for separation between membrane and the mortar adhering tile to the membrane when subjected to excessive substrate movement.
 4. Type: Fluid or Trowel Applied.
 - a. Products:
 - 1) LATICRETE International, Inc; LATICRETE 125 Sound and Crack Adhesive: www.laticrete.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.
- D. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. 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 bullnosed.
- F. Sound tile after setting. Replace hollow sounding units.
- G. Keep control and expansion joints free of mortar, grout, and adhesive.

- H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- I. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- J. 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.
 - 1. Use uncoupling membrane under all tile unless other underlayment is indicated.

3.05 INSTALLATION - WALL TILE

- A. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

3.06 CLEANING

- A. Clean tile and grout surfaces.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 7 days after installation.

END OF SECTION

SECTION 09 91 23 - PAINTING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following: All shop primed metal (red iron) all surfaces to be primed and finished.
 - 1. Mechanical and Electrical:
 - a. In all areas, paint shop-primed items.
- 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. Glass.
 - 9. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating 2005 (Reapproved 2017).
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- D. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- E. SSPC-SP 2 - Hand Tool Cleaning 2018.
- F. SSPC-SP 13 - Surface Preparation of Concrete 1997 (Reaffirmed 2003).

1.03 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 colors available for each surface finishing product scheduled.
- C. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.
- D. 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.
- E. 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.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five 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 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.
- 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. Sherwin-Williams Company: www.sherwin-williams.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. 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.
 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 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. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by Architect after award of contract. Colors indicated on drawings are basis of design and subject to change.

2.03 PAINT SYSTEMS

- A. Exterior Surfaces to be Painted, Unless Otherwise Indicated.
1. Two top coats and one coat primer.
 2. Top Coat(s): Exterior Light Industrial Coating, Water Based; MPI #161, 163, or 164.
 - a. Products:
 - 1) Sherwin-Williams Pro Industrial DTM Acrylic Semi-Gloss.
 3. Primer: As recommended by top coat manufacturer for specific substrate.
- B. Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, uncoated steel, and shop primed steel.
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) Sherwin-Williams Pre-Catalyzed Waterbased Epoxy, Eg-Shel. (MPI #139)
 - 2) Sherwin-Williams Armorseal Rexthane 1, Gloss. (Floor Coating)
 - 3) Sherwin-Williams Pro Industrial DTM Acrylic Semi-Gloss.
 3. Primer: As recommended by top coat manufacturer for specific substrate.
- C. 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) Sherwin-Williams Pro Industrial Waterbased Catalyzed Epoxy, Gloss. (MPI #115)
4. Primer: As recommended by top coat manufacturer for specific substrate.
- D. Medium Duty Vertical and Overhead: Including uncoated steel and shop primed steel.
 1. Two top coats and one coat primer.
 2. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
 - a. Products:
 - 1) Sherwin-Williams Pro Industrial Waterbased Catalyzed Epoxy, Gloss. (MPI #115)
 3. Top Coat(s): Vertical Gypsum Board, High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
 - a. Products:
 - 1) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, Eg-Shel. (MPI #139)
 4. Top Coat(s): Gypsum Board Ceilings, Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.
 - a. Products:
 - 1) Sherwin-Williams Pro Industrial DTM Acrylic Semi-Gloss.
 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. Alkali Resistant Water Based Primer; MPI #3.
 - a. Products:
 - 1) Sherwin-Williams Pro Industrial Pro-Cryl Universal Acrylic
 - 2) Sherwin-Williams Armorseal 1000HS Epoxy
 - 3) Sherwin-Williams ProMar 200 Zero VOC Latex

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. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. 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. Gypsum Wallboard: 12 percent.
2. 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 repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. 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. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- 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. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- J. Ferrous Metal:
 1. Solvent clean according to SSPC-SP 1.
 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 3. 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.
- K. 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 13 34 19 - METAL BUILDING SYSTEMS**PART 1 GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SCOPE OF WORK

- A. The Contractor shall finish all necessary labor, materials, equipment and services to furnish and erect pre-engineered metal buildings as indicated on the drawings and described herein.
- B. **Florida Building Code:** Pre-engineered metal building shall be designed for all loads and loading conditions for structural design requirements and design load combinations that shall comply with the Florida Building Code 2020, 7th Edition, including all addenda and supplemental information. Project location is at Fernandina Beach Municipal Airport, Nassau County. The building shall be designed for an Unreduced Live Load = 20 PSF and Ultimate Wind Speed (3 Second Gusts), V = 130 MPH.
 - 1. Documentation shall be provided signed and sealed by a licensed Florida Structural Engineer to satisfy requirements of the building department that building meets wind borne debris requirements.
- C. The Hangar subcontractor shall supply the required foundation reactions to confirm the foundation design prior to construction. Also, the Hangar subcontractor shall provide necessary anchor bolt layout plan, drawings and documents and shall assist in obtaining all local building permits and facilitate building erection.
- D. The Hangar package shall be supplied as a complete system by a manufacturer who has provided hangar doors and buildings for a minimum of five years.
- E. **Bid Alternates:**
 - 1. Provide Bid Alternate 1 for Hangar #6 Expansion as shown on Sheets A-100A Floor Plan and A-200A Exterior Elevations to include Hangar Sliding Doors in lieu of Hangar Outswing Doors. Contractor to provide all items required for a fully complete Hangar #6 Building Expansion Alternate 1 that meets all required building codes. Bid Alternate 1 should included complete comparable breakdowns of proposed costs between Base Bid and Bid Alternate 1 for Hangar #6 Expansion including debits or credits for all other items effected but not limited to: Mechanical, Plumbing, Electrical, Civil, etc., as required for a complete project and certificate of occupancy.

1.03 SUMMARY

- A. Section Includes but not necessarily limited to the following:
 - 1. Structural-steel framing system.
 - 2. Metal roof panels.
 - 3. Metal wall panels.
 - 4. Metal soffit panels.
 - 5. Gutters and downspouts.
 - 6. Thermal insulation for Manufacturer-engineered steel building.
 - 7. Horizontal sliding hangar doors.
 - 8. Exterior doors and frames, overhead coiling doors, and louvers.

9. Hangar Doors - Sliding.
10. Hangar Doors - Overhead Upward Swinging, Higher Power Door System.
11. Standard accessories and trim for pre-engineered metal buildings including eave trim, ridge trim, door trim, corner trim, flashing, roof vent, etc.

1.04 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealing joints between accessory components and wall system.
- B. Section 08 11 13 - Hollow Metal Doors and Frames.
- C. Section 08 33 23 - Overhead Coiling Doors: for coiling vehicular doors in metal building systems.

1.05 REFERENCE STANDARDS

- A. AISC 360 - Specification for Structural Steel Buildings 2016.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process 2010 (Reapproved 2015).
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- E. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures 2016.
- F. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- G. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2017.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
- I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.
- J. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength 2018.
- K. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.
- L. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
- M. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems 2018.
- N. MBMA (MBSM) - Metal Building Systems Manual 2012.
- O. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies Current Edition, Including All Revisions.

1.06 DEFINITIONS

- A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in standards referenced by this Section.

1.07 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 not limited to, the following:
 - a. Conditions of foundations and other preparatory work performed by other trades.
 - 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.

1.08 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 each type of the following:
 - a. Structural-framing system
 - b. Metal roof panels.
 - c. Metal wall panels.
 - d. Metal soffit panels.
 - e. Thermal insulation and vapor-retarder facings.
 - f. Flashing and trim.
 - g. Personnel doors and frames.
 - h. Roof ventilators.

- i. Louvers.
 - j. Gutters and downspouts.
 - k. Accessories.
- B. Shop Drawings: The manufacturer shall prepare complete shop and erection drawings for pre-engineered metal buildings. Shop drawings shall indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, and loads; wall and roof system dimensions, panel layout, general construction details, anchors and methods of anchorage, and installation; framing anchor bolt settings, sizes, locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature. Shop Drawings shall be submitted to the Engineer/Architect for review and approval. The Engineer's/Architect's review of shop drawings will be for compliance with general design requirements and arrangement of members. The Engineer's/Architect's review and approval of shop drawings shall not relieve the manufacturer of his responsibility for the design and strength of pre-engineered metal building components and their connections, correctness of dimensions shown on shop drawings and general fit-up of parts to be erected. Shop drawings shall include adequately dimensioned anchor bolt setting plans. Shop drawings shall be accompanied by complete design calculations with design loads and design criteria. Shop drawings and design calculations shall be signed and sealed by a Registered Professional Engineer permanently employed by the manufacturer. Indicate components by others. Include but not limited to, full building plans, elevations, sections, details and the following:
1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 2. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach metal building to foundation. Indicate column reactions at each location.
 3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
 - a. Show provisions for attaching service walkways.
 4. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal 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, lighting fixtures, and roof ventilators.
 - b. Show wall-mounted items including personnel doors, vehicular doors, hangar doors, windows, louvers, and lighting fixtures.
 - c. Show translucent panels.
 5. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
 - a. Flashing and trim.
 - b. Gutters.

- c. Downspouts.
 - d. Roof ventilators.
 - e. Service walkways.
- C. Color Charts: Color charts shall be submitted to the Engineer/Architect for selection of panel and trim colors.
- D. Samples for initial Selection: For units with factory-applied finishes submit two samples of precoated metal panels for each type of building component with factory applied color finish selected, illustrating color and texture of finish.
- E. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below for the following products:
- 1. Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
 - 2. Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.
 - 3. Vapor-Retarder Facings: Nominal 6-inch-square Samples.
 - 4. Accessories: Nominal 12-inch-long Samples for each type of accessory.
- F. Door Schedule: For doors and frames. Use same designations indicated on Drawings. Include details of reinforcement.
- 1. Door Hardware Schedule: Include details of fabrication and assembly of door hardware. Organize schedule into door hardware sets indicating complete designations of every item required for each door or opening.
 - 2. Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.
- G. 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.
- H. Manufacturer's Instructions: Indicate preparation requirements, anchor bolt placement.
- I. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.
- J. Designer's Certification Statement.
- 1. Letter of Design Certification: The pre-engineered metal building manufacturer shall issue a letter of certification typed on their letterhead certifying that the design, fabrication, and erection of pre-engineered metal building comply with the approved shop drawings and these specifications. This letter shall be Signed and sealed by a qualified Registered Professional Engineer licensed in the State of Florida. Include the following:
 - a. Name and location of Project.
 - b. Order number.
 - c. Name of manufacturer.
 - d. Name of Contractor.
 - e. Building dimensions including width, length, height, and roof slope.
 - f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 - g. Governing building code and year of edition.

- h. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
 - i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
 - j. Building-Use Category: Indicate category of building use and its effect on load importance factors.
 - k. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.
- K. 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.
- L. Erector's Qualification Statement.
- 1. Erector Certificates: For qualified erector, from manufacturer.
- M. Welding certificates: Certificates of qualifications of all welders, tackers and welding operators issued within the previous 12 months by an agency acceptable to the Engineer/Architect shall be furnished to the Engineer/Architect for all such personnel performing field welding on pre-engineered metal building.
- N. Material Test Reports: For each of the following products:
- 1. Structural steel including chemical and physical properties.
 - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shop primers.
 - 5. Nonshrink grout.
- O. Project Record Documents: Record actual locations of concealed components and utilities.
- P. 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.
- Q. Source quality-control reports.
- R. Field quality-control reports.
- S. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.
- T. Sample Warranties: For special warranties.
- U. Maintenance Data: For metal panel finishes and door hardware to include in maintenance manuals.

1.09 QUALITY ASSURANCE

- A. Replacements

1. In the event of damage to materials or work in place, all necessary repairs and replacements shall be immediately made to the satisfaction of the Engineer/Architect at no additional cost to the Owner.
 2. Damaged materials shall be repaired or replaced at the option of the Engineer/Architect.
 3. Any rejected material shall be immediately removed from the jobsite and replaced by new material at no additional cost to the Owner.
- B. Acceptance and Tolerances
1. Work failing to comply with any part of these specifications will be subject to rejection by the Engineer/Architect.
 2. Bent or disfigured components will not be accepted.
 3. Insulation with torn facing material will not be accepted at exposed locations within the finished structure.
- C. Product Certificates: For each type of Hurricane Product Approved building component.
- D. Certificate of compliance: Certificate of compliance with project drawings and specifications shall be submitted to the Engineer/Architect.
- E. Qualifications of Workmen
1. All workmen and their supervisors engaged in the fabrication and erection of pre-engineered metal building shall be employees of a current member of the Metal Building Manufacturer's Association or a factory authorized erector.
 2. As a manufactured product, the design, detailing, fabrication and erection of pre-engineered metal buildings shall be performed by or under the direct supervision of a Registered Professional Engineer who is a permanent full-time employee of the manufacturer of the pre-engineered metal buildings.
 3. Pre-engineered metal building shall be erected by the manufacturer or by a factory authorized and licensed erection subcontractor.
- F. 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.
- G. Perform work in accordance with AISC 360 and MBMA (MBSM).
1. Maintain one copy on site.
 2. All necessary means shall be used to protect materials specified under this Section from damage before, during and after installation.
 3. The work of other trades shall be adequately protected from damage resulting from work specified under this Section.
- H. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
- I. Manufacturer Qualifications: A qualified manufacturer company specializing in the manufacture of products similar to those required for this project.
1. Not less than five years of documented experience.

2. Accreditation: Manufacturer's facility accredited according to the International Accreditation Service's in accordance with IAS AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
 3. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.
- J. Erector Qualifications: Company with an experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer with minimum five years documented experience.
- K. Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.
- L. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Build mockup of typical wall area as shown on Drawings.
 2. Build mockups for typical wall metal panel including accessories.
 - a. Size: 48 inches long by 48 inches.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.10 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
- D. The Contractor shall exercise care in unloading, storing and erecting pre-engineered building components to prevent damage to material and shop finish. All steel shall be stored a minimum of six (6) inches above ground on adequate supports. Material shall be kept free from dirt, grease, and other foreign matter. Clean steel of all dirt, grease and foreign matter prior to erection.
- E. Framing material shall be stored in such a manner that water will shed off material with no pockets for accumulation.
- F. Panels, insulation, and trim shall be stored under watertight coverings at least six (6) inches above ground on adequate supports.

1.11 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.

1.12 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. Basis-of-Design Product: Subject to compliance with requirements, provide Metal Building System by Dean Steel Buildings: www.deansteelbuildings.com or Approved Equal comparable product by one of the following:
 - 1. Butler Manufacturing Company: www.butlermfg.com.
 - 2. Ceco Building Systems; Division of NCI Building Systems, L.P.: www.cecobuildings.com.
 - 3. Kirby Building Systems; Division of Magnatrx Corp.: www.kirbybuildingsystems.com/#sle.
 - 4. American Buildings Company; Division of Magnatrx Corp.
 - 5. Nucor Building Systems: www.nucorbuildingsystems.com/#sle.
 - 6. Vulcan Steel Structures, Inc.
 - 7. VP Buildings; a United Dominion Company: www.vp.com/#sle.
- B. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

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. Primary-Frame Type:
 - 1. Rigid Frame Modular: Solid-member, structural-framing system with interior columns.
- C. Primary Framing: Rigid frame of rafter beams and columns, canopy beams, intermediate columns, braced end frames, and end wall columns, and wind bracing.
- D. Secondary Framing: Purlins, Girts, Eave struts, Flange bracing, Sill supports, and Clips, and other items detailed.
 - 1. Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.
- E. Wall System: Preformed metal panels of vertical profile, with sub-girt framing/anchorage assembly, and accessory components. Manufacturer's standard exposed-fastener, tapered-rib, metal wall panels.

1. Liner Panels Interior Partitions Wall System: Tapered rib.
- F. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, consisting of primary frame, capable of supporting one-half of a bay design load, and end-wall columns.
- G. Eave Height: Manufacturer's standard height, as indicated by nominal height on Drawings.
- H. Bay Spacing: As indicated on Drawings.
- I. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly and insulation, and accessory components. Manufacturer's standard standing-seam, trapezoidal-rib, metal roof panels.
- J. Roof Slope: 1 inch per 12 inches, unless otherwise indicated.

2.03 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified Professional Engineer to design metal building system, including comprehensive engineering analysis using performance requirements and design criteria indicated.
- B. Installed Thermal Resistance of Roof System at T-hangars (by GC): R-value of 10.
- C. Installed Thermal Resistance of Roof System at Box Hangars (by GC): R-value of 10.
- D. Design structural members to withstand dead load, and design loads due to pressure and suction of wind calculated in accordance with applicable code.
- E. Design structural members to withstand Class 90 wind uplift in accordance with UL 580.
- F. 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. 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."
 3. Deflection and Drift Limits: Design metal building system assemblies to withstand design loads with deflection limits no greater than the following:
 - a. Purlins and Rafters: Vertical deflection of 1/240 of the span.
 - b. Girts: Horizontal deflection of 1/180 of the span.
 - c. Metal Roof Panels: Vertical deflection of 1/240 of the span.
 - d. Metal Wall Panels: Horizontal deflection of 1/240 of the span.
 - e. Design secondary-framing systems to accommodate deflection of primary framing and construction tolerances, and to maintain clearances of openings.
 - f. Lateral Drift: Maximum of 1/100 of the building height.
- G. Seismic Performance: Metal building system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 .
- H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, undue stress on fasteners, 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, ambient; 180 deg F, material surfaces.

- I. Fire-Resistance Ratings: Where assemblies are indicated to have a fire-resistance rating, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 or ASTM E 108 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory," FM Global's "Approval Guide," or from the listings of another qualified testing agency.
- J. Fire Propagation Characteristics: Exterior wall assemblies containing foam plastics pass NFPA 285 fire test.
- K. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- L. Structural Performance for Metal Roof and 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.
- M. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. 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..
- N. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 1.57 lbf/sq. ft..
- O. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 or ASTM E 331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 2.86 lbf/sq. ft..
- P. Water Penetration for 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..
- Q. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 - 1. Uplift Rating: UL 90.
- R. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
 - 1. Fire/Windstorm Classification: Class 1A-120.
 - 2. Hail Resistance: SH.
- S. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.
- T. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

2.04 STRUCTURAL STEEL FRAMING

- A. Structural Steel Members: Comply with AISC 360, "Specification for Structural Steel Buildings."

- B. Anchor Bolts: ASTM F1554, Grade 36, Class 1A, with hot dip type for protective coating.
- C. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- D. Welding Materials: Type required for materials being welded.
- E. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- F. 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.
 - b. Rigid Modular Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
 - c. Frame Configuration: Single gable and One-directional, sloped.
 - d. Exterior Column: **Tapered**.
 - e. Rafter: **Tapered**.
- G. 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.
- H. 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-- wide flanges.
 - a. Depth: As indicated on Drawings.
 - b. Purlins to be Galvanized Steel.
 - 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-wide flanges.
 - a. Depth: As indicated on Drawings.
 - b. Girts to be Galvanized Steel.
 - 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 structural-steel angles or 1-inch-diameter, cold-formed structural tubing to stiffen primary-frame flanges.
 - 5. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.

6. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch, 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.
- I. Bracing: Provide adjustable wind bracing using any method as follows:
1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2 inch-diameter steel; threaded full length or threaded a minimum of 6 inches each end.
 2. Cable: ASTM A 475, minimum 1/4 inch-diameter, extra-high-strength grade, Class B, zinc-coated, seven-strand steel; with threaded end anchors.
 3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
 4. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
 5. Fixed-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
 6. Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels.
- J. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation.
- K. Materials:
1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 55; or ASTM A 529/A 529M, Grade 55.
 2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 55; or ASTM A 529/A 529M, Grade 55.
 3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 55; or ASTM A 529/A 529M, Grade 55.
 4. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
 5. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70; or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80, or HSLAS, Grades 45 through 70.
 6. 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, or HSLAS or HSLAS-F, Grades 50 through 80; with G90 coating designation.

7. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
 - a. Finish: Plain.
8. Structural Bolts, Nuts, and Washers: ASTM A 325 , Type 1, heavy-hex steel structural bolts; ASTM A 563 heavy-hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
 - a. Finish: Plain.
9. High-Strength Bolts, Nuts, and Washers: ASTM A 490 , Type 1, tension-control, bolt-nut-washer assemblies with spline ends; ASTM A 563 heavy-hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers, plain.
10. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with spline ends.
 - a. Finish: Plain.
11. Unheaded Anchor Rods: ASTM A 572/A 572M, Grade 50.
 - a. Configuration: Straight.
 - b. Nuts: ASTM A 563 heavy-hex carbon steel.
 - c. Plate Washers: ASTM A 36/A 36M carbon steel.
 - d. Washers: ASTM F 436 hardened carbon steel.
 - e. Finish: Plain.
12. Headed Anchor Rods: ASTM F 1554, Grade 36.
 - a. Configuration: Straight.
 - b. Nuts: ASTM A 563 heavy-hex carbon steel.
 - c. Plate Washers: ASTM A 36/A 36M carbon steel.
 - d. Washers: ASTM F 436 hardened carbon steel.
 - e. Finish: Plain.
13. Threaded Rods: ASTM A 572/A 572M, Grade 50.
 - a. Nuts: ASTM A 563 heavy-hex carbon steel.
 - b. Washers: ASTM F 436 hardened carbon steel.
 - c. Finish: Plain.
- L. 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.
 - a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil mil on each side.
- M. 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.
 3. Height Change, Plastic State: When tested in accordance with ASTM C827/C827M:
 - a. Maximum: Plus 4 percent.
 - b. Minimum: Plus 1 percent.

2.05 METAL ROOF PANELS

- A. Material: Steel Sheet: ASTM A792/A792M aluminum-zinc alloy coated to AZ50/AZM150.

- B. 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: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch 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: Two-piece floating to accommodate thermal movement.
 - 3. Joint Type: Mechanically seamed.
 - 4. Panel Coverage: 24 inches.
 - 5. Panel Height: 3 inches.
 - 6. Uplift Rating: UL 90.
- C. Clips: Manufacturer's standard, floating type to accommodate thermal movement, fabricated from zinc-coated (galvanized) steel, aluminum-zinc alloy-coated steel or stainless steel sheet.
- D. 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.

2.06 METAL WALL PANELS

- A. Material: Steel Sheet: ASTM A792/A792M aluminum-zinc alloy coated to AZ50/AZM150.
- B. Exposed-Fastener, Tapered-Rib, Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
 - 1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch 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 indicated by manufacturer's designations.
 - 2. Major-Rib Spacing: 12 inches o.c.
 - 3. Panel Coverage: 36 inches.
 - 4. Panel Height: 1.25 inches.
- C. Interior Partition Walls, Tapered-Rib, Metal Liner Panels : Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Zinc-coated (galvanized) steel sheet, 0.018-inch nominal uncoated steel thickness.
 - a. Finish Color: Galvalume
 2. Major-Rib Spacing: 12 inches o.c.
 3. Panel Coverage: 36 inches.
 4. Panel Height: **1.25 inches**.
- D. 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 mil.

2.07 METAL SOFFIT PANELS

- A. General: Provide factory-formed metal soffit panels designed to be 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. Include accessories required for weathertight installation.
- B. Metal Soffit Panels: Match profile and material of metal wall panels.
 1. Finish: Match finish and color of metal wall panels.
- C. Exposed-Fastener, Tapered-Rib-Profile, Metal Soffit Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
 1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch 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. Major-Rib Spacing: 12 inches o.c.
 3. Panel Coverage: 36 inches.
 4. Panel Height: 1.125 inches.

2.08 THERMAL INSULATION

- A. Reflective Insulation: Reflective Bubble Insulation.
 1. Description: 3/16 inch single bubble with facing on both sides.
 2. Compliance:
 - a. ASTM C-1224-03 Standard Specification of Reflective Insulation
 - b. Energy Star Partner
 3. Facing: Metalized Film on one side and White Polyethylene on other side.
 4. Testing:
 - a. Water Vapor Performance, ASTM E 96: 0.00.
 - b. Flammability, ASTM E 84/2599:

- 1) Facing: Reflective/Poly.
 - (a) Flame Spread Rating : <25 (Single Bubble and Double Bubble)
 - (b) Smoke Developed Rating: <50 (Single Bubble and Double Bubble)
 - (c) Category: Class A; includes flame retardant additives throughout plastic layers
- 2) Seal Joints: integrated tape tab or with manufacturer approved foil or white poly tape to match exposed surface.
- 3) Corrosiveness, ASTM D 3310 : None.
- 4) Pliability, ASTM C-1224-03, Section 9.5.2.4 : None.
- 5) Bleeding & Delamination, ASTM C-1224-03, Section 9.5.1.4 : None.
- 6) Mold & Mildew, ASTM C-1338 : Pass.
- 7) Tensile Test, ASTM D 638-01: Single Bubble
 - (a) Tensile Strength MD 33.0 psi
 - (b) Tensile Strength TD 21.4 psi
 - (c) Tear Strength MD 2.6 psi
 - (d) Tear Strength TD 3.2 psi
 - (e) Compression Strength 57.3 psi
- 8) Thermal Performance, ASTM E408-71 (2002):
 - (a) Emissivity : 0.03.
 - (b) Reflectivity: 97%.
 - (c) Service Temperature: -50 degrees F to 180 degrees F.
- 9) R-Values are based on Heat Flow Down and Includes Lower Air Film - Tested in accordance with ASTM C 236, ASTM STP 1116, and ASHRAE Book of Fundamentals and National Bureau of Standards.
 - (a) Drape over Purlins with 1" airspace: Reflective/Poly Facing: R- 10 min..

2.09 PERSONNEL DOORS AND FRAMES

- A. Swinging Personnel Doors and Frames: Metal building system manufacturer's standard doors and frames; prepared and reinforced at strike and at hinges to receive factory- and field-applied hardware according to BHMA A156 Series.
 1. Steel Doors: 1-3/4 inches thick; fabricated from metallic-coated steel face sheets, 0.036-inch nominal uncoated steel thickness, of seamless, hollow-metal construction; with 0.060-inch nominal uncoated steel thickness, inverted metallic-coated steel channels welded to face sheets at top and bottom of door.
 - a. Design: Flush panel.
 - b. Core: Polystyrene foam with U-factor rating of at least 0.16 Btu/sq. ft. x h x deg F.
 2. Steel Frames: Fabricate 2-inch-wide face frames from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.060-inch nominal uncoated steel thickness.
 - a. Type: Knocked down for field assembly.
 3. Fabricate concealed stiffeners, reinforcement, edge channels, and moldings from either cold- or hot-rolled steel sheet.
 4. Hardware:
 - a. Provide hardware for each door leaf, as follows:
 - 1) Hinges: BHMA A156.1. Three antifriction-bearing, standard-weight, full-mortise, stainless-steel or bronze, template-type hinges; 4-1/2 by 4-1/2 inches, with

- nonremovable pin.
 - 2) Lockset: BHMA A156.2. Key-in-lever cylindrical type.
 - 3) Threshold: BHMA A156.21. Extruded aluminum.
 - 4) Silencers: Pneumatic rubber; three silencers on strike jambs of single door frames and two silencers on heads of double door frames.
 - 5) Closer: BHMA A156.4. Surface-applied, standard-duty hydraulic type.
 - 6) Weather Stripping: Vinyl applied to head and jambs, with vinyl sweep at sill.
5. Anchors and Accessories: Manufacturer's standard units, galvanized according to ASTM A 123/A 123M.
6. Fabrication: Fabricate doors and frames to be rigid; neat in appearance; and free from defects, warp, or buckle. Provide continuous welds on exposed joints; grind, dress, and make welds smooth, flush, and invisible.
- B. Materials:
- 1. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, CS, Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.
- C. Finishes for Personnel Doors and Frames:
- 1. Prime Finish: Factory-apply manufacturer's standard primer immediately after cleaning and pretreating.
 - 2. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
 - 3. Factory-Applied Paint Finish: Manufacturer's standard, complying with SDI A250.3 for performance and acceptance criteria.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.10 HORIZONTAL SLIDING DOORS

- A. Horizontal-Sliding Doors: Manufacturer's standard horizontal-sliding door assembly including structural frame, door panels, brackets, guides, tracks, hardware, and installation accessories.
- 1. Door Frames: Channels and zeeks; metallic-coated steel sheet or structural-steel shapes, 0.060-inch nominal uncoated steel thickness.
 - 2. Door Panels: Same material and finish as metal wall panels.
 - 3. Hardware: Manufacturer's standard metallic-coated steel track, bottom guides, lock angles for side closure, and brackets. Support each door leaf by two four-wheel trolleys. Provide metallic-coated steel handle for each leaf, and slide bolt or padlock hasp. Flash top of track with metallic-coated steel sheet hood.

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, fascia, 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.
 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-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 standoff; fabricated from extruded polystyrene.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, 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-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: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch 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: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch 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: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch 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-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: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot- long sections, complete with formed elbows and offsets.
1. Mounting Straps: Fabricated from same material and finish as gutters.
- G. Service Walkways: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048-inch nominal uncoated steel thickness, steel plank grating; with slip-resistant pattern; 36-inch overall width. Support walkways on framing system anchored to metal roof panels without penetrating panels; with predrilled holes and clamps or hooks for anchoring.
- H. Roof Ventilators: Gravity type, complete with hardware, flashing, closures, and fittings.
1. Continuous or Sectional-Ridge Type: Factory-engineered and -fabricated, continuous unit; Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match metal roof panels. Fabricated in minimum 10-foot- long sections. Provide throat size and total length indicated, complete with side baffles, ventilator assembly, end caps, splice plates, and reinforcing diaphragms.
 - a. Bird Screening: Galvanized steel, 1/2-inch-square mesh, 0.041-inch wire; or aluminum, 1/2-inch-square mesh, 0.063-inch wire.
 - b. Throat Size: 12 inches.
- I. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.
- J. 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 or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM sealing washer.
 - b. Fasteners for Metal Wall Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, 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 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.
- K. Reflective Insulation: Single Bubble type faced with Metalized Film on one side and White Polyethylene on the other side.
- L. Joint Seal Gaskets: Manufacturer's standard type.
- M. Fasteners: Manufacturer's standard type, galvanized to comply with requirements of ASTM A153/A153M, finish to match adjacent surfaces when exterior exposed.
- N. Bituminous Paint: Asphaltic type.
- O. Sealant: ASTM C920, elastomeric sealant with movement capability of at least plus/minus 50 percent; 100 percent silicone; for exposed applications, match adjacent colors as closely as possible.
- P. Metal Mesh: Galvanized steel wire, woven.
- Q. Trim, Closure Pieces, Caps, Flashings, Gutters, Downspouts, Rain Water Diverter, Fascias, and Infills: Manufacturers standard type. Same material, thickness and finish as exterior sheets; brake formed to required profiles.

2.12 COMPONENTS

- A. Doors and Frames: Manufacturer's standard.
- B. Wall Louvers: Florida Product Approved Impact Rated type wind driven rain fixed blade design, same finish as adjacent material, with steel mesh insect screen and frame, blank sheet metal at unused portions.

2.13 FABRICATION - FRAMING

- 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. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.
- F. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.
- G. Provide wall opening framing for doors, windows, and other accessory components.

2.14 FABRICATION - WALL AND ROOF PANELS

- A. 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.
- B. Girts/Purlins: Rolled formed structural shape to receive siding, roofing sheet.
- C. Internal and External Corners: Same material thickness and finish as adjacent material, profile brake formed to required angles. Back brace mitered internal corners.
- D. Expansion Joints: Same material and finish as adjacent material where exposed, manufacturer's standard brake formed type, of profile to suit system.
- E. Flashings, Closure Pieces, Fascia, Infills, and Caps: Same material and finish as adjacent material, profile to suit system.
- F. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type.

2.15 FABRICATION - GUTTERS AND DOWNSPOUTS

- A. Fabricate of same material and finish as roofing metal.
- B. Form gutters and downspouts of Squared profile and size indicated to collect and remove water. Fabricate with connection pieces.
- C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints.
- D. Fabricate support straps of same material and finish as roofing metal, color as selected.

2.16 FINISHES

- A. Framing Members: Clean, prepare, and prime to SSPC Manual requirements.

2.17 SOURCE QUALITY CONTROL

- A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.
 - 1. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.
 - 2. After fabrication, submit copy of certificate of compliance to Design Professional, certifying that Work was performed according to Contract requirements.

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. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position
- C. 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.
- D. 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 AISC 360 and manufacturer's written instructions and drawings.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- C. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- D. 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.
- E. 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 column base plates with non-shrink grout to achieve full plate bearing.
 - 2. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 3. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- F. 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.
- G. 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.
- H. 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.
- I. 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.
- J. 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.
- K. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.
- L. After erection, prime welds, abrasions, and surfaces not shop primed.
- M. 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.
- N. 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 ERECTION - WALL AND ROOF PANELS

- A. Install in accordance with manufacturer's instructions.
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.
- E. Use fasteners for wall panels and use concealed fasteners for roof panels.
- F. Provide expansion joints where indicated.
- G. Install insulation and vapor retarder utilizing Manufacturer Recommendations for attachment.
- H. Install sealant and gaskets, providing weather tight installation.

3.05 ERECTION - GUTTERS AND DOWNSPOUTS

- A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.
- B. Apply bituminous paint on surfaces in contact with cementitious materials.
- C. Slope Gutters: Level.

- D. Install concrete splash blocks under each downspout.

3.06 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. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. 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.
- D. 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.
- E. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
 - 1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- F. 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.
- G. 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."

3.07 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 [and hip] 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. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
 5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Pre-drill panels for fasteners.
 6. Provide metal closures at peaks, rake edges, rake walls and each side of ridge [and hip] 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.

3.08 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. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
 5. Rigidly fasten base end of metal wall panels and allow eave end free movement for thermal expansion and contraction. Pre-drill panels.
 6. Flash and seal metal wall panels with weather closures at eaves and rakes, and at perimeter of all openings. Fasten with self-tapping screws.
 7. Install screw fasteners in pre-drilled holes.

8. Install flashing and trim as metal wall panel work proceeds.
 9. 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.
 10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
 11. 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.

3.09 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.

3.10 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.
 3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.
 4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation, with both sets of facing tabs sealed, to provide a complete vapor retarder.
- B. Blanket Roof Insulation: Comply with the following installation method:
1. Over-Framing Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal roof panels fastened to secondary framing.

3.11 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.
- B. Personnel Doors and Frames: Install doors and frames according to NAAMM-HMMA 840. Fit non-fire-rated doors accurately in their respective frames, with the following clearances:
1. Between Doors and Frames at Jambs and Head: 1/8 inch.
 2. Between Edges of Pairs of Doors: 1/8 inch.
 3. At Door Sills with Threshold: 3/8 inch.
 4. At Door Sills without Threshold: 3/4 inch.

5. At fire-rated openings, install frames according to, and doors with clearances specified in, NFPA 80.
- C. Sliding Service Doors: Bolt support angles to opening head members through factory-punched holes. Bolt door tracks to support angles at maximum 24 inches o.c. Set doors and operating equipment with necessary hardware, jamb and head mold stops, continuous hood flashing, anchors, inserts, hangers, and equipment supports.
- D. Door Hardware:
 1. Install surface-mounted items after finishes have been completed at heights indicated in DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 2. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
 4. Set thresholds for exterior doors in full bed of sealant complying with requirements for concealed mastics specified in Division 07 Section "Joint Sealants."

3.12 ACCESSORY INSTALLATION

- A. Install door frames, doors, overhead doors, and windows and glass in accordance with manufacturer's instructions.
- B. 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.
- C. 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).

- D. 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.
- E. 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. Provide elbows at base of downspouts to direct water away from building.
- F. Continuous Roof Ventilators: Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports. Join sections with splice plates and end-cap skirt assemblies where required to achieve indicated length. Install preformed filler strips at base to seal ventilator to metal roof panels.
- G. 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.
 - 2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
 - 3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of corrosion-resistant paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
 - 4. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.
- H. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.13 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall 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.

3.14 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. **Roof Ventilators:** After completing installation, including work by other trades, lubricate, test, and adjust units to operate easily, free of warp, twist, or distortion as needed to provide fully functioning units.

3.15 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. 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.
- E. 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.
- F. 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 31 31 16 - TERMITE CONTROL**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Chemical soil treatment.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Vapor barrier placement under concrete slab-on-grade.

1.03 REFERENCE STANDARDS

- A. 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.
- B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs 2017.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements.
- B. Test Reports: Indicate regulatory agency approval reports when required.
- C. Test Reports: Submit termite-resistant sheet manufacturer's summary of independent laboratory and field testing for effectiveness in subterranean termite exclusion.
- D. Manufacturer's Certificate: Certify that toxicants meet or exceed specified requirements.
- E. Manufacturer's Instructions: Indicate caution requirement.
- F. Record and document moisture content of soil before application, date and rate of application, and areas of application.
- G. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing this type of work and:
 - 1. Having minimum of three (3) years documented experience.
 - 2. Approved by manufacturer of treatment materials.
 - 3. Licensed in the State in which the Project is located.

1.06 WARRANTY

- A. Provide five year installer's warranty against damage to building caused by termites.
 - 1. Include coverage for repairs to building and to contents damaged due to building damage. Repair damage and, if required, re-treat.

PART 2 PRODUCTS**2.01 CHEMICAL SOIL TREATMENT**

- A. Toxicant Chemical: EPA Title 7, United States Code, 136 through 136y approved; synthetically color dyed to permit visual identification of treated soil.
- B. Diluent: Recommended by toxicant manufacturer.
- C. Manufacturers:
 - 1. Bayer Environmental Science Corp; [____]: www.backedbybayer.com/pest-management/#sle. Bayer Environmental Science Corp; [____]:

www.backedbybayer.com/pest-management/#sle.Bayer Environmental Science Corp;
[]: www.backedbybayer.com/pest-management/#sle.

2. FMC Professional Solutions; []: www.fmcprosolutions.com/#sle.
3. Syngenta Professional Products; []: www.syngentaprofessionalproducts.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

D. Mixes: Mix toxicant to manufacturer's instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
- B. Verify final grading is complete.

3.02 APPLICATION - CHEMICAL TREATMENT

- A. Comply with requirements of U.S. EPA and applicable state and local codes.
- B. Spray apply toxicant in accordance with manufacturer's instructions.
- C. Apply toxicant at following locations:
 1. Under Slabs-on-Grade.
- D. Under slabs, apply toxicant immediately prior to installation of vapor barrier.
- E. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- F. Re-treat disturbed treated soil with same toxicant as original treatment.
- G. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.03 PROTECTION

- A. Do not permit soil grading over treated work.

END OF SECTION